

Attitude and Academic Achievement of High School Students in Mathematics Under the Conditional Cash Transfer Program

Emerson Peteros ¹, Diosa Columna ², Jonathan O. Etcuban ^{1*}, Porferio Almerino, Jr. ¹,
Jana Gloria Almerino ¹

¹ Cebu Technological University, Cebu City, PHILIPPINES

² Mayor Inocencio Mendez High School, Bohol, PHILIPPINES

* CORRESPONDENCE: ✉ joetcuban@gmail.com

ABSTRACT

Students' accomplishment in mathematics is a component of their home condition, attitudes towards the discipline, and curriculum that clarify varieties in students' achievement. The study determined the attitudes and academic achievement of students who are recipients of Conditional Cash Transfer (CCT) towards mathematics in a public national high school, Bohol, Philippines. It utilized the descriptive research to gather data on the achievement and attitude of students towards mathematics. The 112 respondents answered a standardized survey questionnaire, Attitudes toward Mathematics Inventory (ATMI) constructed, which contains self-confidence, value, enjoyment, and motivation. The gathered data were statistically treated using frequency, simple percentage, and Pearson *r*. The study revealed that respondents fairly performed in their achievement in math. Also, it found out that the students' attitudes have a significant relationship with their achievement in mathematics. The study concluded that the students' attitudes towards mathematics have a more significant impact on affecting their academic achievement. The researchers recommend that teachers should be developed and enhanced the self-confidence of students in mathematics by involving them in class discussions and interactions through facilitating in any means.

Keywords: achievement, attitude, math performance, CCT

INTRODUCTION

The attitudes towards mathematics assume a critical job in the instructing and learning procedure of science. It influences understudy's accomplishment in science. Endeavor to improve demeanor towards science at lower level gives the base to higher investigations in arithmetic. It additionally causes an impact on the accomplishment of science at auxiliary school level (Ma & Xu, 2004). Farooq and Shah (2008) also added that the students' success in mathematics depends upon the attitude towards mathematics and it influences the participation rate of learners. Thus, the role and applicability of mathematics in today's generation, which is characterized by the exponentially increasing technology, becomes more imperative.

The Philippine government had given equal opportunities to all Filipinos whose economic condition is equal or below the provincial poverty threshold. The government program helps the families by providing and giving social assistance and social development to the 4Ps beneficiaries to alleviate poverty in the country. Through this program, many children-beneficiaries are now in school in order to avail the monthly benefits that the government had provided in each family.

Article History: Received 19 April 2019 ♦ Accepted 6 May 2018

© 2019 by the authors; licensee Modestum Ltd., UK. Open Access terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>) apply. The license permits unrestricted use, distribution, and reproduction in any medium, on the condition that users give exact credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if they made any changes.

These days, the present condition of the Pantawid Pamilyang Pilipino Programs (4Ps) students is delinquent in their studies as noticed by most teachers. Some attend classes often and others for sometimes just for the sake of checking attendance in order not to be marked in their 4Ps form to continue receiving their allowances. However, these students do not show eagerness to perform the task in the school. The researcher, however, frequently hear some common sentiments heard from all teachers that students nowadays are challenging to teach for they have lesser understanding and comprehension of the learning concept. Specifically, the teachers' some complaints on the students' in which aside from performing low in the class most of the students are very tardy and not severe in going to school.

In effect, many students get low performance in Mathematics. Accordingly, the ratio of low performing students in Mathematics to the total population of students is an essential factor of Mathematics education quality. Most notably, in terms of mathematics instruction, it seems that it is tough for the learners to cope up with the subject matter because of the students learning attitudes. Commonly, the students' mindset in Mathematics is very negative towards the subject. Even if teachers nowadays are very approachable and friendly, but most of the students hate numbers. This attitude worsens from time to time and in every year. Considering these observations, there is a need for quality education in the field of Mathematics of the teachers' that would help them to arouse students' self-confidence, interest, and attitude for an interactive class discussion. So, it is very vital that teachers need to determine the students' attitudes in engaging and learning Mathematics. This would serve as a blueprint in helping every student learned the subject.

In parallel with those above, the researchers were concerned with the 4Ps or the CCT recipients in the Philippines. This motivates the researcher to find out the relationship between the attitudes and academic achievement of the 4Ps' students in mathematics instruction. The researcher wants to determine if the attitudes of the students in Mathematics could affect academic achievement. This study was conducted because of the researcher's eagerness to know if these 4P's recipient compensated the effort of government through studying sincerely and if the 4P's recipients properly utilized the government funds through conditional cash transfer.

Moreover, this study will be used for addressing the areas of concern in order to gain the trust and positive attitudes of the students of Mayor Inocencio B. Mendez High School at Carlos P. Garcia District, Division of Bohol towards mathematics particularly the CCT program recipient. This could also give significant findings those teachers, students, and the school administrations can benefit from the improvement of the teaching-learning process towards Mathematics education.

FRAMEWORK

The theoretical framework of the study is based on Constructivism Theory, Discovery Learning Theory, Situated Cognition theory, Functionalist theory, Classical Conditioning theory, Observational theory, and Operant conditioning theory.

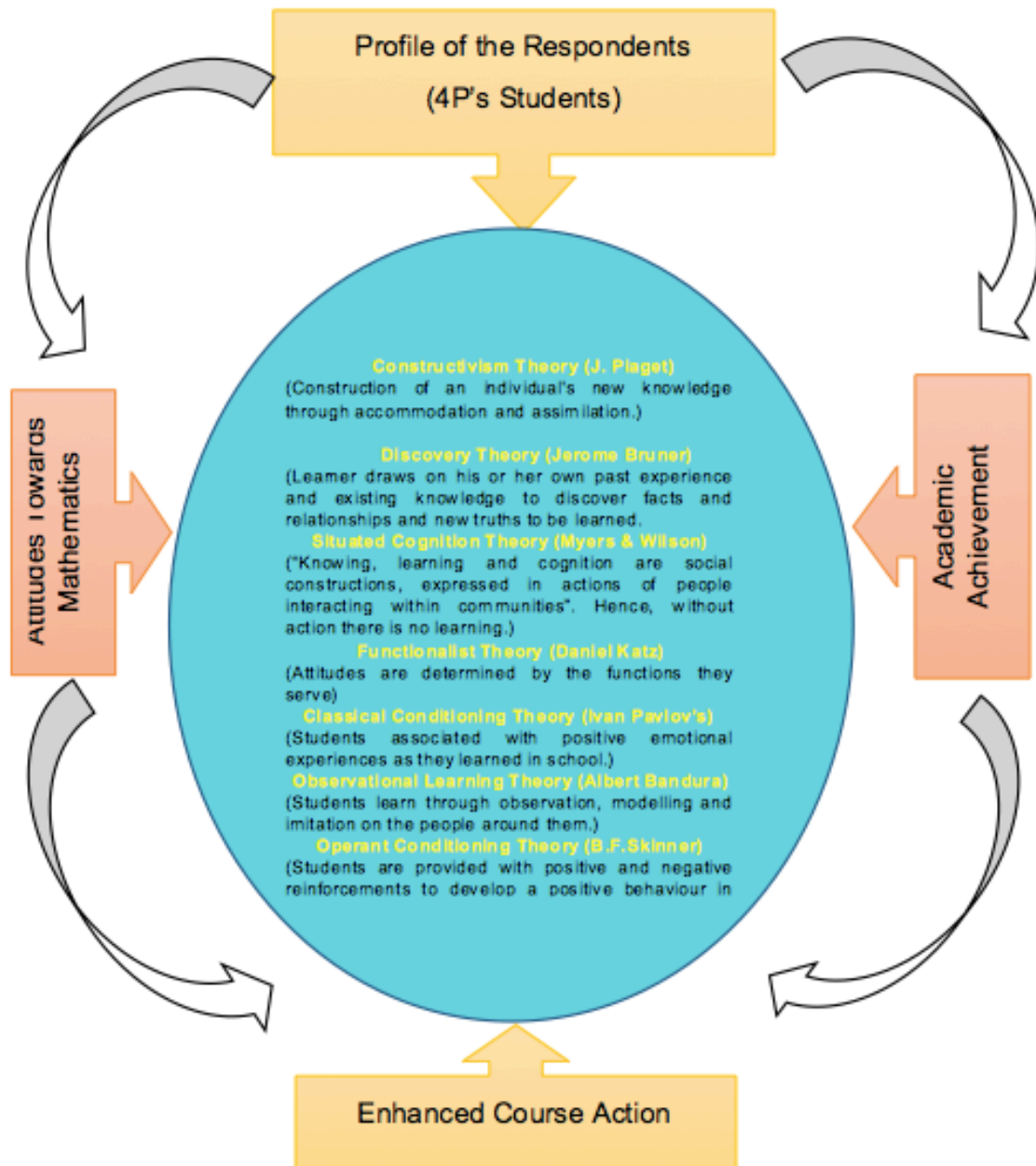


Figure 1. Conceptual Framework of the Study

Piaget's hypothesis of constructivism contends that individuals produce information and structure significance dependent on their encounters (Bada & Olusegun, 2015). Piaget's hypothesis secured learning speculations, showing strategies, and instruction change (Hatch, 2010). Two of the key segments, which make the development of a person's new learning are convenience and digestion. Acclimatizing makes an individual consolidate new encounters into old encounters (Bada & Olusegun, 2015; Wang, 2014). This makes the individual grow new standpoints, reconsider what were once false impressions, and assess what is imperative, at last modifying their observations. Convenience, then again, is reframing the world and new encounters into the psychological limit officially present. People imagine a specific style in which the world works. At the point when things do not work inside that specific circumstance, they should oblige and reframing the desires with the results.

Aside from learning speculations, Piaget's hypothesis of constructivism tends to how adapting happens, not concentrating on what impacts realizing. The job of educators is imperative. Rather than giving an address the instructors in this hypothesis work as facilitators whose job is to help the understudy with regards to their

comprehension. This removes the center from the educator and address and puts it upon the understudy and their learning. The assets and exercise designs that must be started for this learning hypothesis adopt an altogether different strategy toward customary learning too.

Rather than telling, the instructor must start inquiring. Rather than responding to questions that line up with their educational modules, the facilitator for this situation must make it, so the understudy arrives at the resolutions all-alone as opposed to being told. Additionally, educators are persistently in discussion with the understudies, making the learning background that is available to new bearings contingent on the necessities of the understudy as the learning advances. Instructors following Piaget's hypothesis of constructivism must test the understudy by making them successful basic masterminds and not being just an educator but rather additionally a guide, a specialist, and a mentor.

A few systems for instructor incorporate having understudies cooperating and supporting to respond to each other's inquiries. Another methodology incorporates assigning one understudy as the master regarding a matter and having them show the class, at last, enabling understudies to work in gatherings or matches and research moot points which they should then present to the class.

Disclosure Learning Theory by Jerome Bruner then again, is a request based, constructivist learning hypothesis that happens in critical thinking circumstances where the student draws on his or her past involvement and existing information to find certainties and connections and new facts to be scholarly (Bereiter, 2005; Clark, 2009). Understudies interface with the world by investigating and controlling articles, grappling with inquiries and debates, or performing tests. Accordingly, understudies might be bound to recollect ideas and learning found without anyone else. The standards of this hypothesis were, it supports dynamic commitment, advances inspiration, advances self-rule, duty, freedom, creates imagination and critical thinking aptitudes and tailors learning encounters.

Moreover, this examination additionally was secured by the Situated Cognition Theory, which stresses that individuals' information is developed inside and connected to the movement, setting, and culture in which it was found out (Marsick & Watkins, 2001; Paavola & Hakkarainen, 2005). Learning is social and not segregated, as individuals learn while communicating with one another through shared exercises and language, as they examine, share information, and issue illuminate amid these errands. For instance, while language students can consider a lexicon to expand their vocabulary, this regularly lone work just shows fundamental pieces of learning a language; when language students converse with somebody who is a local speaker of the language, they will learn vital parts of how these words are utilized in the local speaker's home culture and how the words are utilized in ordinary social communications.

Functionalist Theory of Attitudes by Daniel Katz additionally takes the view that frames of mind are dictated by the capacities they serve for us (Keller, 2012). Individuals hold given frames of mind because these mentalities help them accomplish their fundamental objectives.

Also, the Classical Conditioning Theory by Ivan Pavlov's stressed that when two stimuli are repeatedly associated, the person learns to respond to them with the same emotional reaction (Field, 2006). Accordingly, this theory emphasizes the importance of learning from the environment and support nurture over nature. Also, Pavlov explained that if students associate with positive emotional experiences in school, then this can have a better result such as creating positive attitudes. However, if students associate with negative emotional experiences in school, then this can have an adverse result such as possessing negative attitudes. Thus, a teacher should make a best effort to lead the students associated with positive emotional experiences as they learned in school.

On another hand, Observational Learning Theory by Albert Bandura elaborated that youngsters watch the conduct of individuals around them and mirror what they see (Petty, 2018; Sheldon, 2011). Children learn by paying attention to others behavior, attitude, and consequences of those behaviors. According to Bandura, children's behavior is learned observationally through modeling from people of the same gender, imitating with either reinforcement or punishments and observing consequences of another person's behavior. This theory explains that children have many models with whom they identify. Hence, in order to gain knowledge, students learn from people around them through observation, modeling, and imitation. Since teachers are most of the time with their students, they should always display appropriate behaviors toward them to gain learning and imitate positive attitudes.

The Operant Conditioning Theory of B.F. Skinner also states that attitudes that are followed by positive consequences are strengthened and are more likely to be repeated than behaviors and attitudes that are engaged with negative consequences (Johnston, 2016; Taylor & MacKenney, 2008). Skinner's theory suggests

that positive reinforcement strengthens a behavior by giving a consequence an individual finds rewarding, and also negative reinforcement strengthens behavior because it removes an unpleasant experience. In this matter, to ensure successful and meaningful learning process, it is necessary for the teachers to make sure that students are provided with various positive and negative reinforcements that will help to develop their positive attitudes towards learning Mathematics.

It is very evident that the students who are put into this kind of learning condition would utilize their insight and abilities by deduction basically, applying to learn to new circumstances, dissecting data, understanding new thoughts, imparting, teaming up, tackling issues, and deciding.

REVIEW OF RELATED LITERATURE

In line with the Philippine Department of Education (DepEd) mission, vision, and goal. The classroom assessment is an integral part of curriculum implementation. It allows instruction accordingly. Classroom assessment informs the learners, as well as their parents and guardians of their progress.

Also, the study also was based on the 4Ps which is a human advancement proportion of the national government that gives restrictive money stipends to the most unfortunate of poor people, to improve the wellbeing, nourishment, and the instruction of kids matured 0-18. It is designed after the CCT plots in Latin American and African nations, which have lifted a large number of individuals around the globe from neediness. The Philippines' Department of Social Welfare and Development (DSWD) is the lead government organization of the 4Ps. The program has double destinations as the lead neediness lightening; the social assistance, giving financial help to incredibly low-income families to react to their immediate needs; and social improvement, breaking the intergenerational destitution cycle by examining in the wellbeing and training of poor kids through projects. The 4P's likewise enables the Philippine government to satisfy its responsibility to the Millenium Development Goals (MDGs)- explicitly in annihilating extraordinary destitution and appetite, in accomplishing general essential training, in advancing sexual orientation uniformity, in lessening kid mortality, and in improving human maternal services.

These days, instructing and learning Mathematics has been one of the significant difficulties and worries of teachers. As indicated by Goos et al. (2004), that the educating of arithmetic is not tied in with administering principles, definitions and methodology for understudies to retain, yet captivating understudies as dynamic members through exchange and coordinated effort among understudies. Lau et al. (2009) clarify that the science abilities required for the youth of the present and grown-ups of tomorrow to work in the work environment are not quite the same as that for youth and grown-ups of yesterday.

The showing techniques, the help of the structure of the school, the family and understudies frame of mind towards school influences the dispositions towards arithmetic (Cohen et al., 2009; Germann, 1988). More often than not, how arithmetic is introduced in the homeroom and seen by understudies, notwithstanding when educators trust they are showing it incredible and setting subordinate route stands to distance numerous understudies from science.

Attested by Lewis (2012) as cited by Diaz and Dio (2017), Mathematics is not about answer, but rather it is about processes. He elaborated that how students learn Mathematics is like to build a scaffold without even constructing the building that the scaffolding is intended to support. As further stated, the real building in the Mathematics knowledge is the correct mathematical understanding, the actual ability to think, perceive and analyze mathematically. Many students admitted that learning and engaging in Mathematics is a difficult task to accomplish, not even realizing its importance and usefulness.

Attitudes Towards Mathematics. Research recommends that there are three distinct parts of demeanor. These are the individual segment, the full of feeling part, and the social segment (Maio et al., 2018). It has serious ramifications for the student, the instructor, the prompt social gathering with which the individual student relates, and the whole educational system. Demeanors are framed because of some learning encounters understudies experience. This is mimicry, which additionally has a section to play in the instructing and learning circumstance. Besides, attitude influences an individual's choice of action, responses to challenges, incentives, and rewards. Mensah et al. (2013) suggest that attitudes are generally positive or negative views about a person, place, thing or event, which referred to as the attitude object.

Based on the Theory of Planned Behavior, Montano and Kasprzyk (2008) also state that attitude is determined by the individual's belief about attributes of performing the behavior, weighted by evaluations of those outcomes or attributes. Thus, a person who holds a firm belief that positively valued outcomes will result

from performing the behavior will have a positive attitude towards the behavior. Conversely, a person with negatively valued outcomes will have a negative attitude.

Mentality towards Mathematics incorporates the inclination to be dreadful of and on edge about Mathematics. Mentality towards Mathematics has individual, emotional and social segments; and like some other sort of frame of mind, it very well may be shaped through any of the three procedures depicted before. An understudy can create an inspirational frame of mind towards Mathematics since the individual in question figures out how to connect positive encounters or occasions with it. Additionally, uplifting feedback makes space for the arrangement of inspirational frame of mind for Mathematics. What is more, in no way, shape or form is understudies' perception of instructors and educators' conduct particularly in connection to Mathematics among the least of the variables that impact their demeanor towards Mathematics.

Also, a few variables have been found to assume an essential job in the arrangement and advancement of an understudy's frame of mind. These incorporate the learning condition, educator quality, and essential showing techniques (Larsen, 2013). Anyway, factors from the home condition and society can likewise be influential (Mohamed & Waheed, 2011). Kara (2009) affirmed that right attitude leads to show positive behavior toward studying, engaging themselves in it, and striving to learn more. Such students are also observed to show more confidence in working mathematical problems and to engage themselves emotionally.

Several types of research concluded that a positive attitude towards mathematics leads students towards success in mathematics. One of these is the study of Farooq and Shah (2008) which averred that attitude could also be gender related. There are numerous who hold the view that young men improve in Mathematics than young ladies. This conviction will in general influence the disposition of young ladies towards Mathematics. It is then discovered that there was no noteworthy contrast in the certainty of male and female understudies towards Mathematics at the auxiliary school level. They instead found that students' success in Mathematics depended on attitude towards the subject.

Mensah et al. (2013) posted that students' achievement in Mathematics depended on their attitude towards the subject. Thus, it was found out that if students have a positive attitude towards Mathematics, they would have better performance and if they have negative attitudes, they would have a lower performance on it.

Ma and Xu (2004) concluded that a positive attitude towards mathematics leads students towards success in mathematics. Attempt to improve attitude towards mathematics at lower level provides the base for higher studies in mathematics. It also causes an effect in achievement of mathematics at the secondary school level.

For Zan and Martino (2007), attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics.

Several studies and researchers have been done on the student's attitude and academic performance of students in Mathematics. Among these variables, students' attitude towards Mathematics is emphasized to verify as one of the critical factors in learning.

Schenkel's (2009) investigation of grade school understudies, a positive relationship between's understudy mentality and understudy execution was found. Understudy convictions and demeanors were found to can either encourage or repress learning. This is by the investigation of Tezer and Karasel (2010), which evaluated the frames of mind of elementary school second and third-grade understudies towards the numerical course. This study showed that the students have a relatively positive attitude towards Mathematics. This suggests that teachers educated the students in their early stage in positive ways.

The study conducted by Farooq and Shah (2008) showed that there is no significant effect of gender on students' attitude towards mathematics at the secondary school level. It concluded that male and female students of 10th grade of the secondary schools of Lahore have the same type of attitude towards mathematics. It means that gender differential has no impact on the attitude of students towards mathematics in Pakistan. It is similar to the several studies that suggest that there is no significant relationship between attitudes towards Mathematics among male and female students (Kögçe et al., 2009; Mohd et al., 2011). Similarly, Bramlett (2007) also revealed that there existed a positive relationship among the gender of students towards Mathematics learning.

In the action research study of Sorensen (2006), which examined the relationship between the teacher, the students and the types of motivation used in mathematics in the seventh-grade mathematics students. Motivating middle school students is difficult, and the types of motivation can be as numerous as the number of students studied. The researcher discovered that the teachers used various motivating tactics from praise to extra time spent with a student, to extra fun activities for the class. Moreover, in many instances, the

students' perception of mathematics was predetermined or predetermined by parental perceptions of mathematics. The social environment of the student and a sense of belonging also plays a role in how motivated a student stays.

The results of the study of Zakaria et al. (2010) also indicate that the cooperative learning approach increase attitude towards mathematics. This is probably because when students work in a group, they feel that they can depend on others for help and therefore increase their confidence in solving a mathematics problem. This may indirectly change their attitudes towards mathematics. Accordingly, cooperative learning also emphasizes social interaction and relationships among groups of students in particular and classmates in general. Cooperative learning actively involves students in the learning process. It is also concluded that student-centered approaches such as cooperative learning improve mathematics achievement and attitudes towards mathematics among students. Therefore, teachers in schools, especially teachers who teach mathematics need to be aware of the benefits and importance of cooperative learning and thus changing the practice of teacher-centered teaching methods to student-centered teaching methods.

OBJECTIVES OF THE STUDY

This study assessed the attitudes and academic achievement of the 4Ps' students towards mathematics in a public national high school, Bohol, Philippines. It answered the: 1) Profile of the respondents; 2) Level of the academic achievement of the respondents; 3) Level of students' attitudes towards mathematics learning as to self-confidence, value, enjoyment, and motivation; and 4) Significant relationship between academic achievement and students' attitude towards mathematics.

METHODOLOGY

This study utilized the descriptive research design using the survey technique. It is a descriptive correlational study to gather data on the achievement and attitude of 4Ps' students towards mathematics. The study was conducted in a public national high school particularly the Mayor Inocencio Mendez High School, Bohol, Philippines. The respondents were the 112 4Ps' students who are randomly selected. They were the Grade 8 junior high school students who are recipients of the 4Ps wherein their attitudes and academic achievement towards mathematics were determined. These respondents answered a standardized survey questionnaire, ATMI constructed by Tapia and Marsh (2004). The tool consists of 40-items under four subscales (self-confidence, value, enjoyment, and motivation). In the questionnaire, all participants were required to choose the answer that reflected their feelings by the Likert-format scale of the five-point Likert scale. Furthermore, the students' academic achievement was determined with the use of the first quarter grade provided in the data given in the report card with the assistance of their respective adviser. The gathered data were statistically treated using frequency, simple percentage, and Pearson r .

RESULTS AND DISCUSSIONS

Table 1 presents the gathered data from the respondents. These data include their age, number of siblings, parents' occupations, and combined monthly family income.

Table 1. Profile of the Respondents

	Frequency	Percentage
A. Age (in years)		
More than 15	8	7.14
15	6	5.36
14	24	21.43
13	69	61.61
12	5	4.46
B. Number of siblings		
10 - 12	8	7.14
7 - 9	28	25.00
4 - 6	58	51.79
1 - 3	18	16.07
C. Father's Occupation		
Fisherman	33	29.46
Farmer	20	17.86
Construction Worker	21	18.75
Habal-habal Driver	11	9.82
Laborer	10	8.93
Motorboat Operator	8	7.14
Others	8	7.14
None	1	0.90
D. Mother's Occupation		
House Wife	80	71.43
House Helper	17	15.18
Mat Waiver	9	8.04
Laborer	3	2.68
Others	3	2.68
E. Combined Family Income (in PhP)		
Less than 7,890	60	53.57
7,890 - 15,780	53	39.29
15,780 - 31,560	8	7.14

Table 2. Mathematical Performance of Students

Level	Rating	Frequency	Percentage
Outstanding	90 - 100	4	3.57
Very Satisfactory	85 - 89	14	12.50
Satisfactory	80 - 84	33	29.46
Fairly Satisfactory	75 - 79	48	42.86
Poor	Below 75	13	11.61
Average :	79.37		

Table 1 found out that the average age of the 4P's recipients' was 13.52 which means that they are on their right age on becoming a grade-8. Majority of the respondents also are males with 54.46 percent in the study. Most of the 4Ps' recipients have a larger number of siblings with 4 to 6 members. In terms of the combined monthly family income, most of the families of the 4Ps' recipients have an income of less than PhP 7,890. For the parents' occupation, the majority of the respondents' mother is housewife, which means there is no source of income for the family. Moreover, for the occupation of the father of the respondents, mostly are fisherman, which signifies that there is no stable source of income for the family.

Table 2 presents the results of the respondents' academic achievement in mathematics.

The effectiveness of the Mathematics instruction can be measured through the academic achievement of the students, which in terms of knowledge and skills acquired and developed.

On the other hand, on the academic achievement of the respondents, the researchers found out that the average grade of the respondents was 79.37 percent, which is described as reasonably satisfactorily. There were 13 respondents' failed the subject for the first grading period, which means that the 4Ps students are not performing well in the class.

Table 3. Students' Attitudes Towards Mathematics as to Self-Confidence

Indicators	Mean	StDev	Verbal Description
1. Mathematics is a standout amongst my most feared subjects.	3.26	1.161	Neutral
2. My psyche goes clear, and I am unfit to think unmistakably when working with math I am constantly under an awful strain in a math class.	3.45	0.966	Positive
3. Studying mathematics makes me feel nervous.	3.39	1.102	Neutral
4. Mathematics makes me feel uncomfortable.	3.36	0.967	Neutral
5. I am constantly under an awful strain in a math class.	3.43	1.183	Positive
6. When I hear the word arithmetic, I have a sentiments of abhorrence	3.73	0.949	Positive
7. It makes me apprehensive to try and consider completing an arithmetic issue.	3.31	1.099	Neutral
8. Mathematics does not scare me at all.	3.60	1.061	Positive
9. I hope to do genuinely well in any math class I take.	3.58	0.946	Positive
10. I am constantly confounded in my science class.	3.01	1.135	Neutral
11. I have a ton of self-assurance with regards to mathematics.	3.63	1.023	Positive
12. I am ready to take care of science issues without much trouble.	3.12	0.984	Neutral
13. I feel a feeling of instability while endeavoring mathematics.	3.11	1.218	Neutral
14. I learn mathematics easily.	3.30	1.064	Neutral
15. I trust that I am great at taking care of math issues.	3.41	1.103	Positive
Overall :	3.38	1.064	Neutral

This confirmed that the academic performance of the 4Ps grantees is weak in the core subject areas. As revealed in the study, those with better academic achievement have more positive attitudes regarding Math than those with more mediocre academic performance. It is stressed out that student achievement in mathematics has not been good enough.

However, according to Saritas and Akdemir (2009), the nature of instructing and learning science has been one of the real difficulties and worries of instructors. They further explained that general concern about mathematics achievement has been evident for the last 20 years and that the current debate among scholars is what students should learn to be successful in mathematics. They continued to elaborate that the discussion emphasizes new instructional design technique to produce individuals who can understand and apply fundamental mathematical concepts; provide instructional environments, conditions, methods, and solutions that achieve learning goals for students with different skills and ability levels; and innovative instructional approaches and techniques need to be developed to ensure that students become successful learners. However, Farooq and Shah (2008) attested that the student's success in mathematics depends upon the attitude towards mathematics and it influences the participation rate of learners. Thus, the academic achievement of the learners will also depend on their behaviors and attitudes in learning mathematics. It is how they interacted and be motivated in learning the subject. The lesser motivation and confidence towards the subject the low the academic achievement gained.

Table 3 shows the respondents' attitudes towards mathematics as to self-confidence.

The study has an overall weighted mean of 3.38 with an overall standard deviation of 1.064 which is described as Neutral which means that the students have neutral feelings towards learning mathematics.

Attested by Gushue et al. (2006), students with high self-efficacy may attain better performance in tasks and engage in target tasks more actively than those who are less confident about the tasks. It is contested that teaching strategies promote students' self-confidence and willingness to take risks with their learning. It allows the students to move outside the square in their learning and thinking, not just doing the traditional and ordinary way but trying learning and thinking, not just doing the traditional and ordinary way but trying to feel confident in asking, and sharing ideas that involve the teachers and learners formal discussion in relevance to the topic moreover, that the class condition were instructors whom understudies see as steady advance understudy sentiments of control and trust in their capacity to succeed.

Table 4 shows the respondents' attitudes towards mathematics as to value of math.

Table 4. Students' Attitudes Towards Mathematics as to Value of Math

Indicators	Mean	StDev	Verbal Description
1. Mathematics is an essential and necessary subject.	4.35	0.975	Very Positive
2. I want to develop my mathematical skills	4.29	0.924	Very Positive
3. Mathematics helps develop the mind and teachers to think.	4.04	0.977	Positive
4. Mathematics is essential in everyday life.	4.31	1.049	Very Positive
5. Mathematics is a standout amongst the most critical subjects for individuals to examine.	4.35	1.054	Very Positive
6. Secondary school math courses would be useful regardless of what I choose to consider.	4.29	0.963	Very Positive
7. I can consider numerous ways that I use math outside of school.	4.15	1.015	Positive
8. I think studying advanced mathematics is useful.	3.89	1.110	Positive
9. I think considering math encourages me with critical thinking in different zones.	4.32	0.893	Very Positive
10.A solid math foundation could help me in my expert life.	4.43	0.898	Very Positive
Overall :	4.24	0.986	Very Positive

Table 5. Students' Attitudes Towards Mathematics as to Enjoyment in Math

Indicators	Mean	StDev	Verbal Description
1. I get much fulfillment out of taking care of a math issue.	4.11	1.051	Positive
2. I have for the most part delighted in examining math in school.	3.87	0.905	Positive
3. Mathematics is dull and boring.	3.54	1.122	Positive
4. I like to tackle new issues in mathematics.	3.70	1.003	Positive
5. I want to complete a task in math than to compose an article.	3.63	1.066	Positive
6. I like mathematics.	3.80	1.106	Positive
7. I am happier in a mathematics class than in any other class.	3.57	1.011	Positive
8. Mathematics is a fascinating subject.	3.80	0.985	Positive
9. I am open to communicating my very own thoughts on the most proficient method to search for answers for a troublesome issue in math.	3.48	1.022	Positive
10.I am a comfortable answering question in math.	3.46	1.021	Positive
Overall :	3.69	1.029	Positive

Moreover, the level of attitudes of the respondents in terms of their value in math has an overall weighted mean of 4.34 with a standard deviation of 0.986, which is described as Very Positive. This means that in general, most of the respondents strongly agree that learning mathematics is significant and valuable in facing real-life challenges. Nevertheless, these students have very positive feelings and attitudes toward learning mathematics. As verified by Akey (2006) in a study with 10th-grade students that effort was positively and significantly related to Math attitudes.

Table 5 shows the respondents' attitudes towards mathematics as to enjoyment in math.

The table shows that the study got the overall weighted mean of 3.69 with an overall standard deviation of 1.029, which is also positive in the description. It suggests that the students have positive feelings towards learning mathematics and they enjoy mathematics at school. The teachers' utilize activities, which enable the students to experience and manipulate with enjoyment. Chang et al. (2012) found out that games can help enhance students' mathematical skills. In choosing such games, it must be significant and most importantly is the involvement of the students. Learning activities including games are first hand and provide the use of practice and repetition as a part of the standard gameplay to help promote mastery learning. It is supported by Stone et al. (2008), who affirmed that when learning support is not enough in a mathematics curriculum, the interest of student's learning may quickly decrease and further can cause a decrease of positive attitudes.

Table 6 shows the respondents' attitudes towards mathematics as to motivation in math.

Table 6. Students' Attitudes Towards Mathematics as to Motivation in Math

Indicators	Mean	StDev	Verbal Description
1. I am sure that I could learn propelled mathematics.	3.77	1.057	Positive
2. I might want to abstain from utilizing arithmetic in school.	3.46	1.266	Positive
3. I will take more than the required measure of mathematics.	3.45	0.985	Positive
4. I intend to take as much science as I can amid my training.	3.46	1.098	Positive
5. The challenge of math appeals to me.	3.98	1.090	Positive
Overall :	3.62	1.099	Positive

Table 7. Summary Table on Students' Attitudes Towards Mathematics

Indicators	Mean	StDev	Verbal Description
A. Self - Confidence	3.38	1.064	Positive
B. Value	4.24	0.986	Very Positive
C. Enjoyment	3.69	1.029	Positive
D. Motivation	3.62	1.099	Positive
Overall :	3.73	1.045	Positive

Motivation is one of the critical factors in achieving a better performance towards the subject. It means that the attitudes of the respondents in terms of their motivation in math are positive which further implies that the students have positive feelings towards learning mathematics. They agree that they are motivated and interested in learning mathematics as stated by Klem and Connell (2004) that to support the involvement strategies that follow to tap the students' potential and keep them feeling involved and motivated. Singh et al. (2002) also justify that if student displayed low motivation in school had a more negative attitude towards mathematics. It signifies that students should be motivated in school and classes to have positive attitudes towards the subject.

This further emphasized that teachers should take actions to motivate students that do not get constant reinforcement from home; nevertheless, this motivation is most easily included into first years because students have more indurated attitudes by middle and secondary years in schooling. Thus, the absence of such motivation could mean an impassive attitude or a lack of self-confidence in school.

Table 7 shows the summary table on respondents' attitudes towards mathematics.

As illustrated in the table, the self-confidence of the respondents had a weighted mean of 3.38 with 1.064 standard deviations, which are described as positive. Value had a weighted mean of 4.24 with 0.986 standard deviation, which is Very positive in the description. Furthermore, enjoyment also had a weighted mean of 3.69 with a standard deviation of 1.029 which is described as positive; and in terms of motivation, the weighted mean is 3.62 with 1.099 standard deviation which is also positive in the description. The consequences of this examination additionally demonstrate that the cooperative learning approach increases attitude towards mathematics. This is probably because when students work in a group, they feel that they can depend on others for help and therefore increase their confidence in solving a mathematics problem. This may indirectly change their attitudes towards mathematics. Cooperative learning also emphasizes social interaction and relationships among groups of students in particular and classmates in general. Cooperative learning actively involves students in the learning process. These findings are consistent with the findings of some previous researchers such as Ifamuyiwa and Akinsola (2008) and others.

Generally, the level of the respondents' attitudes towards mathematics learning is positive, in which mostly 4P's respondents have positive feelings towards learning mathematics.

Table 8 shows the test of significant relationship.

Table 8. Significant Relationship Between Students' Attitudes and Achievement in Mathematics

Variables	Pearson r	p-value @ 0.01 Level of Significance	Decision	Remarks
Achievement in Mathematics and				
Self - Confidence	0.310	0.001	Ho rejected	Significant
Value	0.325	0.000	Ho rejected	Significant
Enjoyment	0.371	0.000	Ho rejected	Significant
Motivation	0.251	0.007	Ho rejected	Significant

The significant relationship between academic achievement and students attitude was assessed using four variables of attitudes such as the self-confidence, value, enjoyment, and motivation in mathematics; and the first quarter grade of the grade-8 4P's respondents. The data were tested with the used of Pearson r at a = 0.01 level and two-tailed.

The table showed the test of significance used Pearson Correlation Coefficient at a significant level of 0.01 (two-tailed). The students' attitudes were sub-scales into four variables; self-confidence, value, enjoyment, and motivation.

Students' self-confidence and achievement in Math having a p-value of 0.001 revealed a significant coefficient of 0.310. The results of the value and achievement in Math with a p-value of 0.000 revealed a significant correlation of 0.325. Enjoyment and academic achievement in Math with a p-value of 0.000 also revealed a significant correlation at Pearson-r of 0.371. In terms of the relationship in motivation and academic achievement in Math with a p-value of 0.007 which also revealed a significant correlation of 0.251. The results show a weak positive correlation between students' self-confidence, value, enjoyment and academic achievement in Math. While for the motivation and achievement in Math shows a negligible positive correlation. Therefore, the null hypothesis is rejected, and it is concluded that a significant positive relationship exists between students' attitude and academic achievement towards Mathematics in terms of self-confidence, value, enjoyment, and motivation.

The results of the research support the findings of studies conducted by Schenkel (2009), Bramlett (2007), Mohd et al. (2011) and among others, which found a positive and significant correlation between the attitude of the student and their performance in Mathematics. According to this study, the performance of students in Mathematics is significantly related to the attitude of the students towards Mathematics. By its findings, this research has joined the school of thought that relates student attitude significantly to student performance. Nevertheless, Georgiou et al. (2007) demonstrated that high accomplishment could serve to anticipate an inspirational frame of mind towards Math. However, such a demeanor could not foresee more grounded accomplishment.

Generally, there existed a weak positive correlation between the attitudes and academic achievement in Math of the 4P's recipient as presented by the r-value, in which the students' achievement can be affected by the students' attitude towards the subject. The relationship between attitudes and academic achievement is significant at the point of intercept of 0.000 this means rejection of the null hypothesis.

School administrators, teachers' and parents, should work collaboratively hand-in-hand to maximize students' achievement in Mathematics. They should see to it that every needed material, resources, varied activities, and differentiated instruction are available and applied in order to cater students need to learn and be motivated enough to learn.

CONCLUSIONS

This study showed that there is a significant relationship between students' attitudes and academic achievement in Mathematics learning. Generally, it shows that the 4Ps' recipients in a public national high school had fairly satisfactory performance in Mathematics, which is affected by the respondents' attitudes towards Mathematics. Thus, it is concluded that the attitudes towards the subject have a greater impact in affecting students' academic achievement. The manifested results challenged the school administrator to go deeper in evaluating and improving the teaching-learning process in Mathematics.

RECOMMENDATIONS

The students' attitudes towards Mathematics specifically the 4P's respondents should be developed and enhanced through parents, teachers, school administrators, and community teamwork and collaboration. To develop the self-confidence in Math, the students' must always be involved in class discussion and interaction and any activities through facilitating in any means. To appreciate the value of Math in their daily living, teachers must always integrate learning across the school curriculum and apply the importance of the subject by applying the PPST Module or The Philippine Professional Standard for Teachers. The enjoyment in Math would be developed by always enjoying the subject and never think it as a difficult one. It could also be enhanced through the subject teacher's help in making lessons easier and enjoyable through using different teaching methodologies those learners nowadays. To motivate learners in Math, teachers should always have their motivating activities to engage learners in the learning competencies, and students also should always read and study more in Mathematics.

Moreover, 4Ps recipients must always possess an interest in studying through establishing study habits at home and in school to avoid low grades in class, avoid tardiness in going to school, perform the task provided by the teacher and practice proper time management in helping their parents and in doing the tasks in schools. Lastly, contextualization and localization of the topics by the teacher may help the students better understand the learning competencies.

School administrators, teachers' and parents, should work collaboratively hand-in-hand to maximize students' achievement in Mathematics. They should see to it that every needed material, resources, varied activities, and differentiated instruction are available and applied in order to cater students need to learn and be motivated enough.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Emerson Peteros – Doctor of Development Education, College of Teacher Education, Cebu Technological University, Cebu City, Philippines.

Diosa Columna – Master of Arts in Education, Faculty, Mayor Inocencio Mendez High School, Bohol, Philippines.

Jonathan O. Etcuban – Doctor of Philosophy in Technology Management, Doctor of Philosophy in Education Management, Faculty, College of Teacher Education, Cebu Technological University, Cebu City, Philippines.

Porferio Almerino, Jr. – Doctor of Philosophy in Technology Management, Faculty, College of Teacher Education, Cebu Technological University, Cebu City, Philippines.

Jana Gloria Almerino – Doctor of Development Education, Faculty, Graduate School, Cebu Technological University, Cebu City, Philippines.

REFERENCES

- Akey, T. M. (2006). School context, student attitudes and behavior, and academic achievement: An exploratory analysis. *MDRC*. Retrieved from <http://bit.ly/2UGex9a>
- Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, 5(6), 66-70. Retrieved from <http://bit.ly/2v7mlSg>
- Bereiter, C. (2005). *Education and mind in the knowledge age*. Routledge. <https://doi.org/10.4324/9781410612182>
- Bramlett, D. C. (2007). *A study of African-American college students' attitudes towards mathematics*. Retrieved from <http://bit.ly/2Gm9LE0>
- Chang, K. E., Wu, L. J., Weng, S. E., & Sung, Y. T. (2012). Embedding game-based problem-solving phase into problem-posing system for mathematics learning. *Computers & Education*, 58(2), 775-786. <https://doi.org/10.1016/j.compedu.2011.10.002>

- Clark, R. E. (2009). How much and what type of guidance is optimal for learning from instruction. *Constructivist instruction: Success or failure*, 158-183. Retrieved from <http://bit.ly/2GsBTqi>
- Cohen, J., McCabe, L., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers college record*, 111(1), 180-213. Retrieved from <http://bit.ly/2XlwCGz>
- Diaz, E. D., & Dio, R. V. (2017). Effectiveness of Tri-In-1 strategic intervention materials for Grade 9 students through Solomon Four-Group Design. *Asia Pacific Journal of Education, Arts and Sciences*, 4(1), 79-86. Retrieved from <http://bit.ly/2IF9jTT>
- Farooq, M. S., & Shah, S. Z. U. (2008). Students' attitudes towards mathematics. *Pakistan Economic and Social Review*, 75-83. Retrieved from <http://bit.ly/2IsNeZq>
- Field, A. P. (2006). Is conditioning a useful framework for understanding the development and treatment of phobias? *Clinical Psychology Review*, 26(7), 857-875. <https://doi.org/10.1016/j.cpr.2005.05.010>
- Georgiou, S. N., Stavrinides, P., & Kalavana, T. (2007). Is Victor better than Victoria at maths? *Educational Psychology in Practice*, 23(4), 329-342. <https://doi.org/10.1080/02667360701660951>
- Germann, P. J. (1988). Development of the attitude toward science in school assessment and its use to investigate the relationship between science achievement and attitude toward science in school. *Journal of research in science teaching*, 25(8), 689-703. <https://doi.org/10.1002/tea.3660250807>
- Goos, M., Galbraith, P., & Renshaw, P. (2004). Establishing a community of practice in a secondary mathematics classroom. *Mathematics education: Exploring the culture of learning*, 91-116. Retrieved from <http://bit.ly/2DhlX8c>
- Gushue, G. V., Scanlan, K. R., Pantzer, K. M., & Clarke, C. P. (2006). The relationship of career decision-making self-efficacy, vocational identity, and career exploration behavior in African American high school students. *Journal of Career Development*, 33(1), 19-28. <https://doi.org/10.1177/0894845305283004>
- Hatch, J. A. (2010). Rethinking the relationship between learning and development: Teaching for learning in early childhood classrooms. *The Educational Forum*, 74(3), 258-268. <https://doi.org/10.1080/00131725.2010.483911>
- Ifamuyiwa, S. A., & Akinsola, M. K. (2008). Improving senior secondary school students' attitude towards mathematics through self and cooperative-instructional strategies. *International journal of mathematical education in science and technology*, 39(5), 569-585. <https://doi.org/10.1080/00207390801986874>
- Johnston, M. (2016). What more can we learn from early learning theory? The contemporary relevance for behaviour change interventions. *British Journal of Health Psychology*. <https://doi.org/10.1111/bjhp.12165>
- Kara, A. (2009). The effect of a learning theories unit on students' attitudes toward learning. *Australian Journal of Teacher Education*, 34(3), 5. <https://doi.org/10.14221/ajte.2009v34n3.5>
- Keller, K. L. (2012). Understanding the richness of brand relationships: Research dialogue on brands as intentional agents. *Journal of Consumer Psychology*, 22(2), 186-190. <https://doi.org/10.1016/j.jcps.2011.11.011>
- Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health*, 74(7), 262-273. <https://doi.org/10.1111/j.1746-1561.2004.tb08283.x>
- Köğçe, D., Yıldız, C., Aydın, M., & Altındağ, R. (2009). Examining elementary school students' attitudes towards mathematics in terms of some variables. *Procedia-Social and Behavioral Sciences*, 1(1), 291-295. <https://doi.org/10.1016/j.sbspro.2009.01.053>
- Larsen, J. (2013). *Attitude in mathematics: A thematic literature review*. British Columbia: Simon Fraser University. Retrieved from <http://bit.ly/2IsLFL4>
- Lau, P. N. K., Singh, P., & Hwa, T. Y. (2009). Constructing mathematics in an interactive classroom context. *Educational Studies in Mathematics*, 72(3), 307-324. <https://doi.org/10.1007/s10649-009-9196-y>
- Ma, X., & Xu, J. (2004). Determining the causal ordering between attitude toward mathematics and achievement in mathematics. *American journal of education*, 110(3), 256-280. <https://doi.org/10.1086/383074>
- Maior, G. R., Haddock, G., & Verplanken, B. (2018). *The psychology of attitudes and attitude change*. Sage Publications Limited. Retrieved from <http://bit.ly/2UnDPuo>

- Marsick, V. J., & Watkins, K. E. (2001). Informal and incidental learning. *New Directions for Adult and Continuing Education*, 2001(89), 25-34. <https://doi.org/10.1002/ace.5>
- Mensah, J.K., Okyere, M., & Kuracnchie, A. (2013). Student attitude towards mathematics and performance: Does the teacher attitude matter. *Journal of Education and Practice*, 4(3), 132-133. Retrieved from <http://bit.ly/2KL8BXU>
- Mohamed, L., & Waheed, H. (2011). Secondary students' attitude towards mathematics in a selected school of Maldives. *International Journal of humanities and social science*, 1(15), 277-281. Retrieved from <http://bit.ly/2VU1IVA>
- Mohd, N., Mahmood, T. F. P. T., & Ismail, M. N. (2011). Factors that influence students in mathematics achievement. *International Journal of Academic Research*, 3(3), 49-54. Retrieved from <http://bit.ly/2VQw0Z3>
- Montano, D. E., & Kasprzyk, D. (2015). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. *Health Behavior: Theory, Research, and Practice*, 95-124. Retrieved from <http://bit.ly/2Vdaoce>
- Nicolaidou, M., & Philippou, G. (2003). Attitudes towards mathematics, self-efficacy, and achievement in problem-solving. *European Research in Mathematics Education III. Pisa: University of Pisa*, 1-11. Retrieved from <http://bit.ly/2IG6RwG>
- Paavola, S., & Hakkarainen, K. (2005). The knowledge creation metaphor: An emergent epistemological approach to learning. *Science & Education*, 14(6), 535-557. <https://doi.org/10.1007/s11191-004-5157-0>
- Petty, R. E. (2018). *Attitudes and persuasion: Classic and contemporary approaches*. Routledge. <https://doi.org/10.4324/9780429502156>
- Saritas, T., & Akdemir, O. (2009). Identifying factors affecting the mathematics achievement of students for better instructional design. *International Journal of Instructional Technology and distance learning*, 6(12), 21-36. Retrieved from <http://bit.ly/2KNXXQh>
- Schenkel, B. D. (2009). *The impact of an attitude toward mathematics on mathematics performance* (Doctoral dissertation, Marietta College). Retrieved from <http://bit.ly/2KMSw4a>
- Sheldon, B. (2011). *Cognitive-behavioural therapy: Research and practice in health and social care*. Routledge. <https://doi.org/10.4324/9780203833711>
- Singh, K., Granville, M., & Dika, S. (2002). Mathematics and science achievement: Effects of motivation, interest, and academic engagement. *The Journal of Educational Research*, 95(6), 323-332. <https://doi.org/10.1080/00220670209596607>
- Sorensen, V. (2006). *Motivating middle school mathematics students*. Retrieved from <http://bit.ly/2UGDQbf>
- Stone III, J. R., Alfeld, C., & Pearson, D. (2008). Rigor and relevance: Enhancing high school students' math skills through career and technical education. *American Educational Research Journal*, 45(3), 767-795. <https://doi.org/10.3102/0002831208317460>
- Tapia, M., & Marsh, G. E. (2004). An instrument to measure mathematics attitudes. *Academic Exchange Quarterly*, 8(2), 16-22. Retrieved from <http://bit.ly/2v81vCh>
- Taylor, G. R., & MacKenney, L. (2008). Improving human learning in the classroom: Theories and teaching practices. *R&L Education*. Retrieved from <http://bit.ly/2ICeOTq>
- Tezer, M., & Karasel, N. (2010). Attitudes of primary school 2nd and 3rd-grade students towards mathematics course. *Procedia-Social and Behavioral Sciences*, 2(2), 5808-5812. <https://doi.org/10.1016/j.sbspro.2010.03.947>
- Wang, H. (2014). On the constructivist teaching of extensive reading for English majors. *International Journal of Social, Education, Economics and Management Engineering*, 3, 780-782. Retrieved from <http://bit.ly/2UO28jS>
- Zakaria, E., Chin, L. C., & Daud, M. Y. (2010). The effects of cooperative learning on students' mathematics achievement and attitude towards mathematics. *Journal of social sciences*, 6(2), 272-275. <https://doi.org/10.3844/jssp.2010.272.275>
- Zan, R., & Di Martino, P. (2007). Attitude toward mathematics: Overcoming the positive/negative dichotomy. *The Montana Mathematics Enthusiast*, 3, 157-168. Retrieved from <http://bit.ly/2ZgsvNK>