Journal of Educational Research and Indigenous Studies
Volume: 2 (1), 2020
Journal website: www.jerisjournal.com
e-ISSN 2682-759X

Effectiveness of Strategy Disney^{NLP} in Reducing Math Anxiety of Students in Perak Matriculation College

Mohamad Tahar Mohamad Amirnudin[1] & Salmiza Saleh[2]
[1] Kolej Matrikulasi Perak, [2] Universiti Sains Malaysia

Article Info

Received:
5 May 2020

Accepted:
11 August 2020

Published
01 September 2020

E-mail address:

**corresponding Author:*
rahatvirtual@gmail.com

e-ISSN 2682-759X

Abstract

Neuro Linguistic Programming (NLP) is a study on human excellence for exploring the process of behavior most effectively to achieve excellence. NLP combines verbal and nonverbal communication to influence the systems of the human mind. Hence, this research aims to examine the effectiveness of the Disney's Strategy based on NLP (Strategy Disney^{NLP}) to reduce student math anxiety. This study was conducted at the Perak Matriculation College. The method used was a quasi-experimental pre-test/post-test design. The participants were 40 students from Perak Matriculation College. The researcher used intact group technique to determine the sample. The sample was divided into two groups, namely the control group using conventional modules and the experimental group using Strategy Disney^{NLP}. Data were collected through pre-test and post-test and analyzed using paired t-tests and independent t-tests. The instrument used is the Abbreviated Math Anxiety Scale (AMAS). This study confirms that students in the treatment group had higher mean scores (t (38) = 3.94, p <0.05) from the students in the control group (mean = 31.45, s.p = 6.00). The results of this study show that the use of Strategy Disney^{NLP} in learning and teaching has reduced the level of student mathematics anxiety in the topic of probability.

Keyword: Neuro Linguistic Programming, Strategy Disney^{NLP}, Mathematics Anxiety, Abbreviated Math Anxiety Scale, AMAS

Introduction

In Malaysia, students are required to study mathematics for 11 years from primary to secondary school (KPM, 2013). This is aimed at forming students who are able to solve problems involving maths in everyday life (Bahagian Pembangunan Kurikulum, 2015). Thus, learning mathematics should be able to attract students and do not give stress to the students that can cause math anxiety occur.

There are studies showing students are more anxious in maths than other subjects (Richardson & Suinn, 1972; Wigfield & Meece, 1988; Hembree, 1990; Dowker et al., 2016). According to the Bayazıt (2017), a math teacher was doing a study of the earliest on the concerns of this math in 1950. This study is done to find the cause and treatment to students who suffer from this problem. This is because this anxiety can affect student achievement and lead to the occurrence of the problem of student disciplinary (Marzita Puteh & Siti Zaleha Khalin, 2016). These math anxiety if not solved will remain in the realm of work. In fact there are studies that show students in Matriculation also have math anxiety (Effandi Zakaria, Normalizam Mohd Zain, Nur Amalina Ahmad, & Ayu Erlina, 2012; Asiahwati Awi, Azman Mohd Noh, & Salwati Yaakub, 2014; Marzita Puteh & Siti Zaleha Khalin, 2016; Azman, Ismail, Maat, Kampus, & Melewar, 2017).

There are various factors that cause this problem to occur such as skipping class, self-concept negative, problem-solving skills are weak, the teaching methods of teachers over-focused drill and practice (Norwood, 1994). However, the main factors of this math anxiety is a method of teaching that does not emphasize on the understanding of the students but more to the practice of memorizing (Norwood, 1994). Teachers prefer to teach using the method of drill and practice because of its quick and easy. This is due to the students only learn to pass the exam only or "exam oriented".

Among the methods of teaching that can solve this problem have been done by Lashkarian and Sayadian (2015). They have conducted studies to reduce the problem of this anxiety using Neuro Linguistic Programming (NLP). NLP was founded by John Grinder and Richard Bandler in early 1977 aimed at studying methods for humans to be excellent by modifying methods that have proven successful. Since then, NLP has become popular because of the many excellence gained in a short time. Thus, NLP has been applied in other areas including education (Carey et al., 2010).

Strategy Disney^{NLP} is one of the techniques which are modeled using NLP by Robert Dilts. This technique modeled based on Walt Disney's excellence of bringing new ideas for animated movies from fantasy into reality. There are studies that shows this Strategy Disney^{NLP} can solve human problems related to such as anxiety (Dilts, 1998).

Problem Statement

The main purpose of the education system is to equip students with knowledge to succeed in life. Hence, the Malaysian education system has focused on developing knowledge content through subjects such as science, mathematics and language. In line with this, the government of Malaysia through KPM launched the Malaysian Education Development Plan (PPPM) which one of the focus is to further enhance the number of students in the field of science, technology, English and Mathematics (STEM). But this effort is difficult to achieve if the student suffers from anxiety especially in mathematics. This is based on PISA report, which suggests that there are 63 out of 64 countries that join PISA, finding students with high math anxiety showing low mathematical achievements (OECD, 2013). Even PISA data also found 59.26% of Malaysian students suffered from math anxiety. This is the fact that the global problem would have to be given priority to ensure excellence in students ' achievement (Foley et al., 2017).

Math Anxiety

Math anxiety can be defined as feelings of tension or fear that can interfere with in solving math problems (Ashcraft & Faust, 1994; Richardson & Suinn, 1972; Ashcraft, 2002) caused by low self-confidence, fear to failure and the overall negative attitude towards math (Bandalos, Yates, & Thorndike-Christ, 1995). While, McMahon (2018) defines math anxiety is feeling of worry, upset and fear of failure when learning math, doing math assignments or exams math. Therefore the researcher concluded that math anxiety refers to discomfort, disorder and a sense of worry when faced with math either during the learning or during the math assessment (Hopko, Mahadevan, Bare, & Hunt, 2003).

Mary Fides Gough is the first person to do a study on academic about math anxiety when introducing the term mathemaphobia (Suárez-Pellicioni, Núñez-Peña, & Colomé, 2016). This term refers to the feelings of the phobia towards mathematics is introduced as early as the 1950s. This study is done to find out the reasons students fail math courses, but pass with distinction in other subjects. Then a more detailed study on math anxiety with the use of the term “number anxiety” was done by Dreger and Aiken (1957). This study was done at the time because, in general, have known emotional factors can disrupt the achievement of math, but there is still a lack of studies about it. In order to deal with this problem, they become the first to introduce a standard evaluation in a study about math anxiety and adding three items about emotional response to mathematics for the Taylor Mathematic Anxiety Scale (TMAS) originally consisting of 50 questions shaped right or wrong (Taylor, 1953). Then TMAS is named as the Numerical Anxiety Scale.

Instruments the measurement of math anxiety the more formal has been developed by the Richardson dan Suinn (1972) known as Mathematics Anxiety Rating Scale (MARS). This instrument contains 98 items using a Likert scale. Then, there are instruments other that is produced based on MARS and more concise like concise version of MARS contains 25 items (sMARS, Alexander & Martray, 1989), Fennema–Sherman Mathematics Anxiety Scale containing 12 items (MAS; Fennema & Sherman, 1976), Sandman Anxiety Towards Mathematics Scale containing 12 items (ATMS; Sandman, 1980), Math Anxiety Rating Scale Revised containing 24 items (MARS-R; Plake & Parker, 1982) and Abbreviated Math Anxiety Scale containing 9 items (AMAS; Hopko, Mahadevan, Bare & Hunt, 2003b). All of these instruments are built based on the MARS. Therefore acknowledged by scholars, MARS contributed significantly to the creation of a mathematical anxiety measurement instrument.

AMAS has been built by Hopko, Mahadevan, Bare and Hunt (2003b) which has a two-week test reliability of 0.85 for this test and contains two analytical factors namely learning anxiety and assessment anxiety. According to Ashcraft and Moore (2009), this instrument is suitable to be used to measure the anxiety level of middle school students or higher as shown to have its reliability. AMAS also is an instrument of the lowest number of its items which is only 9 items only and have been proven as effective with MARS (Hopko et al., 2003b; Hopko, 2003).

Typically studies about the math anxiety studied only from one dimension only, namely affective. However, studies conducted by Wigfield and Meece (1988) found there are two different dimensions on the math anxiety that is affective and cognitive. This study is in line with studies by Liebert and Morris (1967). The dimensions of cognitive, which is known by the term "worry" refers to concerns about the performance and impact of failure. While the dimensions of the affective known as the "emotionality" refers to the restlessness and tension when engaging assessment (Liebert & Morris, 1967).

There are many studies that show math anxiety has a relationship with mathematics achievement (Devine et al., 2012; Ho et al., 2015; Siti Huzaifah Mohammad & Nor Sharidah Mohd Roslan, 2017). The relationship that exists this explains that students who have math anxiety would affect their math skills compared to students who do not have math anxiety (Hembree, 1990). As a result, students who worry math tend to stay away from math classes. This relationship exists not only because of mathematics, but there are other anxiety factors such as test anxiety and general anxiety. There have been several studies that have found that math anxiety has a stronger relationship with test anxiety than the relationship with achievement (Hembree, 1990; Ashcraft, Kirk, & Hopko, 1998).

Ma and Xu (2004) study found that higher math anxiety in the previous year led to lower math achievement the following year. However, these effects are small and occur only in the early stages of education. His study further showed that lower math achievement in the previous year would also lead to higher math anxiety the following year. This phenomenon occurs because of negative thoughts and experiences of failure in mathematics subjects (Ashcraft & Kirk, 2001).

There are various factors that influence the occurrence of math anxiety. Previous studies in mathematics education have shown that students' experiences with their math teachers shape how they think and respond to math (Ball, 1988; Swars, Daane, & Giesen, 2006; Mizala & Martínez, 2015). The main factor influencing students' experiences is the strategies teachers use in teaching mathematics (Sloan, 2010; OECD, 2017; McMahon, 2018). Consistently, these studies show that there is a relationship between students' math anxiety and negative experiences in teacher teaching (Chavez & Widmer, 1982; Markovits, 2011). This is because students build most of their math knowledge in the classroom and usually their first interaction with formal mathematics begins with their teacher (Ramirez, Shaw, & Maloney, 2018).

Strategy Disney^{NLP}

John Grinder was a Professor at the University of California at Santa Cruz and Richard Bandler was a psychology student at the same university. In the beginning they both had made studies on the factors that caused an individual to be excellent and can repeat the excellence at the desired time. Their observation found that the individuals they studied exhibited their own patterns of behavior and thinking. Bandler and Grinder identified these patterns, furthering them and developing a technique called NLP (Churches & West-burnham, 2008).

The NLP is also known as the study of human excellence because the NLP not only studies the most effective behaviors to achieve excellence but also examines how the process involves the study of behavior, language, mental processes and ways of thinking. This methodology is called NLP modeling. The NLP has modeled many great figures in history to model, reference and guide such as Virginia Satire, Frizt Perl, Milton Erickson, Aristotle, Sherlock Holmes and Walt Disney (Dilts, 1994).

Disney^{NLP} was founded by Walt Disney in producing creative animations. This strategy was modeled in 1994 by experts of NLP, Robert Dilts (Dilts, 1994). This strategy involves the three processes that is creative, realistic and critic. All three of these processes are needed to solve existing problems and find effective solutions. This process is named imagineering (Dilts, 1998). Therefore, the Strategy Disney^{NLP} is suitable applied for problem solving especially involving math and science (Beeden, 2008; Bell, 2016). Strategy Disney^{NLP} is different from the Sixth Hat that created by Edward De Bono (De Bono, 2017). Strategy Disney^{NLP} emphasize the irregularity of the process begins with a creative, realistic and ends with a criticl while the technique of Six Thinking

Hats does not emphasize the rules. Strategy Disney^{NLP} this also involves not only a cognitive process which is thinking creatively, logically and critically but also involves a control on the emotions (Bell, 2016). Study conducted by Bell, (2016) this found that the Strategy Disney^{NLP} was able to reduce student anxiety and make students happier during class. This is because the Strategy Disney^{NLP} using this communication with the self to influence the system of the mind to change the emotions and thoughts that is required.

Methodology

The Design of Study

The purpose of this study is to examine the effects of Strategy Disney^{NLP} on math anxiety. Thus, the selection of quasi-experimental design that uses a quantitative approach is appropriate. The selection of the design quasi-experiment is accurate if a study aims to see the relationship between cause and effect (Piaw, 2006; Fraenkel, Wallen, & Hyun, 1993;Gay, Mills, & Airasian, 2009; Ghazali Darussalam & Sufean Hussin, 2016). Design quasi-experiment was chosen to test the effectiveness of the use of the Strategy Disney^{NLP} that has been developed. Design quasi-experimental pre-test / post-test two groups were used in this study as involving the treatment group and the control group (Creswell, 2014). Teaching using the Strategy Disney^{NLP} and conventional teaching are independent variables while dependent variables are students' level of math anxiety.

The study was conducted on students at The study was conducted on students at the Perak Matriculation College, at the academic session of 2018/2019. Refer to the figure below there are two groups that will be formed, namely the control group and the treatment (the distribution group based on the scores of pre-test). The treatment group using Strategy Disney^{NLP} while the control group using the teaching methods of existing conventional.

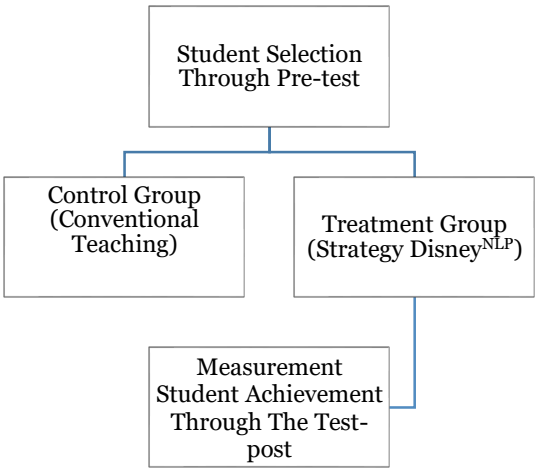

Figure 1. Process of study implementation

Table 1. Quasi-Experiment Implementation Schedule

Activity	Time
Strategy Disney^{NLP} Workshop	1 Day (Week 1)
Pre-test	1 Hour (Week 2)
Teaching and learning	6 weeks, 2 hours per week (Week 3-Week 9)
Post-test	1 Hour (Week 10)

Instrument of Study

The instrument used in this study is Abbreviated Math Anxiety Scale (AMAS) containing 9 items to measure level of math anxiety students (AMAS; Hopko, Mahadevan, Bare & Hunt, 2003b). AMAS has been constructed by Hopko, Mahadevan, Bare and Hunt (2003b) which has a reliability of 0.85 for this test and contains two analysis factors namely learning anxiety and test anxiety. According to Ashcraft dan Moore (2009), this instrument is suitable to be used to measure the anxiety levels of the students secondary school or higher because it has been proven to have reliability based on a study he had done. AMAS is also the instrument with the lowest number of items being 9 items and has been proven to be as effective as MARS (Hopko et al., 2003b; Hopko, 2003) containing 98 items.

Researchers have appointed three mathematicians to conduct face and content validation for the instrument. All of this expert has served more than 20 years and has grade DG52. Therefore, they have the knowledge and experience that is respected, reputable, and could not be questioned.

Table 2. Table Validity of the Expert

Expert	The total score validity (%)	Criteria (Valid/Not Valid)
Expert 1	93	Valid
Expert 2	91	Valid
Expert 3	95	Valid
Mean	93	

According to Table 2, Expert 3 (95%) gave the highest percentage, while Expert 2 gave the lowest percentage (91%). The instrument achieved an average of 93% in terms of validity index. Therefore, it can be concluded that the instrument has high face and content validity and that all experts agree that this instrument can measure students' level of math anxiety. The reliability of this instrument has also been evaluated involving a total of 31 students. All items were accepted and Alpha Cronbach's alpha was 0.87 which was greater than 0.8. This indicates that all items have acceptable reliability (George & Mallery, 2003).

Data analysis

Data analysis in this study is using statistical inference technique. Data were obtained from Pre-test and post-test. Data were analyzed using independent t-test sample and paired t-test sample. Both tests use the SPSS program version 23.

The Implementation of the Strategy Disney^{NLP}

Strategy Disney^{NLP} enables students to actively participate in the learning process by linking new ideas to the cognitive structure (existing knowledge) using three phases in the Strategy Disney^{NLP} the Creative phase, the Realistic phase and the Critic phase (Dilts, 1994).

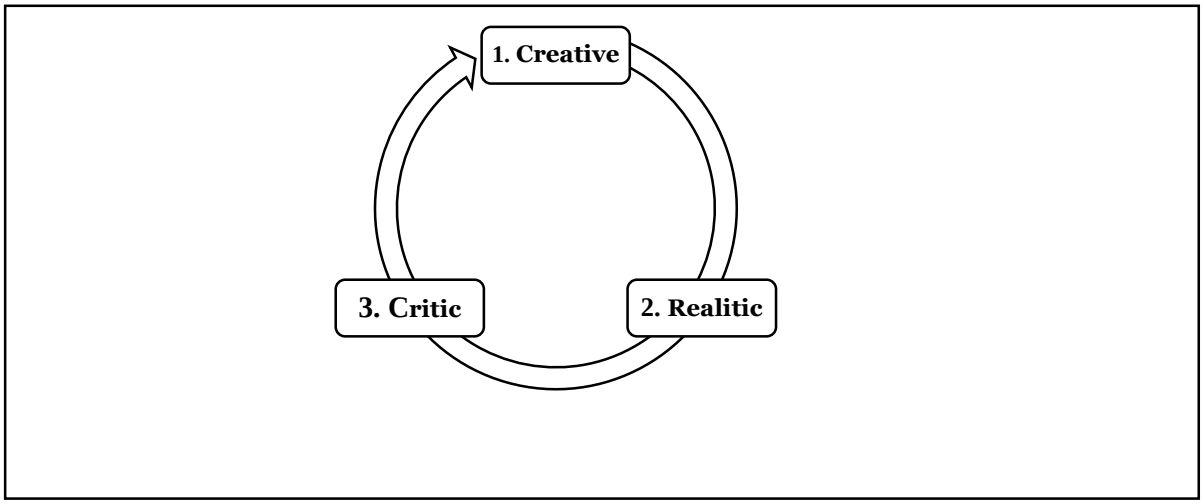

Figure 2. Cycle Strategy Disney^{NLP}.

Table 3. Procedure of The Implementation Of The Strategy Disney^{NLP}

Strategy Disney^{NLP} Phase	**Steps**
Creative	➢ Please understand the question. ➢ Take a long breath 3 times and exhale slowly (Brunyé et al., 2013). ➢ Please sit quietly and comfortably. ➢ Try to recall situations where you have answered math questions successfully. ➢ How do you come up with ideas and make great plans. ➢ Recall what you saw, what you heard, and how you felt at that time (Dilts, 1994). ➢ Please repeat the above actions again until you see, hear and feel the situation as you answer your math questions first. ➢ Repeat minimum 3 times. ➢ Then think of a solution and write the plan in the CREATIVE Strategy Disney^{NLP} Worksheet (Figure 3).
Realistic	➢ Take a deep breath 3 times and exhale slowly (Brunyé et al., 2013). ➢ Try to recall situations where you have answered math questions successfully. ➢ How can you execute those ideas and plans with great confidence and confidence? ➢ Recall what you saw, what you heard, and how you felt at that time. ➢ Please repeat the above actions again until you see, hear and feel the situation as you answer your math questions first. ➢ Repeat minimum 3 times. ➢ Then think of a solution and write the plan in the REALISTIC Strategy Disney^{NLP} Worksheet (Figure 3).
Critic	➢ Take a deep breath 3 times and exhale slowly (Brunyé et al., 2013). ➢ Try to recall situations where you have successfully reviewed math questions. ➢ Recall what you saw, what you heard, and how you felt at that time. ➢ Please repeat until you see, hear and feel the situation when you first review the math questions (Dilts, 1994). ➢ Repeat minimum 3 times. ➢ Then please review the solution and write a comment in the CRITIC section (Figure 3).

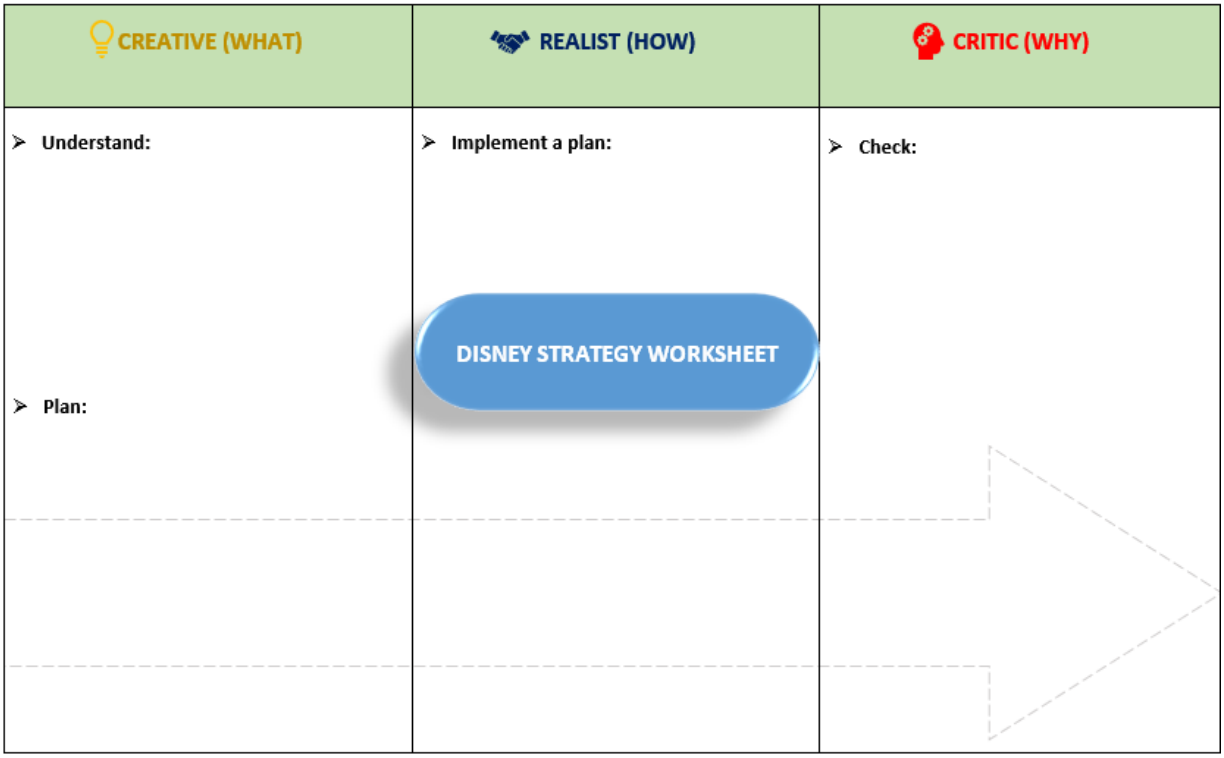

Figure 3. Worksheet Strategy Disney[NLP]

Findings

A paired t-test was used to measure the comparison of student test in the treatment and control groups for math anxiety level. The results from this analysis (Table 4) showed that the mean post-test mean score (mean = 24.60, s.d = 4.96) was significantly lower for the treatment group (t (19) = 10.33, p <0.05) than the pre-test mean (min) = 40.30, s.d = 4.61). Similar results were also obtained for the control group with post-test mean scores (mean = 31.45, s.d = 6.00) for students with significantly lower pre-test mean scores (mean = 39.30, s.d = 4.61) for math anxiety levels. This result indicates that in the post-test, both groups performed better than the pre-test. However, the mean decrease in mean score of 15.70 in the treatment group was higher than the mean decrease in the control group score of 7.85.

Table 4. Mean Difference Scores between Pre-Test and Post-Test for Control Group and Treatment Group

Group	Pre-test	Post-test	Difference	t	df	p
		Mean (SD)				
Treatment	40.30 (4.61)	24.60 (4.96)	15.70 (6.80)	10.33	19	0.000
Control	39.30 (4.61)	31.45 (6.00)	7.85 (9.06)	3.88	19	0.001

Note: Significant level at p =0.05

Independent t-test was performed to compare mean pre-test scores between the control and treatment groups. The results of this test analysis (Table 5) showed that there was no significant difference between the control group and the treatment group in the pre-test score mean (t (38) = −6.86, p = 0.497). If there is no significant difference between the two pre-tests, according to Gay, Mills and Airasian (2011), t-test can be used on a post-test. Therefore, these independent t-tests were conducted to compare post-test mean scores between the control and treatment groups.

The results of this analysis confirmed that students in the treatment group had significantly higher mean scores (t (38) = 3.94, p <0.05) than students in the control group (mean = 31.45, s.d = 6.00). This finding indicates that there was a significant difference in the post-test scores between the control and treatment groups. The results of this analysis show that teaching using the Strategy Disney^{NLP} effectively reduces student math anxiety levels.

Table 5. Independent t-Test Analysis of Pre-Test and Post-Test

Test	Control	Treament	Group Differences	t	df	p
		Mean (s.d)				
Pra	39.30 (4.61)	40.30 (4.61)	-1.0	-6.86	38	0.497
Post	31.45 (6.00)	24.60 (4.96)	6.85	3.94	38	0.000

Note: Significant level at p =0.05

Discussion

The t-test results show that the Strategy Disney^{NLP} has a significant impact on reducing student math anxiety. In implementing the Strategy Disney^{NLP}, students are more relaxed and prepared during teaching and learning as the activity begins with breathing and imagination. In other words, students who use Strategy Disney^{NLP} have strategies to make themselves happier and more comfortable than conventional teaching. The use of worksheet Strategy Disney^{NLP} also able to help students think in a more structured because students are able to know the action to do next.

Based on the researchers' observations, students using the Strategy Disney^{NLP} were able to answer each question better than students using the conventional method. When students have low levels of math anxiety, they will be better at solving math questions (Brunyé et al., 2013; Hui, Ho, Wong, Ho, & Mak, 2014). This is based on Theory of control (Eysenck, Derakshan, Santos, & Calvo, 2007) which provides a solid basis for understanding the state of students with math anxiety shows a decline in mathematics achievement despite having sufficient knowledge to solve the problem.

Conclusion

The results of the research show that teaching methods Strategy Disney^{NLP} conducted successfully reduce the math anxiety of the students in the topic of this probability. This study also concluded that the method used is suitable for use in the college matriculation and is able to attract the interest of students towards math. In addition, Strategies Disney^{NLP} can also improve student achievement in math, but more in-depth research needs to be done.

It is recommended that everyone who wishes to implement the Strategy Disney^{NLP} focus on time management as this application of the Strategy Disney^{NLP} takes more time. Students also need to be exposed to mastery of these Strategy Disney^{NLP} to maximize their classroom application. Suggesting for future studies, this Strategy Disney^{NLP} can be applied to other populations such as schools and universities. Studies for larger populations in college matriculation are also highly encouraged. Studies of the effectiveness of student achievement can also be made in order to obtain the impact of the Strategy Disney^{NLP} on math or other subjects.

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