

# BUILDING BETTER DISCIPLINE STRATEGIES FOR SCHOOLS BY FUZZY LOGICS

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## ABSTRACT

This study aims to realize better discipline strategies for applying in high schools. We invited 400 teachers to participate the survey and collected their perceptions on the discipline strategies in terms of the acceptance of strategies and their effectiveness in schools. Based on the idea of fuzzy statistics, this study transformed the fuzzy interval data by way of fuzzy means, fuzzy centroids, and fuzzy distances to select better discipline strategies. The result reveals, in positive discipline domain, the high acceptable and effective strategies are “praise student in oral frequently”, following “integrated life events in classroom management”, “grant awards, small merit, and work incentives”, and “leading students to participate volunteering activities”; In general discipline domain, the high acceptable and effective strategies are “notify parents to associate to solve”, then “adjusting students’ seating”; In special discipline domain, there is no high acceptable and effective strategies available. The selected discipline strategies might be used to improve the current issues in high schools.

## KEYWORDS

High schools, teacher perception, discipline strategies, positive discipline, fuzzy statistics, fuzzy distance

## 1. INTRODUCTION

In 2006, “Zero Corporal Punishment” Act had put into gear in Taiwan. The Act provides a new direction that teachers cannot use corporal punishment anymore in campus. Consequently, the traditional discipline, which teachers depended on for a long time, was withdrawal from schools. While the new discipline strategies did not well develop yet. Teachers always respond that the decline in families and social values made their task more difficult, and sometime impossible. According to the Ministry's report, 2011 statistics of school discipline events, the number of serious conflicts rose in campus from 78 in 2003 to 377 in 2010 (Ministry of Education, 2011). The conflict growth rate indicates up to 4.8 times in this period. Among the conflicts, 45% is in high school level (Yan, 2010). When the students’ problems become increasingly complex in schools, the teachers have no choice should face the music. How to find a better way to deal with the problem? How to lead teachers to face the discipline problems has cause public concerns. Schools may need more proper strategies for improving discipline problem, essentially, it need to get all staff, parents, and the community to involve the issue (Blandford, 2005). Nonetheless, what kind of discipline strategies are more acceptable by teachers? Which discipline strategies are more effective in schools? This study aims to detect the acceptance and effectiveness of discipline strategies.

## 2. LITERATURE REVIEW

Discipline has been defined as teachers for educational purposes, dealing with their students’ behaviors, which includes various advantages or disadvantages enacted by collective or individual treatments. From the behavior control’s view, the control influences can be classified as rewards and punishments. For example, rewards include bonuses, prizes, give praise, and excellent reviews; however, punishments contain blaming, warning,

impose a mental or physical suffering (Etzioni, 1975). Lindgren and Suter (1985) pointed that discipline is controlled through coercion, obedience, and punishment. Wolfgang (1995) thought discipline is when students' behaviors disrupt educational activities or violate general social norms or laws, school teachers or administrators take the necessary actions to treat them. Specifically, Charles' (1999) point of discipline refers to teachers help students to do well in school, the purpose is to prevent, terminate, and guide their misconducts. The ultimate goal is appropriated to help students control their behaviors and reduce teacher's intervention. Better discipline strategies may refer to teachers realize the right of education, the aims of education, students' proper behaviors. Charles (1999) suggested that the treatment system should be consolidated into the following three dimensions:

(1) Preventive discipline refers to providing interesting content in the classroom, when students engage in the designed activities, they have no time to undertake improper behaviors.

(2) Supportive discipline refers to helping students to back to their jobs, enabling them to achieve self-control. (3) Corrective discipline refers to termination of students' inappropriate behaviors, resetting their acceptable behaviors while retaining their dignity.

Previous studies have listed kinds of discipline strategies that teachers often adopted as Table 1 (Lin, 2004).

Table 1. Listing the teachers' discipline strategies listed in literature

No.	Discipline strategies	No.	Discipline strategies
1	Encourage good performance	10	Role play
2	Persuasion	11	Inform their parents
3	Individual talks	12	Referrals to other professional organizations of guidance
4	Boot behavior problems in class review	13	Penalty for repeatedly copying activities
5	Small group counseling	14	Increased labor loading
6	Temporarily ignoring their inappropriate behaviors	15	Deprivation of their physiological needs
7	Transfer their focus	16	Impose labor on their body
8	Use of community sanctions issues	17	Inflict pain on their body
9	Value clarification		

In 2006, the "Basic Education Act" amendment in the 8th and 15th related to "prohibition of corporal punishment" has clearly designated that government should protect students from corporal punishment in schools. Taiwan became the 109th nations that the legislative decision must implement zero corporal punishment in schools. The government has also initiated a "Positive Discipline Plan" for school teachers. But school teachers still worried about the related measures that announced by the Ministry of Education might be ineffective. Teachers always stand in the first line and face to their students. What are they really concern? Following the related "Acts", "Guidelines", and "Measures" for school discipline, we integrated the related strategies by their timing and fittest to students. Then, we classified the strategies into the following three domains: positive, general, and special discipline, see Table 2. In this study, we would like to know how the teachers' view on the related discipline strategies.

### 3. METHODS

#### 3.1 Research Framework

Figure 1 demonstrates the framework of the teachers' perception on the discipline strategies under the fuzzy measurement. The strategy selection follows the fuzzy logics. By way of fuzzy questionnaires, this study corrected teachers' perceptions on acceptance and effectiveness of the strategies and transformed the data to select better discipline strategies for schools.

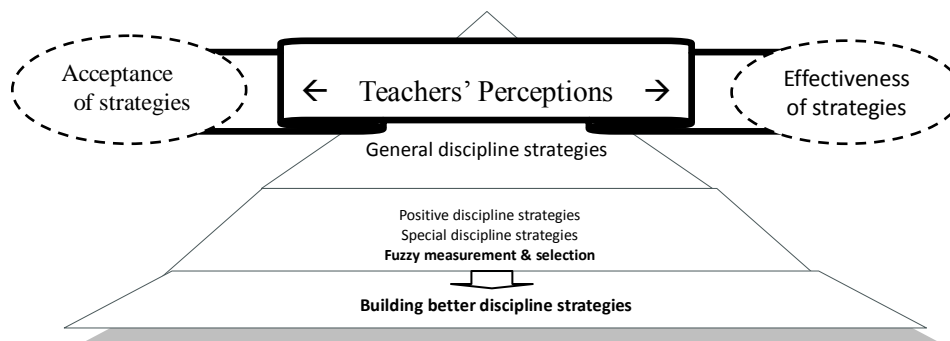


Figure 1. Logics of selecting the school discipline strategies

### 3.2 Instrument Design

In initial stage, we collected 29 related discipline strategies which based on the literature review. After inviting seven professors/experts to provide their comments, we follow their suggestions to delete improper strategies. Finally, the selected 20 discipline strategies were assigned to “positive discipline”, “general discipline”, or “special discipline” domain respectively, see Table 2.

Table 2. Classify the discipline strategies to related domain

Classification	Codes	Discipline strategies
Positive discipline	1-1	Integrated life events in classroom management
	1-2	Leading students to participate volunteering activities
	1-3	Praising students in oral frequently
General discipline	1-4	Grant awards, small merit, and work incentives
	2-1	Using student’s oral apology
	2-2	Using student’s written introspection
	2-3	Adjusting student’s seating
	2-4	Asking students to stand to reflect
	2-5	Increasing student’s proper job (such as penalty wrote)
	2-6	Asking students to participate public services (such as play a daily helper)
	2-7	Notify parents to associate to solve
	2-8	Deferring students to stay after school
	2-9	Depriving students class miss time
Special discipline	2-10	Giving a warning, a small or a big punishment
	3-1	Asking for assistance from the office of student affairs
	3-2	Asking for assistance from the office of student counseling
	3-3	Transfer students to other school
	3-4	Handed over their parent to implement bring-back-discipline for five days
	3-5	Offering high-risk-caring courses
	3-6	Asking for assistance from the police office

### 3.3 Fuzzy Questionnaire

The designed questionnaire includes 20 items which have been divided into the following three domains: positive, general, and special disciplines. The participants were asked to fill the questionnaire as our fuzzy format. The examples of completing the questionnaire are listed as follows:

*Direction: The following questions are related to discipline strategies. We need your opinions on the acceptance and effectiveness of these discipline strategies. Please circle the number representing your opinion of acceptance and effectiveness of these discipline strategies. If you feel the possible acceptance of positive discipline strategy is 4–6 on the scale of 1–7, then please fill your numbers 4 and 6. If your selection of effectiveness of positive discipline strategy is from 6 to 7, it means your judgment of the possibility of the effectiveness is 6 to 7 on the scale. Figure 2 refers to your perceptions on the positive discipline strategy.*

<u>Degree of Acceptance</u>							<u>Degree of Effectiveness</u>						
1	2	3	○, 4	5	○, 6	7	1	2	3	4	5	○, 6	○, 7

Figure 2. The examples of fuzzy questionnaire for selecting discipline strategies

This study randomized 16 high schools in New Taipei city and invited 400 high school teachers to participate this survey. Finally, there are 347 valid questionnaires available in this study.

### 3.4 Fuzzy Statistics

Fuzzy statistics is a useful tool for measuring ambiguous concepts in science and social science (Hsu & Wu 2010; Chang 2007; Samatsu, Tachikawa & Shi 2010). Fuzzy set concepts were proposed by Zadeh and applied to fuzzy measurement to contend with the dynamic environment which will provide a more reasonable description of numerous data transformation (Sun & Wu 2007; Zadeh 1968). The idea of membership function allows the studies transform their data and interpret from crisp to interval data. Following the concept, this study designed a fuzzy survey to deal with the issues of discipline strategy selection in high schools. This study applied fuzzy means, centroids of fuzzy numbers, and fuzzy distance to transform fuzzy interval data. The definitions and their calculations are listed as follows:

**Definition 1.** Fuzzy means (data with interval values) (Nguyen & Wu, 2006):

Let  $U$  be the universal set and  $\{Fx_i = [a_i, b_i], a_i, b_i \in R, i = 1, \dots, n\}$  be a sequence of random fuzzy samples on  $U$ . The fuzzy sample mean is then defined as

$$F\bar{x} = \left[ \frac{1}{n} \sum_{i=1}^n a_i, \frac{1}{n} \sum_{i=1}^n b_i \right]$$

Membership function can be used to explain the idea of the triangular fuzzy numbers. Let's display two triangular fuzzy numbers, one is  $[1,3,5]$  and the other is  $[4,5,5,7]$ . We can use the idea of membership function to determine their centroids. In the fuzzy measurement, the centroid represents 1.0 in terms of its membership function is 100% to fit. We can use the centroids to determine the weights of fuzzy means.

**Definition 2.** Distance between samples of interval-valued data (Chang, 2012):

Let  $U$  be the universe of discourse. Let  $\{\chi_i = (a, b, c), i = 1, 2, 3\}$  be three samples from  $U$ , with the center

$$C_i = \frac{a_i + b_i + c_i}{3}, \quad h_i = 1, \quad \text{and area } A_i = \frac{(c_i - a_i) * h_i}{2}. \quad \text{The distance between the triangle samples } \chi_1 \text{ and } \chi_2 \text{ is defined as } \chi_1 \rightarrow [C_1, A_1], \text{ and } \chi_2 \rightarrow [C_2, A_2]. \text{ Therefore,}$$

$$d(\chi_1, \chi_2) = |C_i - C_j| + \left| \frac{\ln(1 + |A_i|)}{|A_i|} - \frac{\ln(1 + |A_j|)}{|A_j|} \right|$$

This study analyzed the acceptance and effectiveness of discipline strategies. We applied fuzzy means, centroids, and fuzzy distances to interpret the fuzzy interval data related to the discipline strategies.

**Example 1.** The fuzzy means: Let  $x_1=[3,5]$ ,  $x_2=[2,4]$ ,  $x_3=[4,6]$ ,  $x_4=[5,7]$ , and  $x_5=[5,7]$  be the perception of acceptance of discipline strategy by five teachers with fuzzy interval. Thus, the fuzzy mean for their perceptions estimated as

$$\overline{F\bar{x}} = \left[ \frac{3+2+4+5+5}{5}, \frac{5+4+6+7+7}{5} \right] = [3.8, 5.8]$$

**Example 2.** How to calculate the fuzzy distance between acceptance and effectiveness? Let two sets of interval data be  $\chi_1=[2,4,6]$  and  $\chi_2=[4,5.5,7]$ , then  $\chi_1=[(2+4+6)/3, (6-2)/2]=[4,2]$ ,  $\chi_2=[(4+5.5+7)/3, (7-4)/2]=[5.5;1.5]$ . We can get the following fuzzy distance:

$$d(\chi_1, \chi_2) = |4 - 5.5| + \left| \frac{\ln(1+2)}{2} - \frac{\ln(1+1.5)}{1.5} \right| = 1.53$$

## 4. RESULTS

### 4.1 Acceptance of Discipline Strategies

After transforming the fuzzy data, we found teachers perceive that “praise students in oral frequently” (C=5.91) is the most acceptable strategy, following “integrated life events in classroom management” (C=5.81) and “leading students to participate volunteering activities” (C=5.61). The least one is “grant awards, small merit, and work incentives” (C=5.56) in positive discipline domain, see Table 3.

In general discipline domain, teachers think that “notify parents to associate to solve” (C=5.41) for most acceptable strategy, following are “adjusting students’ seating” (C=5.37), “asking students to participate public services (such as play a daily helper)” (C=5.31), “using student’s oral apology” (C=5.23), “using student’s written introspection” (C=5.17), “asking students to stand to reflect” (C=4.99), “increasing student’s proper job (such as penalty wrote)” (C=4.92), “giving a warning, a small or a big punishment” (C=4.76), “deferring students to stay after school” (C=4.74), and “depriving students class miss time” (C=4.65).

In special discipline domain, the teachers view “asking for assistance from the office of student affairs” (C=5.18) is the most acceptable strategy, then “asking for assistance from the office of student counseling” (C=5.06), “asking for assistance from the police office” (C=4.98), “offering high-risk-caring courses” (C=4.82), “handed over their parent to implement bring-back-discipline for five days” (C=4.69), and “transfer students to other school” (C=4.64).

Overall, the teachers view our selected discipline strategies at medial level or above in our fuzzy scale 1-7. The average of positive discipline domain (C=5.72) is higher than both general discipline (C=5.06) and special discipline domain (C=4.90).

### 4.2 Effectiveness of the Discipline Strategies

The result reveals that the most effective discipline strategy is “praising students in oral frequently” (C=5.44). The other effective discipline strategies are as follows: “integrated life events in classroom management” (C=5.33), “grant awards, small merit, and work incentives” (C=5.18), “asking students to participate public services (such as play a daily helper)” (C=5.08), “notify parents to associate to solve”, and “adjusting student’s seating” (C=5.01), see Table 3.

Table 3. Teachers' perceptions on acceptance and effectiveness of the discipline strategies

Classification	Codes	Fuzzy Means (Acceptance)	Centroids	Rank	Fuzzy means (Effectiveness)	Centroids	Rank
Positive discipline	1-1	[4.91,6.04]	5.81	2	[4.76,5.54]	5.33	2
	1-2	[4.74,5.82]	5.61	3	[4.18,5.31]	5.08	4
	1-3	[5.05,6.14]	5.91	1	[4.54,5.67]	5.44	1
	1-4	[4.68,5.79]	5.56	4	[4.31,5.40]	5.18	3
General discipline	2-1	[4.33,5.46]	5.23	4	[3.76,4.87]	4.64	7
	2-2	[4.27,5.40]	5.17	5	[3.78,4.89]	4.66	6
	2-3	[4.46,5.61]	5.37	2	[4.12,5.24]	5.01	1
	2-4	[4.06,5.24]	4.99	6	[3.71,4.84]	4.60	9
	2-5	[4.00,5.17]	4.92	7	[3.70,4.86]	4.61	8
	2-6	[4.39,5.55]	5.31	3	[3.95,5.11]	4.87	3
	2-7	[4.49,5.66]	5.41	1	[4.11,5.25]	5.01	1
	2-8	[3.82,4.98]	4.74	9	[3.91,5.03]	4.80	4
	2-9	[3.76,4.88]	4.65	10	[3.86,4.99]	4.76	5
	2-10	[3.86,5.00]	4.76	8	[3.65,4.81]	4.57	10
Special discipline	3-1	[4.27,5.42]	5.18	1	[3.93,5.05]	4.82	2
	3-2	[4.15,5.30]	5.06	2	[3.78,4.91]	4.67	3
	3-3	[3.76,4.87]	4.64	6	[3.62,4.70]	4.48	4
	3-4	[3.79,4.93]	4.69	5	[3.45,4.57]	4.34	6
	3-5	[3.91,5.06]	4.82	4	[3.58,4.69]	4.46	5
	3-6	[4.08,5.22]	4.98	3	[4.02,5.13]	4.91	1

### 4.3 Finding the Harmonizing between Acceptance and Effectiveness

This study applied fuzzy distances to determine better harmonizing between acceptance and effectiveness of the discipline strategies. Fuzzy distances were calculated by the formula in Definition 2. The fuzzy distance was defined by the center of acceptance minus the center of effectiveness which was calculated by its fuzzy measurement respectively. The results of fuzzy distance measurement show in the Table 4. Which one is the best strategy? The result reveals there are six strategies listed in the high acceptance and high effectiveness dimension, see the codes 1-1, 1-2, 1-3, 1-4, 2-3, and 2-7 in Table 5. Most of them belong to positive discipline strategies. We also found there are five discipline strategies belong to high acceptance and moderate effectiveness. These discipline strategies may suggest for high school teachers.

## 5. CONCLUSION

Discipline issues have disturbed most of teachers for a long time. Since the "Zero Corporal Punishment" Act put into gear, there is only one way to go building better discipline strategies for teachers. In this study, we applied fuzzy measurement to determine which discipline strategies fit to schools. The participants provide a lot of useful information for us to make a better decision to select discipline strategies. According to the fuzzy data transforming, we suggest six high acceptable and effective discipline strategies for teachers. The suggestion also goes to the further related studies to take advantage to deal with fuzzy measurement.

Table 4. The distance between acceptance and effectiveness of discipline strategies

Classification	Codes	Discipline strategies	Fuzzy Distance* $D=C_a-C_e$	Ranking in Domain	Ranking in Total
Positive discipline	1-1	Integrated life events in classroom management	0.48	2	16
	1-2	Leading students to participate volunteering activities	0.54	4	19
General discipline	1-3	Praising students in oral frequently	0.49	3	17
	1-4	Grant awards, small merit, and work incentives	0.38	1	11
	2-1	Using student's oral apology	0.59	10	20
	2-2	Using student's written introspection	0.51	9	18
	2-3	Adjusting student's seating	0.36	5	8
	2-4	Asking students to stand to reflect	0.38	6	11
	2-5	Increasing student's proper job (such as penalty wrote)	0.31	4	6
	2-6	Asking students to participate public services (such as play a daily helper)	0.44	8	15
	2-7	Notify parents to associate to solve	0.40	7	14
	2-8	Deferring students to stay after school	0.07	1	1
Special discipline	2-9	Depriving students class miss time	0.10	2	3
	2-10	Giving a warning, a small or a big punishment	0.20	3	5
	3-1	Asking for assistance from the office of student affairs	0.36	4	8
	3-2	Asking for assistance from the office of student counseling	0.38	6	11
	3-3	Transfer students to other school	0.16	2	4
	3-4	Handed over their parent to implement bring-back-discipline for five days	0.35	3	7
	3-5	Offering high-risk-caring courses	0.36	4	8
	3-6	Asking for assistance from the police office	0.07	1	1

\*Note.  $D=C_a-C_e$  in terms of the distance D equals to center of acceptance minus the center of effectiveness calculated by fuzzy measure.

Table 5. Suggested strategies for high school teachers

Classification	Codes	Discipline strategies	Moderate A&E	High A& Moderate E	High A&E
Positive discipline	1-1	Integrated life events in classroom management			✓
	1-2	Leading students to participate volunteering activities			✓
General discipline	1-3	Praising students in oral frequently			✓
	1-4	Grant awards, small merit, and work incentives			✓
	2-1	Using student's oral apology		✓	
	2-2	Using student's written introspection		✓	
	2-3	Adjusting student's seating			✓
	2-4	Asking students to stand to reflect	✓		
	2-5	Increasing student's proper job (such as penalty wrote)	✓		
	2-6	Asking students to participate public services (such as play a daily helper)		✓	
	2-7	Notify parents to associate to solve			✓
	2-8	Deferring students to stay after school	✓		
Special discipline	2-9	Depriving students class miss time	✓		
	2-10	Giving a warning, a small or a big punishment	✓		
	3-1	Asking for assistance from the office of student affairs		✓	
	3-2	Asking for assistance from the office of student counseling		✓	
	3-3	Transfer students to other school	✓		
	3-4	Handed over their parent to implement bring-back-discipline for five days	✓		
	3-5	Offering high-risk-caring courses	✓		
	3-6	Asking for assistance from the police office	✓		

Note. A=acceptance, E=effectiveness

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