

FUZZY METHOD FOR DETERMINING THE GAPS BETWEEN PARENTS AND TEACHERS PERCEIVED ON IMPLEMENTING OF PRESCHOOLS ENGLISH CURRICULUM POLICY

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ABSTRACT. *The Taiwan Executive Yuan has initiated to develop Taiwan as a bilingual nation by 2030. The major implement strategy for early childhood education is to develop English curriculum in preschools. Taiwan government did not implement English curriculum in preschool level before; how to release preschool teachers' anxiety of practicing English courses to meet parents' expectations has become a new challenge. Reviewing previous studies, we found that teachers' anxiety comes from low confidence of their English teaching ability. To detect the issue, this study used fuzzy method to determine the gaps between teachers and parents. There are two categories consisting of 15 indicators related to expectations and anxiety of preschools English curriculum in the self-design questionnaire. We invited 102 parents and 78 teachers in New Taipei City to participate this survey. Based on fuzzy statistics, this study lists three correspondences and mismatches items related to the issue. Based on the findings, the suggestions go to related policy makers to ameliorate English curriculum implementing in preschools.*

Keywords: English curriculum, Fuzzy statistics, Fuzzy distance, Preschool, Policy implementing

1. **Introduction.** In 2018, the Premier of Taiwan Executive Yuan announced to develop Taiwan as a bilingual nation by 2030 [1]. In order to achieve the goal, the Taiwan's National Development Council has initiated a blueprint to implement English curriculum policy in preschools [2]. As previous reports, Taiwan's English curriculum policy cannot meet preschool parents' expectations. According to the survey in 2017, 78.1% of parents in Taipei hoped to implement English curriculum in preschools [3]. In 2018, 42% of parents made their children learn English before enrolling in elementary schools and 64.2% of them agreed that English curriculum was not enough in schools [4]. Related studies also found that parents hope enhancing English curriculum and hiring foreign English teachers in preschools [6,8]. As previous studies [4-7], we found parents perceived that English teaching in preschools has shown little change. Furthermore, the Taiwan Ministry of Education ever prohibited preschool children learning English since 2005; the preschool English curriculum researches were less.

Within the context, we found that the anxiety of teachers' English ability has become an obstacle in implementing English curriculum. For example, teachers practiced the English curriculum by their own beliefs under the bilingual education policy in South

Korea and Hong Kong [9,10]. In Indonesia, teachers did not change themselves to face their new roles and made the English curriculum failed [11]. Teachers all agreed that they were not comfortable with bilingual education and with certain kind of anxiety in teaching English courses. In Turkey and Japan, teachers' anxiety came from feeling unprofessional and lacking knowledge of preparing English teaching [12,13]. Teachers' anxiety was also influenced by parents' requests in Hong Kong [9]. In Taiwan, parents agreed that preschool English teachers should pass the GEPT (the general English proficiency test) [6]. Based on previous studies, we realize that the anxiety of teaching English comes from teachers' low confidence and parents' requisition in English teaching ability [11,14]. It needs to examine the anxiety and find a better way to improve the situation.

Previous studies focused on individual group but this study investigated both parent and teacher groups. This study aims to determine the gaps between teachers' and parents' expectations of English curriculum and anxiety of teacher's English ability in early childhood education. Given this purpose, this study develops a fuzzy questionnaire and transforms interval data. In this study, it begins with method section which will draw the research framework, instrument design and fuzzy method to transform data. Then, we will report the results. Finally, the conclusion will draw and the suggestions will be provided to the Taiwan government for making a proper preschool English curriculum policy. Then, the policy will include parents' and teachers' opinions and will satisfy both of them.

2. Methods.

2.1. Research framework. Figure 1 shows this research framework of using fuzzy distance to determine the gaps between teachers' and parents' expectations and anxiety of English curriculum in preschools. Expectations refer to the opinions on advantages and disadvantages for preschool students to study English. Anxiety refers to the anxiety experiences of preschool teachers' English teaching related to their capabilities. The gaps may exist between parents' and teachers' perceptions by using fuzzy distance.

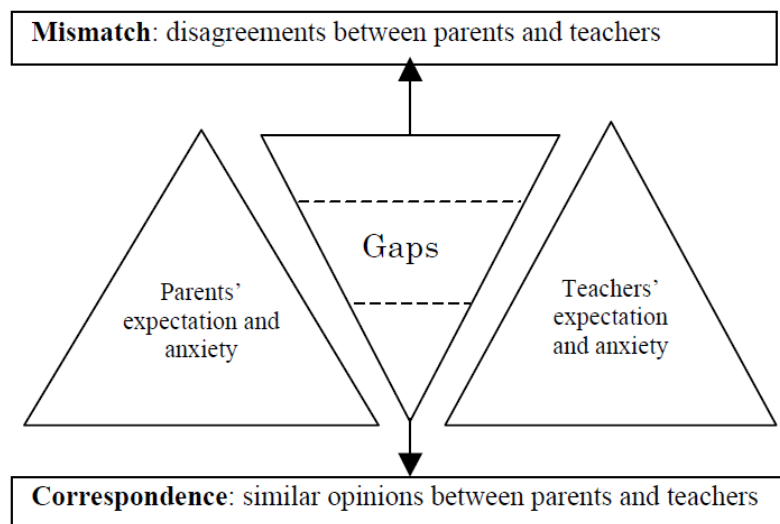


FIGURE 1. Research framework

2.2. Instrument design. To develop the research instrument, we follow the process. First, review the supportive literature. Second, expectations and anxiety of English curriculum were chosen as the major factors. Third, items of expectation and anxiety from previous studies were selected [5,6,12]. Fourth, according to current situation in Taiwan, the items with two categories were adjusted to fit the preschools. Fifth, reviewed by

TABLE 1. Expectation and anxiety of English curriculum in preschools

I	Expectations of English curriculum in preschools
E1	Early childhood is the critical period of learning English
E2	Children can get good grade in English exams
E3	To build children’s English learning ability
E4	Children can get better career in the future
E5	To enhance children’s internationalization
II	Anxiety of teachers’ English ability
A1	Preschool needs to provide English basic course
A2	Preschool needs to provide integrating English courses
A3	Preschool needs to provide whole day English courses
A4	Preschool teachers are not professional in teaching English
A5	The worry about preschool teachers may teach wrong English
A6	The preschool teachers who teach English should pass the GEPT (the general English proficiency test)
A7	The preschool teachers who teach English should have the English teacher certificate
A8	English should be the preschool English teacher’s mother language
A9	Preschool teachers can prepare appropriate resources for English learners
A10	Preschool can provide English-learning supporting environment

experts, related items were carefully chosen as the self-designed questionnaire. Sixth, implementing Delphi techniques, after two rounds of Delphi with five experts, the content of the questionnaire was finally integrated, including two categories and fifteen items, see Table 1.

Previous studies’ questionnaires were usually designed by a five-point Likert scale format. In this study, the participants were asked to fill the questionnaire with fuzzy format on voluntary basis. In each question, the participants needed to present their opinion about the important level by circling two numbers. The level numbers were from 1 to 7. Number 1 was the less important while number 7 was the most important. The example of fuzzy questionnaire was displayed as follows, see Figure 2.

Direction: The following questions are related to English curriculum in preschools. We need your opinions. If you feel the important level is 4-6 on the scale of 1-7, please circle the number 4 and 6 for representing your opinion.

	Unimportant	←→	Important
Early childhood is the critical period of learning English	1	2 3	④ 5 ⑥ 7

FIGURE 2. A sample of fuzzy questionnaire

2.3. Fuzzy statistics. This study employs fuzzy means, defuzzification and fuzzy distance to analyze the data from the perceptions on preschool English curriculum. The gaps between preschool teachers and parents have been determined by using fuzzy statistics. The data transformation processes have been addressed as follows.

Definition 2.1. *Fuzzy sample means (data with interval values) [8,15-17]*

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 means is then defined as follows.

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

Example 2.1. Let $x_1 = [4, 6]$, $x_2 = [2, 3]$, $x_3 = [2, 6]$, $x_4 = [3, 7]$, $x_5 = [1, 4]$ be the expectations of English curriculum in preschool with fuzzy interval scale. Thus, the fuzzy mean for the evaluation is

$$F\bar{x} = \left[\frac{4 + 2 + 2 + 3 + 1}{5}, \frac{6 + 3 + 6 + 7 + 4}{5} \right] = [2.4, 5.2]$$

Definition 2.2. Let $\chi = [a, b]$ ($a \neq b$) be an interval fuzzy number on U , then the defuzzification number $R\chi$ of $[a, b]$ is defined as follows [8,15-17]:

$$R\chi = \frac{a+b}{2} + \left(1 - \frac{\ln(1+|b-a|)}{|b-a|} \right)$$

Example 2.2. Let $\chi = [4, 6]$, then

$$R\chi = \frac{4+6}{2} + \left(1 - \frac{\ln(1+|6-4|)}{|6-4|} \right) = 5.45$$

Definition 2.3. Distance between samples of interval-valued data [8,15-17]

Membership function can be used to explain the idea of the triangular fuzzy numbers. 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 being 100% to fit. We can use the centroids to determine the weights of fuzzy means.

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 $C_i = \frac{a_i+b_i+c_i}{3}$, $h_i = 1$, and area $A_i = \frac{(c_i-a_i) \times h_i}{2}$.

The distance between the triangle samples $\chi_1 \rightarrow [C_1, A_1]$ and $\chi_2 \rightarrow [C_2, A_2]$ is defined as follows [8,15-17]:

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

Example 2.3. Let $\chi_1 = [4, 5, 6]$ be the expectations of English curriculum of the preschool teacher and $\chi_2 = [1, 2.5, 4]$ be the expectations of English curriculum of students' parent; therefore two sets of interval data should be $\chi_1 = [(4+5+6)/3, (6-4) * 1/2] = [5, 1]$, $\chi_2 = [(1+2.5+4)/3, (4-1) * 1/2] = [2.5, 1.5]$. The fuzzy distance is

$$d(\chi_1, \chi_2) = |5 - 2.5| + \left| \frac{\ln(1+1)}{1} - \frac{\ln(1+1.5)}{1.5} \right| = 2.58$$

3. Results.

3.1. Ranking items of expectation and anxiety based on defuzzification. Table 2 displays the items' ranking based on defuzzification. In the category **I**, both parent and teacher groups ranked E3 as the second and E2 as the least. In the category **II**, parent and teacher groups both considered A6 was the third and A3 was the least. The results reveal that expectations of preschool English curriculum in parent group and teacher group had consistency in E2 and E3 but had inconsistency in E1 and E5. In the category **II**, the item was noted in high-score cluster or low-score cluster to examine the consistent opinion of important level in parent and teacher groups. In both parent and teacher groups, A2, A6 and A7 were in high-score clusters. It means that parents and teachers both agreed that the very important level of A2, A6 and A7. In both parent and teacher groups, A3, A8 and A10 were with low important level.

TABLE 2. Fuzzy means, defuzzification, and ranking of preschool English curriculum

Category	Item	Fuzzy Means (Parent)	<i>R</i>	Rank	Fuzzy Means (Teacher)	<i>R</i>	Rank
I Expectations of English curriculum in preschool	E1	[3.61,5.15]	4.76	1	[2.47,3.96]	3.59	4
	E2	[3.31,4.87]	4.47	5	[2.44,3.92]	3.55	5
	E3	[3.60,5.11]	4.73	2	[2.82,4.28]	3.92	2
	E4	[3.41,4.89]	4.52	4	[2.63,4.10]	3.74	3
	E5	[3.48,4.90]	4.56	3	[2.88,4.38]	4.01	1
II Anxiety of teachers' English ability	A1	[3.62,5.15]	4.76	5	[2.44,3.88]	3.53	7
	A2	[3.81,5.27]	4.91	2	[2.68,4.14]	3.78	5
	A3	[2.63,4.02]	3.68	10	[1.77,3.04]	2.75	10
	A4	[3.34,4.80]	4.44	7	[3.00,4.38]	4.05	4
	A5	[3.23,4.63]	4.29	8	[3.31,4.69]	4.36	1
	A6	[3.76,5.18]	4.83	3	[3.04,4.47]	4.12	3
	A7	[3.93,5.33]	4.99	1	[3.24,4.62]	4.29	2
	A8	[2.94,4.44]	4.06	9	[2.67,4.00]	3.69	6
	A9	[3.70,5.21]	4.83	4	[2.33,3.73]	3.39	9
	A10	[3.51,4.97]	4.61	6	[2.49,3.83]	3.51	8

Note. *R* = defuzzification

3.2. Ranking each item of expectation and anxiety by fuzzy distance. In Table 3, we use fuzzy distance and rank each item in its own category or in both two categories. In the category **I**, the fuzzy distance of E1 is the biggest ($d = 1.17$), then followed by E2 ($d = 0.92$) and the last is E5 ($d = 0.56$). In the category **II**, the fuzzy distance of A9 is the biggest ($d = 1.44$). The second is A1, then followed by A2 and A10. The smallest fuzzy distance in this category is A5 ($d = 0.07$). Furthermore, we ranked all items in parent and teacher groups. Even in the case of combining into two categories, A9 and A1 are still the largest and second fuzzy distance. E1 is the third ranking in all items though as the biggest in category **I**. The smallest fuzzy distance of all items is A5. The least second and third are A8 and A4. All the items can reflect useful information to further interpretation.

3.3. Correspondence and mismatch. The results of correspondences and mismatches of preschool English curriculum using fuzzy distance, are shown as Table 4. The correspondence means that the fuzzy distance of the item is small between parents and teachers. Whereas, the mismatch means that the fuzzy distance of the item is big between parents and teachers. This study found that both teachers and parents agree with A5 (Worry about preschool teachers may teach wrong English), A8 (English should be the preschool English teacher's mother language) and A4 (Preschool teachers are not professional in teaching English); it implies that the related issues should be improved immediately. While teachers and parents perceived greater gaps among A9 (Preschool teachers can prepare appropriate resources for English learners), A1 (Preschool needs to provide English basic course) and E1 (Early childhood is the critical period of learning English). How to implement the preschool English Curriculum effectively still needs consensus.

4. Conclusions. This research used fuzzy statistics to determine the correspondences and mismatches of expectations of preschool English curriculum and anxiety of teachers' English ability. Top three items of correspondences and mismatches were determined by fuzzy statistics. This study found that parents and teachers with consistent opinions of preschool English curriculum are as follows:

- a. The worry of preschool teachers may teach wrong English;

TABLE 3. Fuzzy distance and ranking of preschool English curriculum

Category	Items		Fuzzy distance	Ranking in category	Rank
I Expectations of English curriculum in preschool	E1	Early childhood is the critical period of learning English	1.17	1	3
	E2	Children can get good grade in English exams	0.92	2	7
	E3	To build children's English learning ability	0.81	3	8
	E4	Children can get better career in the future	0.79	4	9
	E5	To enhance children's internationalization	0.56	5	12
II Anxiety of teachers' English ability	A1	Preschool needs to provide English basic course	1.23	2	2
	A2	Preschool needs to provide integrating English courses	1.13	3	4
	A3	Preschool needs to provide whole day English courses	0.94	5	6
	A4	Preschool teachers are not professional in teaching English	0.39	8	13
	A5	The worry about preschool teachers may teach wrong English	0.07	10	15
	A6	The preschool teachers who teach English should pass the GEPT (the general English proficiency test)	0.72	6	10
	A7	The preschool teachers who teach English should have the English teacher certificate	0.71	7	11
	A8	English should be the preschool English teacher's mother language	0.38	9	14
	A9	Preschool teachers can prepare appropriate resources for English learners	1.44	1	1
	A10	Preschool can provide English-learning supporting environment	1.10	4	5

b. English should be the English teacher's mother language;

c. Preschool teachers are not professional in teaching English.

On the other hand, the different opinions of preschool English curriculum between parents and teachers are as follows:

a. Preschool teachers can prepare appropriate resources for English learners;

TABLE 4. Top three correspondences and mismatches of preschool English curriculum

Correspondence			
Rank	Items		Fuzzy distance
1	A5	The worry about preschool teachers may teach wrong English	0.07
2	A8	English should be the preschool English teacher’s mother language	0.38
3	A4	Preschool teachers are not professional in teaching English	0.39
Mismatch			
Rank	Items		Fuzzy distance
1	A9	Preschool teachers can prepare appropriate resources for English learners	1.44
2	A1	Preschool needs to provide English basic course	1.23
3	E1	Early childhood is the critical period of learning English	1.17

- b. Preschool needs to provide English basic course;
- c. Early childhood is the critical period of learning English.

In this study, we suggest the government should adjust the English curriculum policy based on the consensus of parents and teachers. For example, parents and teachers are worried about that preschool teachers are unprofessional English teachers and may teach wrong English. They all disagreed that English should be the teacher’s mother language. Based on the findings, the government may open more English courses and promote English capabilities for preschool teachers. The preschool managers also need to encourage teachers to enhance their English teaching skills.

The perceived gaps between parents and teachers provide much clear information for related policy makers. Similar with previous studies, this study found preschool teachers lack confidence of having ability to prepare appropriate resources for the young learners. Moreover, the early childhood is the critical period of learning English, while teachers’ perception cannot fit the parents’. Based on this, we suggest that the government can provide more activities for preschool teachers to experience British and American children’ cultures and literature. Also, the government can supply sufficient resources and equipment, such as picture books, medias, and Apps, to help preschool teachers to prepare English courses in reading, writing, listening and speaking.

This study provides a practical example by using fuzzy statistics to determine the gaps between parents and teachers with preschool English curriculum. The self-designed questionnaire and selected items work well in this study. For further studies, we suggest extending the samples to wide areas; thus the evidences will provide more practical values for related policy making.

REFERENCES

[1] Taiwan National Development Council, Executive Yuan, *Press Release: Taiwan Launches the Policy of Developing Taiwan into a Bilingual Nation by 2030 and Deregulates Bilingual Education*, <https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzExL3JlbGZpbGUvMC8xMjE2OS85ZDcwZTk2Mi05MDkxLTQwOTktYjE2Zi1iNDk2ZWlyZmZkYTkcGRm&n=UHJlc3MgUmVsZWZzZSBvbiBEZWNlbWJlciA2LCAyMDE4LnBkZg%3d%3d&icon=..pdf>, 2018.

[2] Taiwan National Development Council, Executive Yuan, *Blueprint for Developing Taiwan into a Bilingual Nation by 2030*, <https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzExL3JlbGZpbGUvMC8xMjE2OS9lOWlZjRkZS05YmZmLTRiNzYtYTBiZS05NzQ5ODU3MzhmMzkucGRm&n=Qmx1ZXByaW50IGZvcilBEZXXZlbg9waW5nIFRhaXdhbiBpbmRvIGegQmlsaW5ndWFsIE5hdGlvbiBieSAyMDMwLnBkZg%3d%3d&icon=..pdf>, 2018.

- [3] H. C. Hsu, *Case Study of Parental Expectations on Children Learning English at Preschools in Taipei*, Master Thesis, Department of Children English Education of National Taipei University of Education, 2018.
- [4] *An English Report in Taiwan Early Learners*, http://www.toefl.com.tw/junior/new-pdf/20180527_young_students.pdf, 2018.
- [5] I. Li, H. H. Chiou and H. S. Lu, Parents' expectation and children's learning related behaviors in English as foreign language (EFL) classrooms, *Journal of Pingtung University of Education*, vol.26, pp.325-342, 2007.
- [6] C. Y. Lin and H. C. Chen, Perceptions of early childhood English education, *International Journal on Studies in English Language and Literature*, vol.4, no.11, pp.62-70, 2016.
- [7] L. I. Chuang, *An Analysis on Parental Choice Regarding Private Child-Care Institutes in the Taipei Area*, Master Thesis, Department of Infant and Child Care of National Taipei University of Nursing and Health Sciences, 2014.
- [8] H. T. Huang, D. F. Chang and H. J. Weng, Selecting managerial strategies by using fuzzy logics for kindergarten under the decreasing birth rate, *ICIC Express Letters, Part B: Applications*, vol.8, no.10, pp.1439-1447, 2017.
- [9] W. L. Chan, The discrepancy between teachers' beliefs and practices: A study of kindergarten teachers in Hong Kong, *Teacher Development*, vol.20, no.3, pp.417-433, 2016.
- [10] J. Chung and T. Choi, English education policies in South Korea: Planned and enacted, in *English Language Education Policy in Asia, Part of the Language Policy*, R. Kirkpatrick (ed.), Cham, Springer, 2016.
- [11] R. H. Zaifuddin, The barriers to implementing English school based curriculum in Indonesia: Teachers perspective, *International Journal for Innovation Education and Research*, vol.3, no.4, pp.102-110, 2015.
- [12] G. Öztürk, Foreign language teaching anxiety among non-native teachers of English: A sample from Turkey, *Sakarya University Journal of Education*, vol.6, no.3, pp.54-70, 2016.
- [13] T. Machida, Japanese elementary school teachers and English language anxiety, *Wiley online Library*, vol.7, no.1, pp.40-66, 2016.
- [14] K. Clark-Goff and Z. Eslami, Exploring change in preservice teachers' beliefs about English language learning and teaching, *Iranian Journal of Language Teaching Research*, vol.4, no.3, pp.21-36, 2016.
- [15] D. F. Chang, W. C. Chou and C. W. Yu, Fuzzy relationship between Facebook using and security awareness, *ICIC Express Letters*, vol.8, no.1, pp.31-36, 2014.
- [16] D. F. Chang, Y. Y. Juan and W. C. Chou, Building better discipline strategies for schools by fuzzy logics, *International Conferences on Educational Technologies and Sustainability, Technology and Education*, IADIS, New Taipei City, Taiwan, pp.67-74, 2014.
- [17] D. F. Chang and H. M. Wang, Colleagues' perception on servant leadership explained by fuzzy measurement, *ICIC Express Letters*, vol.8, no.1, pp.165-171, 2014.