Nothing is More Wonderful Than Children : Performance Evaluation of After School Care Policy in Taiwan

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ABSTRACT

This study discusses the effective evaluation of an after-school care services program in Taiwan according to a two-level review of children and parents. Because the collected data are uncertain and incomplete, this study uses fuzzy statistics analysis for evaluation instead of traditional methods. The results show: Overall, parents and students have positive understandings of, support for, and affirmation of the after-school care policy. Both students and parents also have good attitudes toward and satisfaction concerning policy status. And the most important function that parents and students rely on is “Homework Instructions”. About the standard fee charged by the Ministry of Education is generally accepted by most parents.

Recommendations: First, teachers still need to communicate with parents in a timely manner about the after-school care policy. Second, because after-school care services meet the needs of parents and students, schools should continue to promote it.

Keywords: After-School, Child Care, Compulsory Education

INTRODUCTION

Of so many marvelous things, nothing
Is more wonderful than man, he crosses the fomay sea
In the south wind, navigating its depths and crests;
And the mother of gods, the sovergein Earth, immortal,
Inexaustible, year after year he takes his plow
And furrows her with horse and mule.
Sophocles, Antigone, Line 332-341

The choice of after school care can be extremely difficult, even traumatic for parents. Social scientists have recently started drawing on popular folktales such as after school care in order to uncover some of the complex socio-psychological elements in the decision, which is often more protracted and involved for modern parents. How to evaluate the performance of after school care it is also important to evaluate the influence of school children’s achievement.

It is traditional in society for children to be taken care at the paid care center. In families where children go to the after school care, the childcare role may also be taken on by the extended family/school. In the absence of parents and the extended school/family willing to care for the children, are a way of providing for children's study as well as care. Commercial care centers are open for set hours, and provide a standardized and regulated system of care/study for after school children. Parents may choose from a commercial care center close to their work, and some companies offer care at their facilities.
Active children may thrive in the educational activities provided by a quality commercial care center, but according to the National Center for Early Development and Learning, children from low quality centers may be significantly less advanced in terms of vocabulary and reading skills. Classes are usually largest in this type of care, ratios of children to adult caregivers will vary according to state licensing requirements.

After school care can be based in a center, family child care home or a public school. Head Start is a federally funded program for regular income children ages 6 and 12 and their families. Regardless of type of care chosen, a quality care provider should provide children with (a) light, bright and clean areas to study (b) be the kind of person you can have confidence in leaving your child with. Most western countries also have compulsory education during which the great majority of children are at school starting from five or six years of age. The school will act in loco parentis meaning "in lieu of parent supervision".

The competitive ability of a country can be promoted by well-educated people trained at school and in the family. The recent low birth rate in Taiwan has necessitated better circumstances for taking care of school-age children. Family patterns change rapidly because of the changeable modern social structure. Double-income families, nuclear families (parents and children), single-parent families, and three-grandparent families are common family types. The "Taiwan-Fukien area children and adolescents living conditions survey analysis" from the Ministry of the Interior showed in 2001, that the nuclear family household type made up 51.77% of all families; this percentage dropped to 51.72% in 2005. However, single-parent and grandparent-breeding family patterns rose from 4.25% to 5.47% (Ministry of the Interior, 2001; 2005).

These statistics show that the family pattern is changing. Single-parent families and grandparent-breeding families are increasing. The nuclear family has replaced the three-generational family to become the most important family type, meaning that children receive fewer resources from a family support system. Because most modern families are dual-earner families, full-time childcare at home has gradually decreased. Survey data about the "at home with adult care" ratio from the Ministry of the Interior showed that from 2001 to 2005, after-school care before dinner time in the family declined from 74.66% to 64.90%. (Ministry of the Interior, 2001; 2005)

Data from a government-related survey revealed that current social family functions have gradually declined. Because of economic factors, some families have adopted a laissez-faire attitude toward school children (Chang, 2010). Therefore, it is impossible to rely on individual families to meet the needs of school-age children. Many school-age children may not receive appropriate care after school. Because the government needs to protect the safety of students and help relieve pressure on parents to take care of children, the "after-school care program," combining community and school resources was established. The Ministry of Education (2003) has enacted rules about after-school care services under the Child Welfare Law to promote healthy development of children, enhance the relationship between couples, aid in the upbringing of families, and help parents work without distraction. Under this plan, the Ministry of Education (MoE) encourages all elementary schools to organize an “after-school care program” to provide a safe, affordable program to cater to the needs of parents and children. However, because of individual differences, the "after-school care program" is rather diversified. Therefore, course content and fees are not completely the same. The current research adopts a comprehensive view to assess parent and student awareness regarding “after-school care services” promotion as well as their attitude and satisfaction toward the program. The research results may serve as a reference for the government to improve and implement their future policy.
AFTER-SCHOOL CARE POLICY

The following sections show the meaning, function, and current situation of the after-school care policy in Taiwan.

The meaning and function of after-school care services

The main purpose of these services is to promote healthy development of children, enhance the relationship between couples, give aid to upbringing in families, and help parents work without distraction (Ministry of Education, 2003). Therefore, school care services should be based on the rights of the child and pay attention to the needs of children (Wang, 2007). The Peng Wan-ru Foundation (2011) believed that after-school care services should help provide a good and safe learning environment for children to grow up properly and help train students to develop full human physical and mental equilibrium. After-school care services help students to form a stable life, conscientiously do their homework, and obtain good learning habits without emphasizing academic competition. After-school care services propose to balance the needs of parents and students, provide a secure care environment, help students develop regular learning habits, reduce the burden on parents, and extend the function of school education. Most scholars agree that after-school care should offer students a safe environment (Wang & Chen, 2009b; Bae, Oh, Kim, Lee, & Oh, 2010; Ma, Andjela, Shavaun, Karly, & Jessica, 2009; Neuman, 2010; Rinehart, 2008) and reduce the burden on parents (Ho, 2008; Bae, S., Oh, H., Kim, H., Lee, C., & Oh, B., 2010; Rinehart, J., 2008; Young, PG, 2010). After-school care can also stimulate student interest in learning to improve academic performance (Neuman, 2010; Fleming, 2011; Rua, 2008). Wang and Chen (2009a) indicated that students receive support from peer friendships by joining after-school childcare services that meet their needs (Wang & Chen, 2009b; Hirsch, 2011). In summary, after-school care has five functions: providing a safe environment, reducing parental burden, inspiring students, improving student performance, and meeting the needs of students.

Implementation of after-school care service status (number of students, duration, course content, and fees)

The Ministry of Education after-school care program is based on the 19th provision of the Child and Youth Welfare Law (Ministry of the Interior, 2003), which promotes the healthy growth of children, supports female marriage and childbirth, and eases parents’ workload. The program has been implemented for nearly ten years.

The statistics of the Ministry of Education (2011) indicate that by 2011, schools offering after-school care services reached 1,600, accounting for 61% of the schools in Taiwan, with 145,678 students participating in the program. The government assists in participation fees for low-income households, the disabled, indigenous, special children, and children of foreign spouses. From 2003 until 2010, the cumulative total of grant-aided students reached 360,000 people, with total assistance of NTDS$1.26 billion being provided. Compared to the average amount (more than one billion dollars) that the United States Federal Government offers for after-school programs each year, Taiwan supplemental aid can still be increased (Dietel, 2009).

This study was conducted in one of the public schools that started after-school care services under the provision of the Ministry of Education during the 2010 academic year. To date, the school has one low-grade and one mid-grade class. The low-grade class has 17 students and the mid-grade has 25, for a total of 42 students. Thirty-two of these students pay their own fees, two of them are low-income students, and eight are special students.
Wang and Chen (2009c) indicated that parents were not satisfied with the environment and equipment of after-school care services, and suggested that the content of after-school care needed more diversification. Due to time limitations, teachers for after-school care services cannot help each student solve their academic problems as they do in a private institution (Wang & Chen, 2009a). After comparing the differences between public and private after-school care service (Table 1), this study found that whether a school can meet the needs of parents and students is the most important factor in developing continued promotion for after-school care services.

Table 1: Comparison table of elementary school after-school care services and implementation status.

<table>
<thead>
<tr>
<th>Ministry of education provision</th>
<th>Case School status</th>
<th>Private institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course content</td>
<td>Planning service activities and principles that should be diverse and lively; taking into account writing homework, recreation, physical activity, and life skills</td>
<td>Contains homework instruction, recreation and sports, physical activities, reading, information, and life skills</td>
</tr>
<tr>
<td>Time</td>
<td>Accommodates parent work time</td>
<td>Monday, Tuesday, Thursday, Friday ending at 5:30 pm</td>
</tr>
<tr>
<td>Payment</td>
<td>Each student’s fee is based on the period fees of teachers on duty (NTDS 260) and off duty (NTDS450). The calculation formula is as follows: (NTDS260 × total periods of care service ÷ 0.7 ÷ total number of students) + (NTDS450 × total periods of care service ÷ 0.7 ÷ the number of students)</td>
<td>Approximately NTDS1,000 per month for mid-grades, approximately NTDS1800 for lower-grades (including all materials and activity costs)</td>
</tr>
<tr>
<td>Number of students</td>
<td>The number of students per class is approximately 20 and not to exceed a maximum of 25 members. If there are disabled students in the class, reducing the number of students should be considered with no more than two physically and mentally challenged students in each class.</td>
<td>According to the main executive points of Changhua County, elementary after-school care services provides for 15 members per each class; no more than 25 students can attend a class.</td>
</tr>
</tbody>
</table>

**RESEARCH METHODS**

This study evaluates after-school care services according to three levels, including parent and student cognition, attitudes, and satisfaction. The study also investigates whether the after-school course, duration, and fee can meet the needs of parents and students. However, these two parts of the research are unclear because they involve subjective judgments of human affairs, and demand diverse subjective consciousness. Because the thinking and feelings of most people are complex, it is difficult to answer an affirmative “Yes or No” to posed questions. The real answer is often vague and not clear enough to lead to a decision (Wang, 2005). Wu (2005) proposed that fuzzy theory refers to the human way of thinking about the environment with fuzzy measurement and classification, which provides a rather robust way of describing how to handle multiple, complex, ambiguous, and uncertain phenomena. The size of this study
is N=50, and the valid sample is N=43. The study sample is small, and therefore suitable for using nonparametric statistical analysis with fuzzy statistics.

The current study used the fuzzy statistics meter, which concluded whether parent and student cognition of after-school care services, course content, their satisfaction, and their attitude complied with their requirements. This research also provides an effective evaluation of after-school care services. The following section describes the fuzzy statistical method used in this study.

Degree of membership

In a traditional sample survey, respondents select a single answer or a range of answers. However, traditional methods cannot truly reflect the complex ideas of each applicant. If people use the membership function to express their degree of feeling, the answer given will be close to the real idea. Unfortunately, scholars do not agree on the construction of ambiguous data. Few studies have used the continuous fuzzy description of construction methods. The core problem is that all data determine the fuzzy membership function, but the construction of membership functions is quite subjective.

Membership grade function is the most basic concept and foundation of the fuzzy theory, and derives from a traditional collection of characteristic functions used to express elements of fuzzy set membership grade. The range for the grade is from 0 to 1. Not only does the grade describe fuzzy set properties, it also quantifies them. Precise mathematical methods analyze and deal with fuzzy information. Setting up a membership function to completely express the fuzzy concept is not easy. Because the membership grade function derives from the individual's subjective consciousness, there is no general theorem or formula by which to develop it; thus, it is typically based on experience or statistics. Therefore, the establishment of a membership function is typically controversial, and membership functions are not widely accepted or used (Wu, 2005).

De-fuzzification of discrete fuzzy data

Let D be a fuzzy sample on a domain U with sequence of continuous variables \{L_i; i=1,...,k\}. \(\mu_D(L_i) = m_i\) is the corresponding number of membership \(L_i\), \(\sum_{i=1}^{n} \mu_D(L_i) = 1\). We call \(D_f = \sum_{i=1}^{n} m_i L_i\) a discrete fuzzy sample D, the defuzzification value.

Example: Let \(D = \frac{0}{1} + \frac{0.2}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0}{5}\) be a discrete fuzzy sample on the sequence of the semantic variable with \{L_1 = 1, L_2 = 2, L_3 = 3, L_4 = 4, L_5 = 5\}.

The discrete fuzzy data D defuzzification value should be

\[D_f = \sum_{i=1}^{k} m_i L_i = 0.1 + 0.2 \cdot 2 + 0.5 \cdot 3 + 0.3 \cdot 4 + 0.5 = 3.1 \quad (Wu, 2005)\.

Fuzzy sample mean

Set \(U\) as a universe of discourse. Let \{L_1, L_2, ..., L_k\} be a universe of discourse U’s k-equidistant scale variables. \{x_1, x_2, ..., x_n\} is used for a set of fuzzy samples, and every sample \(x_i\) has a corresponding variable \(L_{i,j}\) the membership grade of which is \(m_{i,j}\), and \(\sum_{j=1}^{k} m_{i,j} = 1\). Let \(M_j\) be a group of mid-point \(L_j\). If

\[F\bar{x} = \frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{k} m_{i,j} M_j \in L_j,\]

we define fuzzy sample \{x_1, x_2, ..., x_n\} and it’s fuzzy sample mean: \(F\bar{x} = L_k\)

\((Wu, 2005)\)
Testing hypothesis of homogeneity for discrete fuzzy samples

Wu (2005) indicated that if set $\Omega$ is a domain, $\{L_j, j=1,\ldots,k\}$ are ordered linguistic variables on $\Omega$, and $\{a_1,a_2,\ldots,a_m\}$ and $\{b_1,b_2,\ldots,b_n\}$ are random fuzzy samples from population A, B with a standardized membership function $mA_{ij}, mB_{ij}$.

If $H_0: F\mu_A=F\mu_B, A, B$ have the same population of two distribution ratios.

$$F\mu_A = \frac{M_A}{L_1} + \frac{M_A}{L_2} + \ldots + \frac{M_A}{L_k} \text{ vs. } F\mu_B = \frac{M_B}{L_1} + \frac{M_B}{L_2} + \ldots + \frac{M_B}{L_k}.$$  

$$\chi^2 = \sum_{i=A,B} \sum_{j=1}^k \frac{([M_{ij}] - e_j)^2}{e_j}$$, ($e_j$ is the expected number. In order to meet the software calculation $\chi^2$ test, the form using the total membership of the round obtains the integer value. This calculation for a sample number greater than 25 fuzzy samples has little effect on calculated results).

The hypothesis tested in this study takes a $\alpha=.05$ significance level, and if $\chi^2 > \chi^2_\alpha(k - 1)$, then $H_0$ is rejected.

**Fuzzy samples trapezoidal fuzzy number measured**

Measurement computation and ordering with fuzzy data

1. Ordering fuzzy data

Wu (2005) stated that a trapezoid fuzzy set can be viewed as a continuous fuzzy set, which further represents uncertain events. When a sample of trapezoid-data are presented, we are interested in scaling its value on the real line. In some practical applications, however, it is reasonable to consider, instead of the original class of all linear re-scalings, a more general class of non-linear transformations between scales. For example, earthquake energy can be described both in typical energy units and in the logarithmic (Richter) scale. Similarly, the power of a signal or sound can be measured in watts and can also be measured in the logarithmic scale in decibels.

When considering reasonable and meaningful conditions, mapping trapezoid-data into the real line requires the identification of two conditions. This means that the transformation data should be (1) finite-dimensional and (2) the dependence on these parameters should be smooth (differentiable). In mathematical terms, this means that the transformation group is a Lie group.

Once such a transformation is selected, instead of the original trapezoid-data, we have a new value $y = f(x)$. In an ideal situation, this new quantity $y$ is normally distributed. (In practice, a normal distribution for $y$ may be a good first approximation.) When selecting the transformation, we must take into account that, due to rescaling possibilities, the numerical values of the quantity $x$ are not uniquely determined.

Definition: Scaling for a trapezoid fuzzy number on R.

Let $A=[a,b,c,d]$ be a trapezoid fuzzy number on $U$ with its centroid $(cx, cy) = \left( \int_{U} xu_{A}(x)dx, \frac{\int_{U} \frac{1}{2}(u_{A}(x))^2 dx}{\int_{U} u_{A}(x)dx} \right)$. The defuzzification value $RA$ of $A=[a,b,c,d]$ is defined as

$$RA = cx + \left(1 - \frac{\ln(1 + \|A\|)}{\|A\|} \right);$$

where, $\|A\|$ is the area of the trapezoid.
For convenience, \( RA = -\frac{(a + b)^2 + (c + d)^2 + (ab - cd)}{3((c + d)-(a + b))} \), if \( A \) is a trapezoid; \( RA = \frac{a + b + d}{3} \), if \( A \) is a triangle; \( \mathcal{R}(A) = \frac{b + c}{2} \), if \( A \) is an interval.

Example 3.1
Let \( A_1 = [2,2,3,3], A_2 = [1,1,4,4], A_3 = [1,2.5,2.5,4], A_4 = [1,2.3,4], A_5 = [1,2,3,8] \) Then,
\[ RA_1 = 2.5 + (1 - \frac{\ln(1+1)}{1}) = 2.5 + 0.3069 = 2.8069, \quad RA_2 = 2.5 + (1 - \frac{\ln(1+3)}{3}) = 2.5 + 0.5379 = 3.0379 \]
\[ RA_3 = 2.5 + (1 - \frac{\ln(1+1.5)}{1.5}) = 2.5 + 0.3891 = 2.8981, \quad RA_4 = 3.83 + (1 - \frac{\ln(1+3.5)}{3.5}) = 3.83 + 0.5703 = 4.4033 \]
\[ RA_5 = 2.5 + (1 - \frac{\ln(1+2)}{2}) = 2.5 + 0.4507 = 2.9507, \quad RA_6 = 3.79 + (1 - \frac{\ln(1+4)}{4}) = 3.79 + 0.5976 = 4.3936. \]

Obtaining a clear picture concerning the distance between the idea and the actual data necessitates the following definition about efficiency, for which the value will be a standardized constraint on 0 and 1. This study uses exponential transformation \( f(x) \) that transforms the distance of the fuzzy data set of possible values of \( x \) into \((0,1).\) A natural symmetry requirement explains the selection of the exponential function as an appropriate transformation of all-positive quantities (Wu, 2005).

**EMPIRICAL RESEARCH**

The questionnaire was divided into a survey of students and parents, consisting of six questions. Questionnaires were based on the fuzzy method and asked participants to fill in blanks. The study target was children who belong to one of the elementary schools that offer after-school services in Changhua County, and their parents. Before filling out the questionnaires, the researcher explained the questionnaire. Out of 50 questionnaires, 25 were received from children, and 18 from parents, yielding 43 valid samples. An analysis of the sample structure and descriptive statistics is shown in Tables 3 and 4.

According to Tables 3 and 4, the study finds that fourth-grade students made up 68% of all samples, and that the normal family type also made up 68% of all parent samples. However, the proportion of single-parent families and grandparent-breeding families made up a very high proportion at 32%, which indicates that these two family types require continuous intensive care. Eighteen parent samples revealed that 89% of parents work.

### Table 3: Student sample structures and descriptive statistics.

<table>
<thead>
<tr>
<th>Background variables</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>Third Grade</td>
<td>8</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>Fourth Grade</td>
<td>17</td>
<td>68%</td>
</tr>
<tr>
<td>Gender</td>
<td>Men</td>
<td>12</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>13</td>
<td>52%</td>
</tr>
<tr>
<td>Family Type</td>
<td>Normal Family</td>
<td>17</td>
<td>68%</td>
</tr>
<tr>
<td></td>
<td>Single-parent Family</td>
<td>7</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>Grandparent-breeding Family</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

### Table 4: Parent sample structures and descriptive statistics.

<table>
<thead>
<tr>
<th>Background variables</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Men</td>
<td>10</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>8</td>
<td>44%</td>
</tr>
</tbody>
</table>

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After-school care cognitive status, attitudes, and satisfaction

1. Analysis of parent and student cognition, attitudes, and satisfaction

Table 4.1 shows the results from the study. It was discovered that students and parents "slightly, but not particularly, understood" after-school policy. Their attitudes toward the school handling of after-school care policies showed "strong recognition and support." Students and parents expressed that after-school care policies were "most satisfactory." Student satisfaction with after-school care services exceeded that of parents.

Table 4.1: Average membership fuzzy grade for parent and student cognition, attitudes, and satisfaction with after-school care

<table>
<thead>
<tr>
<th></th>
<th>Cognition of policy</th>
<th>Attitude toward policy</th>
<th>Satisfaction with policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>3.81</td>
<td>4.14</td>
<td>3.92</td>
</tr>
<tr>
<td>Students</td>
<td>3.996</td>
<td>4.176</td>
<td>4.34</td>
</tr>
</tbody>
</table>

2. Chi-square homogeneity test of parent and student after-school care service cognition

A homogeneity test was conducted for student and parent awareness of after-school care. The results from Table 4.2 show that parents and student awareness of after-school care services differ significantly.

Table 4.2: Chi-square homogeneity test of parent and student after-school care service cognition

<table>
<thead>
<tr>
<th>Cognition</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>4</td>
<td>15</td>
<td>47</td>
<td>80</td>
<td>54</td>
</tr>
<tr>
<td>Students</td>
<td>20</td>
<td>4</td>
<td>43</td>
<td>23</td>
<td>110</td>
</tr>
</tbody>
</table>

$H_0$: There is no difference in parent and student cognition regarding after-school care service

$\chi^2 = 67.879 > 9.48 = \chi_{0.05}^2(4)$; Rejected $H_0$

3. Chi-square homogeneity test of parent and student attitudes toward after-school care

A homogeneity test was conducted for child and parent attitudes toward after-school care. The results from Table 4.3 show that parent and child attitudes toward after-school care services significantly differ.

Table 4.3: Chi-square homogeneity test of parent and student attitudes of after-school care

<table>
<thead>
<tr>
<th>Attitude</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>4</td>
<td>4</td>
<td>34</td>
<td>72</td>
<td>86</td>
</tr>
<tr>
<td>Students</td>
<td>11</td>
<td>6</td>
<td>31</td>
<td>43</td>
<td>109</td>
</tr>
</tbody>
</table>

$H_0$: There is no difference in parent and student attitudes of after-school care

$\chi^2 = 13.831 > 9.48 = \chi_{0.05}^2(4)$; rejected $H_0$

4. Chi-square homogeneity test of parent and student satisfaction with after-school care

Results for the homogeneity test of child and parent satisfaction with after-school care in Table 4.4 show that parent and child satisfaction with after-school care services significantly differ.
Table 4.4: Chi-square homogeneity test of parent and student satisfaction with after-school care.

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>2</td>
<td>7</td>
<td>27</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>Students</td>
<td>3</td>
<td>3</td>
<td>14</td>
<td>18</td>
<td>62</td>
</tr>
</tbody>
</table>

\( H_0: \) There is no difference in parent and student satisfaction with after-school care

\[ \chi^2 = 13.136 > 9.48 = \chi^2_{0.05}(4) \]: rejected \( H_0 \)

From the above study, parent and student cognition of after-school care service policy is parents \( M = 3.81 \), children \( M = 3.996 \), attitude is parents \( M = 4.14 \), children \( M = 4.176 \), and satisfaction is parents \( M = 3.92 \), children \( M = 4.34 \). Overall, responses for both sides showed positive understanding, support, and affirmation. The next step analysis shows that student cognition \( (\chi^2 = 67.879 > 9.48 = \chi^2_{0.05}(4)) \), attitude \( (\chi^2 = 13.831 > 9.48 = \chi^2_{0.05}(4)) \), and satisfaction \( (\chi^2 = 13.136 > 9.48 = \chi^2_{0.05}(4)) \) significantly differs from and exceeds that of parents.

**Needs for after-school care services**

1. Analysis of reasons students participate in after-school care

   The results of this study as to reasons students participate in after-school care are shown in Table 4.5

   The highest fuzzy mean is “Teacher instruction,” and the lowest fuzzy mean is “parents have no time.” This result shows that most students participate in after-school care because of the “Teacher instruction” factor.

   Table 4.5: Analysis of reasons students participate in after-school care.

<table>
<thead>
<tr>
<th>Parents have no time</th>
<th>Meeting with classmates</th>
<th>Teacher instruction</th>
<th>Nothing to do after going home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuzzy mean</td>
<td>.112</td>
<td>.32</td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.168</td>
</tr>
</tbody>
</table>

2. Analysis of student preferences for after-school care

   The results from Table 4.6 show the analysis of student preferences for after-school care. The highest fuzzy mean is “Computer Activities,” and the lowest fuzzy mean is “reading activities.” This result shows that most students prefer “Computer Activities” during after-school care.

   Table 4.6: Analysis of student preferences for after-school care.

<table>
<thead>
<tr>
<th>Homework guidance</th>
<th>Reading Activities</th>
<th>Sports Activities</th>
<th>Computer Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuzzy mean</td>
<td>.136</td>
<td>.036</td>
<td>.224</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.604</td>
</tr>
</tbody>
</table>

3. Analysis of parent preferences for after-school care.

   The results of Table 4.7 show the analysis of parent preferences for after-school care. The highest fuzzy mean is “Homework guidance,” and the lowest fuzzy mean is “Life skills.” This result shows that most parents prefer “Homework guidance” during after-school care.

   Table 4.7: Analysis of parent needs for after-school care.

<table>
<thead>
<tr>
<th>Homework guidance</th>
<th>Reading Activities</th>
<th>Sports Activities</th>
<th>Life Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuzzy Mean</td>
<td>.656</td>
<td>.133</td>
<td>.144</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.067</td>
</tr>
</tbody>
</table>
The result shows that the most important factor for students participating in after-school care courses is “Teacher instruction” (M=.4); parent needs are also the same: “Homework guidance” (M=.656). Therefore, schools handling this type of program should focus more on “Homework guidance” to meet the needs of parents and students. Because “Computer Activities” is the most content popular with students (M = .604), schools offering after-school care services should arrange more computer activities for an appropriate course.

**Reasonable prices for after-school care service**

1. Analysis of a reasonable price standard for parents with the trapezoidal fuzzy number

According to trapezoidal fuzzy data analysis (Table 4.8), a reasonable fee for after-school care expected by parents is approximately NTD$700 (minimum monthly) and the average is between NTD$757 and NTD$1079. The maximum should not exceed NTD$1650. The current minimum charge is approximately NTD$670, the average is approximately NTD$958 to NTD$1117, and the maximum is not more than NTD$1590.

<table>
<thead>
<tr>
<th>Monthly Fees (NT dollar)</th>
<th>Lowest Fees (25 students charge per hour)</th>
<th>Average Fees (25 students charge per hour and administration fees)</th>
<th>Average Fees (15 students charge per hour)</th>
<th>Highest Fees (15 students charge per hour and administration fees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuzzy mean</td>
<td>700</td>
<td>757</td>
<td>1079</td>
<td>1650</td>
</tr>
<tr>
<td>Standard Fees Currently</td>
<td>670</td>
<td>958</td>
<td>1117</td>
<td>1596</td>
</tr>
</tbody>
</table>

2. Analysis of parent assessments of standard after-school care service fees

The result shows in Table 4.9 show that the reasonable fees expected by parents do not differ from the current standard fees ($T_{05}=26<T=49$). In other words, current standard fees charged by the MoE (Ministry of Education) are generally accepted by parents.

<table>
<thead>
<tr>
<th>RA</th>
<th>RA</th>
<th>RA</th>
<th>RA</th>
<th>RA</th>
<th>RA</th>
<th>RA</th>
<th>RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA 1</td>
<td>RA 2</td>
<td>RA 3</td>
<td>RA 4</td>
<td>RA 5</td>
<td>RA 6</td>
<td>RA 7</td>
<td></td>
</tr>
<tr>
<td>Reasonable Fees</td>
<td>700</td>
<td>872</td>
<td>1150</td>
<td>1187</td>
<td>751</td>
<td>1779</td>
<td>1083</td>
</tr>
<tr>
<td>Standard Fees Currently</td>
<td>1097</td>
<td>1097</td>
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<td>1097</td>
<td>1097</td>
<td>1097</td>
<td>1097</td>
</tr>
<tr>
<td>$d_i$</td>
<td>-397</td>
<td>-225</td>
<td>53</td>
<td>90</td>
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<td>-14</td>
</tr>
<tr>
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<td>d_i</td>
<td>$</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>$</td>
<td>d_i</td>
<td>$</td>
<td>11</td>
<td>6</td>
<td>13</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

$H_0$ acceptable and reasonable fees for parents are not different from current standard fees.

Wilcoxon Sign Rank Test:

$T^-=3+4+12+11+6+13=49$; $T^+=9+5+7+1+8+2+14+10=56$

$T_{05}=26<T^-=49$; Accept $H_0$
CONCLUSION

The thinking and feelings of most people changed when they answered the survey questions, so the study used fuzzy statistical concepts to explore the effectiveness of elementary after-school care services. Conclusions might serve as a reference for future promotion of after-school care services programs. In this study, the effectiveness evaluation of implementing an after-school care program is summarized as follows.

1. The study found that parent and student cognition of after-school care services policy is parents $M = 3.81$, students $M = 3.996$, attitude is parents $M = 4.14$, students $M = 4.176$, and satisfaction is parents $M = 3.92$, students $M = 4.34$. The responses show positive understanding, support, and affirmation.

2. In three aspects of after-school care: cognition, attitude, and satisfaction, students showed significantly higher rates than parents.

3. The most important factor for students participating in after-school care courses is “Teacher instruction” ($M= .4$); The needs for parents are also the same: “Homework guidance” ($M= .656$).


5. Parents think the reasonable minimum monthly fee is for after-school services is approximately NTDS$700, the average is approximately NTDS$757 to NTDS$1079, and the maximum should not exceed NTDS$1650.

6. Current standard fees charged by the MoE (Ministry of Education) are generally accepted by parents.

Finally, the recommendations proposed by the study are as follows:

1. Teachers need to advocate a timely “after-school care policy” to parents.

2. After-school care services meet the needs of parents and students, so schools should continue their promotion.

3. Schools providing after-school care services should focus particularly on "Homework guidance" to meet the needs of parents and children.

4. Schools can arrange “Computer Activities” during after-school care course.

REFERENCES


Ministry of the Interior, (2001). The Survey and Analysis about the 2001 living conditions of children in Taiwan and Fukien (Summary version). Retrieved June 8, 2011, from http://www.cbi.gov.tw/CBI_2/internet/main/search/search.aspx?key=%e5%85%92%e7%ab%a5%e7%94%9f%e6%b4%bb%e7%8b%80%e6%b3%81


