Abstract

This dissertation aims at investigating the geographical conditions, facilities, programs and status of the shelter and safety facilities of nine selected forest kindergartens in Gyeongsangbuk-do Province in Korea. Based on the surveys of instructors and participating teachers of forest kindergartens, this study provides several suggestions for improving the shelter and safety facilities of forest kindergartens.

The surveyed forest kindergartens had an average of 2.5 forest kindergarten instructors, while the number of participating children in the programs were gradually increasing. In 2017, an average of 9,621.5 children participated in the programs. In some forest kindergartens, the number of participants increased more than two times, three times in 2017 compared to 2016.

As a result, this study suggests following three improvements for the shelter and safety facilities in forest kindergartens. First, the scope of use of the shelters need to be expanded. Emergency kit should be kept in the shelters and the shelters should be constructed as fire-and-quake proof buildings. The shelters need to have air-conditioning and heating so that children can take a rest or enjoy more activities in the shelters. Second, safety facilities need to be improved to have more secure escape routes, more CCTVs and the safety facilities monitoring should be strengthened. Sign board for the children should also be improved to provide more details of the surrounding risks with pictures. Third, safety management should also be improved. Instructors and participating teachers of forest kindergartens need to have more training opportunities to learn how to utilize the shelter and safety facilities and they need to be more responsible and capable in securing safety in the daily activities in forest kindergartens.

[Keywords] Investigation, Developing, Shelter, Safety Facilities, Forest Kindergartens

1. Introduction

Forest kindergartens began in the 1950s with the aim of creating educational effects through outdoor activities in Scandinavian peninsular countries such as Denmark, Sweden, and Norway. Early scholars such as Froevel and Pestalozzi emphasized the importance of play in the infant development process[1], and the forest kindergarten model became popular because infants of various ages can get both physical and mental as well as educational effects by playing in clean nature through forest kindergartens. The Scandinavian model of forest kindergartens has spread around the whole of Europe, including Britain, Germany, and the United States, Canada, and Australia, as alternatives to the situation where urbanization along with industrialization made it difficult for infants and children to enjoy clean air, free space, and healthy diet in their daily lives[2]. Recently, concrete research has shown that forest activities can help infants develop self-esteem and independence and have a positive impact on creativity, emotional
stability, and social development, as well as on the promotion of learning ability. The demand for forest kindergartens as ecological alternative education is also growing[2].

Against this backdrop, Korea has also been spreading across the country since the first infant forest experience center was established in 2008. Korea's infant forest experience center refers to a facility that guides and educates infants to cultivate their emotions and achieve well-rounded growth by experiencing various functions of forests[3], which is established and operated by the Korea Forest Service, not by the education office. It is widely used as an "infant forest experience center" instead of a forest kindergarten because it is not a regular kindergarten[4]. The first infant forest experience center was launched in 2008 when the Northern Forest Service first provided forest kindergarten programs led by "forest commentators" to general kindergartens and daycare centers. Since then, infant forest experience centers have spread under the leadership of public institutions, with the Songpa-gu Office in Seoul running forest kindergartens on a trial basis in 2010[5]. Recently, the number of children's forest experience centers has gradually increased as children's interest in forest experience activities has increased. The number of forest experience centers currently operating nationwide increased to more than 77 as of 2016[6].

As such, the popularity of infant forest experience centers is increasing in Korea, but there is not much interest in the safety of infants participating in the program. What is particularly important about safety in infant forest experience centers is the shelter and safety facilities that help ensure safety[7]. However, there is no previous research on the shelter and safety facilities of infant forest experience centers. Therefore, this study investigated the facilities and use status of the infant forest experience center established by the Gyeongsangbuk-do Forest Service and local governments, investigated the actual conditions of evacuation and safety facilities, and proposed measures to improve the evacuation and safety facilities of infant forest experience centers based on the survey of relevant "forest teachers."

2. Research Method
2.1. Research subjects

The research team has surveyed a total of 68 teachers of infant forest experience centers, daycare centers, and kindergartens to investigate the awareness and practical requirements of the evacuation and safety facilities related to infant forest experience centers. The survey was conducted between September and October 2017.

Overall, for gender, 62 women(91.2 percent) and 6 men(8.8 percent) participated, and for age group, 15 people in their 20s(22.1 percent), 19 in their 30s(27.9 percent), 21 in their 40s(16.2 percent), and 13 in their 50s and older(19.1 percent) participated. For occupation, 27 teachers from infant forest experience centers(39.7 percent), 20 teachers from daycare centers(29.4 percent), and 16 teachers from kindergartens(23.5 percent) participated. In addition, for work period, 5 people with less than 1 year(7.4%), 18 with 1-2 years(26.5%), 26 in 3-5 years(38.2%), and 19 with 6 years or longer(27.9%) participated. As for the educational qualifications, 36 people had a certificate for forest education expert(52.9 percent), followed by 15 with the second-degree kindergarten teacher(22.1 percent), 11 with the first-degree child care teacher(16.2 percent), 7 with the first-degree kindergarten teacher and director of kindergarten(10.3 percent), 6 with the second-degree child care teacher(8.8 percent), and 3 with vice-director of kindergarten(4.4 percent) <Table 1>.
Table 1. General characteristics of the research subjects.

<table>
<thead>
<tr>
<th>Description</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>8.8</td>
</tr>
<tr>
<td>Female</td>
<td>62</td>
<td>91.2</td>
</tr>
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</tr>
<tr>
<td>50s or older</td>
<td>13</td>
<td>19.1</td>
</tr>
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<td>29.4</td>
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<td>Kindergarten teacher</td>
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<td>23.5</td>
</tr>
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<td>Infant forest experience center teacher</td>
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<td>39.7</td>
</tr>
<tr>
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</tr>
<tr>
<td>Less than 1 year</td>
<td>5</td>
<td>7.4</td>
</tr>
<tr>
<td>1-2 years</td>
<td>18</td>
<td>26.5</td>
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<td>3-5 years</td>
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<tr>
<td>6 years or longer</td>
<td>19</td>
<td>27.9</td>
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<tr>
<td>Director of kindergarten</td>
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<td>10.3</td>
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<tr>
<td>Vice-director of kindergarten</td>
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<td>4.4</td>
</tr>
<tr>
<td>Kindergarten teacher(1st degree)</td>
<td>7</td>
<td>10.3</td>
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</tr>
<tr>
<td>Childcare teacher(1st degree)</td>
<td>11</td>
<td>16.2</td>
</tr>
<tr>
<td>Childcare teacher(2nd degree)</td>
<td>6</td>
<td>8.8</td>
</tr>
<tr>
<td>Forest education expert</td>
<td>36</td>
<td>52.9</td>
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<tr>
<td>Total</td>
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<td>100.0</td>
</tr>
</tbody>
</table>

2.2. Measurement tools and data processing

The survey consists of a total of 10 questions, including 2 questions on awareness of the evacuation and safety facility system of infant forest experience centers, 1 question on utilization, 5 questions on utilization methods, and 2 questions on problems and improvements. The data collected from the survey were analyzed using the SPSS 21.0 Version. The analysis details are as follows. First, frequency analysis and multi-response analysis were conducted to identify the general characteristics of those surveyed. Second, cross-analysis was conducted to find out the current status and requirements of infant forest experience centers and to see if there are any differences depending on the general characteristics of the people surveyed.

3. Results and Discussions

3.1. Consciousness on use of evacuation and safety facilities in infant forest experience centers

3.1.1. Number of times to use evacuation and safety facilities during infant forest experience programs

The results of the analysis of the number of times of use of evacuation and safety facilities during infant forest experience programs are as shown in <Table 2>. Overall, 34 people(50.0%) said “never,” followed by 17 people(25.0%) with “1-3 times,” 11 people(16.2%) with “4-9 times,” and 6 people(8.8%) with “10 times or more,” which indicates that the utilization of evacuation and safety facilities is generally very low. There were no statistically significant differences depending on the general characteristics of the subjects surveyed(p>.05).
Table 2. Number of times to use evacuation and safety facilities during infant forest experience programs.

<table>
<thead>
<tr>
<th>Description</th>
<th>Never</th>
<th>1-3 times</th>
<th>4-9 times</th>
<th>10 times or more</th>
<th>χ² (p)</th>
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<td></td>
<td></td>
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<td>2(33.3)</td>
<td>0(0.0)</td>
<td>1(16.7)</td>
<td>1.706</td>
</tr>
<tr>
<td>Female</td>
<td>31(50.0)</td>
<td>15(24.2)</td>
<td>11(17.7)</td>
<td>5(8.1)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>1(6.7)</td>
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<td>30s</td>
<td>8(42.1)</td>
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<td>4(21.1)</td>
<td>1(5.3)</td>
<td>7.811</td>
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<td>5(23.8)</td>
<td>3(14.3)</td>
<td>4(19.0)</td>
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<td>3(23.1)</td>
<td>1(7.7)</td>
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<td>1-2 years</td>
<td>9(50.0)</td>
<td>5(27.8)</td>
<td>3(16.7)</td>
<td>1(5.6)</td>
<td>3.398</td>
</tr>
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<td>3-5 years</td>
<td>11(42.3)</td>
<td>7(26.9)</td>
<td>5(19.2)</td>
<td>3(11.5)</td>
<td></td>
</tr>
<tr>
<td>6 years or longer</td>
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<td>4(21.1)</td>
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<td>2(10.5)</td>
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<tr>
<td>Total</td>
<td>34(50.0)</td>
<td>17(25.0)</td>
<td>11(16.2)</td>
<td>6(8.8)</td>
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</tr>
</tbody>
</table>

3.1.2. Usage of evacuation and safety facilities during infant forest experience programs

The results of the analysis of the usage of evacuations and safety facilities during infant forest experience programs are as shown in Table 3. The total number of responses was 83, with 33(39.8%) for "rain," followed by 14(16.9%) for "heat wave" and "first aid," respectively, 11(13.3%) for "unpredictable behavior of infants," 6(7.2%) for "cold," and 1(1.2%) for "fire," "natural disasters," and "crime prevention" respectively. In general, this shows that the facilities have been used relatively much in rainy weather conditions. Other respondents(2) said that the facilities were used for "break time."

Table 3. Usage of evacuation and safety facilities during infant forest experience programs(multiple responses).

<table>
<thead>
<tr>
<th>Description</th>
<th>Unpredictable behavior</th>
<th>Rain</th>
<th>Heat wave</th>
<th>Cold</th>
<th>Fire</th>
<th>First aid</th>
<th>Natural disasters</th>
<th>Crime prevention</th>
<th>Other (break)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1(16.7)</td>
<td>3(50.0)</td>
<td>1(16.7)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>1(16.7)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>6(100.0)</td>
</tr>
<tr>
<td>Female</td>
<td>10(13.0)</td>
<td>30(39.0)</td>
<td>13(16.9)</td>
<td>6(7.8)</td>
<td>1(1.3)</td>
<td>13(16.9)</td>
<td>1(1.3)</td>
<td>1(1.3)</td>
<td>2(2.6)</td>
<td>77(100.0)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>20s</td>
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<td>5(50.0)</td>
<td>0(0.0)</td>
<td>1(10)</td>
<td>0(0.0)</td>
<td>2(20.0)</td>
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<td>10(100.0)</td>
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<td>3(13.6)</td>
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<td>0(0.0)</td>
<td>22(100.0)</td>
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<td>12(31.6)</td>
<td>8(21.1)</td>
<td>3(7.9)</td>
<td>1(2.6)</td>
<td>7(18.4)</td>
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<td>1(4.2)</td>
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</table>
3.1.3. Demand for the utilization of shelters and safety facilities during infant forest experience programs

The results of the analysis of the demand for utilization of shelters and safety facilities during infant forest experience programs are as shown in Table 4. There were 286 responses in total, with the highest with 47(16.4%) for "first aid," followed by 39(13.6%) for "rain," 38(13.3%) for "natural disasters," 36(12.6%) for "fire," 35(12.2%) for "unexpected emergencies," 31(10.8%) for "crime prevention," 28(9.8%) for "heat wave," and 27(9.4%) for "cold." The overall distribution of responses in each situation indicated the need for teachers to make various uses of shelters and safety facilities[8]. Other opinions(2 people) included "space for sick children to rest" and "space as an earthquake evacuation facility in line with future environmental changes."

### Table 4. Demand for the utilization of shelters and safety facilities during infant forest experience programs(multiple responses).

<table>
<thead>
<tr>
<th>Description</th>
<th>Unexpected emergencies</th>
<th>Rain</th>
<th>Heat wave</th>
<th>Cold</th>
<th>Fire</th>
<th>First aid</th>
<th>Natural disasters</th>
<th>Crime prevention</th>
<th>Other (break)</th>
<th>Total</th>
</tr>
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<td>6(20.7)</td>
<td>3(10.3)</td>
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<td>24(9.3)</td>
<td>33(12.8)</td>
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<td>6(9.4)</td>
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<td>7(10.9)</td>
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<td>11(10.6)</td>
<td>10(9.6)</td>
<td>15(14.4)</td>
<td>17(16.3)</td>
<td>14(13.5)</td>
<td></td>
<td></td>
<td>104(100.0)</td>
</tr>
<tr>
<td>Other</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>3(13.0)</td>
<td>3(13.0)</td>
<td>1(4.3)</td>
<td>3(13.0)</td>
<td>3(13.0)</td>
<td>5(21.7)</td>
<td>3(13.0)</td>
<td></td>
<td></td>
<td>23(100.0)</td>
</tr>
<tr>
<td>1-2 years</td>
<td>10(12.3)</td>
<td>13(16.0)</td>
<td>10(12.3)</td>
<td>10(12.3)</td>
<td>8(9.9)</td>
<td>13(16.0)</td>
<td>8(9.9)</td>
<td></td>
<td></td>
<td>81(100.0)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>10(10.2)</td>
<td>15(15.3)</td>
<td>8(8.2)</td>
<td>5(5.1)</td>
<td>15(15.3)</td>
<td>17(17.3)</td>
<td>16(16.3)</td>
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<td></td>
<td>98(100.0)</td>
</tr>
<tr>
<td>6 years or longer</td>
<td>11(13.6)</td>
<td>9(11.1)</td>
<td>8(9.9)</td>
<td>9(11.1)</td>
<td>9(11.1)</td>
<td>14(17.3)</td>
<td>10(12.3)</td>
<td></td>
<td></td>
<td>81(100.0)</td>
</tr>
<tr>
<td>Total</td>
<td>35(12.2)</td>
<td>39(13.6)</td>
<td>28(9.8)</td>
<td>27(9.4)</td>
<td>36(12.6)</td>
<td>47(16.4)</td>
<td>38(13.3)</td>
<td></td>
<td></td>
<td>286(100.0)</td>
</tr>
</tbody>
</table>

3.1.4. Adequacy of utilization of shelters and safety facilities during infant forest experience programs

The results of the analysis of the adequacy of the utilization of shelters and safety facilities during infant forest experience programs are as shown in Table 5. The analysis shows, 1
person (1.5%) with "very good," 2(2.9%) with "good," 31(45.6%) with "fair," 27(39.7%) with "poor," and 7(10.3%) with "very poor," indicating that 50.0% of the respondents believe that shelters and safety facilities are not properly utilized during infant forest experience programs [10]. According to the general characteristics of the subjects surveyed, there were statistically significant differences depending on the gender (p<.01); men, relative to women, tended to think that shelters and safety facilities were used properly during infant forest experience programs.

**Table 5.** Adequacy of utilization of shelters and safety facilities during infant forest experience programs.

<table>
<thead>
<tr>
<th>Description</th>
<th>Very poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very good</th>
<th>χ² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0(0)</td>
<td>4(66.7)</td>
<td>1(16.7)</td>
<td>0(0)</td>
<td>1(16.7)</td>
<td>13.616** (.009)</td>
</tr>
<tr>
<td>Female</td>
<td>7(11.3)</td>
<td>23(37.1)</td>
<td>30(48.4)</td>
<td>2(3.2)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s</td>
<td>1(6.7)</td>
<td>7(46.7)</td>
<td>7(46.7)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>10.834 (.543)</td>
</tr>
<tr>
<td>30s</td>
<td>2(10.5)</td>
<td>6(31.6)</td>
<td>11(57.9)</td>
<td>0(0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>2(9.5)</td>
<td>9(42.9)</td>
<td>8(38.1)</td>
<td>2(9.5)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>50s or older</td>
<td>2(15.4)</td>
<td>5(38.5)</td>
<td>5(38.5)</td>
<td>0(0)</td>
<td>1(7.7)</td>
<td></td>
</tr>
<tr>
<td>Daycare center teacher</td>
<td>2(10.0)</td>
<td>7(35.0)</td>
<td>10(50.0)</td>
<td>1(5.0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Kindergarten teacher</td>
<td>0(0)</td>
<td>7(43.8)</td>
<td>9(56.3)</td>
<td>0(0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant forest experience center teacher</td>
<td>5(18.5)</td>
<td>10(37.0)</td>
<td>11(40.7)</td>
<td>0(0)</td>
<td>1(3.7)</td>
<td>14.042 (.298)</td>
</tr>
<tr>
<td>Other</td>
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<td>1(20.0)</td>
<td>1(20.0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>0(0)</td>
<td>2(40.0)</td>
<td>3(60.0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>1-2 years</td>
<td>4(22.2)</td>
<td>8(44.4)</td>
<td>4(22.2)</td>
<td>1(5.6)</td>
<td>1(5.6)</td>
<td>15.310 (.225)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>3(11.5)</td>
<td>7(26.9)</td>
<td>16(61.5)</td>
<td>0(0)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>6 years or longer</td>
<td>0(0)</td>
<td>10(52.6)</td>
<td>8(42.1)</td>
<td>1(5.3)</td>
<td>0(0)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7(10.3)</td>
<td>27(39.7)</td>
<td>31(45.6)</td>
<td>2(2.9)</td>
<td>1(1.5)</td>
<td></td>
</tr>
</tbody>
</table>

Note: **p<.01

**3.1.5. Time spent guiding shelters and safety facilities during infant forest experience programs**

The results of the analysis of time spent on guidance for shelters and safety facilities during infant forest experience programs are as shown in <Table 6>. According to the analysis results, "0-3 minutes" was the highest with 38 people (55.9%), followed by 15(22.1%) for "no guidance," 6(8.8%) for "3-5 minutes," and 3(4.4%) for "5 minutes or more," indicating time spent on the guidance is generally less than 2 minutes[9]. There were no statistically significant differences depending on the general characteristics of the subjects surveyed (p>.05).

**Table 6.** Time spent guiding shelters and safety facilities during infant forest experience programs.

<table>
<thead>
<tr>
<th>Description</th>
<th>No guidance</th>
<th>0-3 min.</th>
<th>3-5 min.</th>
<th>5 min. or more</th>
<th>Other</th>
<th>χ² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3(50.0)</td>
<td>2(33.3)</td>
<td>0(0)</td>
<td>1(16.7)</td>
<td>0(0)</td>
<td>6.329 (.176)</td>
</tr>
<tr>
<td>Female</td>
<td>12(19.4)</td>
<td>36(58.1)</td>
<td>6(9.7)</td>
<td>2(3.2)</td>
<td>6(9.7)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s</td>
<td>6(40.0)</td>
<td>4(26.7)</td>
<td>2(13.3)</td>
<td>1(6.7)</td>
<td>2(13.3)</td>
<td></td>
</tr>
<tr>
<td>30s</td>
<td>5(26.3)</td>
<td>12(63.2)</td>
<td>1(5.3)</td>
<td>0(0)</td>
<td>1(5.3)</td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>4(19.0)</td>
<td>13(61.9)</td>
<td>3(14.3)</td>
<td>0(0)</td>
<td>1(4.8)</td>
<td></td>
</tr>
<tr>
<td>50s or older</td>
<td>0(0)</td>
<td>9(69.2)</td>
<td>0(0)</td>
<td>2(15.4)</td>
<td>2(15.4)</td>
<td></td>
</tr>
<tr>
<td>Daycare center teacher</td>
<td>5(25.0)</td>
<td>7(35.0)</td>
<td>3(15.0)</td>
<td>2(10.0)</td>
<td>3(15.0)</td>
<td>10.826 (.544)</td>
</tr>
<tr>
<td>Kindergarten</td>
<td>5(31.3)</td>
<td>9(56.3)</td>
<td>1(6.3)</td>
<td>0(0)</td>
<td>1(6.3)</td>
<td></td>
</tr>
</tbody>
</table>
3.1.6. Guidance details for shelter and safety facilities during infant forest experience programs

The results of the analysis of guidance details for shelter and safety facilities during infant forest experience programs are as shown in <Table 7>. The total number of responses was 83, with 32 people (38.6%) with "location and use of evacuation/safety facilities," followed by 24 (28.9%) with "how to use evacuation/safety facilities," and 15 (18.1%) with "no guidance" at all, indicating the location and use of safety facilities were guided [11]. There were no statistically significant differences depending on the general characteristics of the subjects surveyed (p > .05).

Table 7. Guidance details for shelter and safety facilities during infant forest experience programs (multiple responses).

<table>
<thead>
<tr>
<th>Description</th>
<th>No guidance at all</th>
<th>Location and use of evacuation/safety facilities</th>
<th>How to use evacuation/safety facilities</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3(42.9)</td>
<td>2(28.6)</td>
<td>2(28.6)</td>
<td>0(.0)</td>
<td>7(100.0)</td>
</tr>
<tr>
<td>Female</td>
<td>12(15.8)</td>
<td>30(39.5)</td>
<td>22(28.9)</td>
<td>12(15.8)</td>
<td>76(100.0)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20s</td>
<td>6(35.3)</td>
<td>6(35.3)</td>
<td>2(11.8)</td>
<td>3(17.6)</td>
<td>17(100.0)</td>
</tr>
<tr>
<td>30s</td>
<td>5(23.8)</td>
<td>8(38.1)</td>
<td>5(23.8)</td>
<td>3(14.3)</td>
<td>21(100.0)</td>
</tr>
<tr>
<td>40s</td>
<td>4(14.3)</td>
<td>13(46.4)</td>
<td>8(28.6)</td>
<td>3(10.7)</td>
<td>28(100.0)</td>
</tr>
<tr>
<td>50s or older</td>
<td>0(.0)</td>
<td>5(29.4)</td>
<td>9(52.9)</td>
<td>3(17.6)</td>
<td>17(100.0)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daycare center teacher</td>
<td>5(20.0)</td>
<td>8(32.0)</td>
<td>6(24.0)</td>
<td>6(24)</td>
<td>25(100.0)</td>
</tr>
<tr>
<td>Kindergarten teacher</td>
<td>5(27.8)</td>
<td>7(38.9)</td>
<td>4(22.2)</td>
<td>2(11.1)</td>
<td>18(100.0)</td>
</tr>
<tr>
<td>Infant forest experience center teacher</td>
<td>3(8.8)</td>
<td>15(44.1)</td>
<td>13(38.2)</td>
<td>3(8.8)</td>
<td>34(100.0)</td>
</tr>
<tr>
<td>Other</td>
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<td>2(33.3)</td>
<td>1(16.7)</td>
<td>1(16.7)</td>
<td>6(100.0)</td>
</tr>
<tr>
<td>Work period</td>
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<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>3(60.0)</td>
<td>1(20.0)</td>
<td>0(.0)</td>
<td>1(20.0)</td>
<td>5(100.0)</td>
</tr>
<tr>
<td>1-2 years</td>
<td>4(18.2)</td>
<td>10(45.5)</td>
<td>7(31.8)</td>
<td>1(4.5)</td>
<td>22(100.0)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>5(15.6)</td>
<td>10(31.3)</td>
<td>10(31.3)</td>
<td>7(21.9)</td>
<td>32(100.0)</td>
</tr>
<tr>
<td>6 years or longer</td>
<td>3(12.5)</td>
<td>11(45.8)</td>
<td>7(29.2)</td>
<td>3(12.5)</td>
<td>24(100.0)</td>
</tr>
<tr>
<td>Total</td>
<td>15(18.1)</td>
<td>32(38.6)</td>
<td>24(28.9)</td>
<td>12(14.5)</td>
<td>83(100.0)</td>
</tr>
</tbody>
</table>

3.2. Awareness of problems and improvements in evacuation and safety facilities of infant forest experience centers

3.2.1. Problems in evacuation and safety facilities of infant forest experience centers

The results of analyzing the problems of shelters and safety facilities in infant forest experience centers are as shown in <Table 8>. The total number of responses was 195; 33 (16.9%)
with "lack of knowledge or interest in using the evacuation and safety facilities," followed by 31(15.9%) with "poor facility conditions," 30(15.4%) with "limited use," 23(11.8%) with "lack of the number of persons to be accommodated and size," 22(11.3%) with "lack of budget to secure and maintain evacuation and safety facilities," 21(10.8%) with "lack of standards and guidelines," 17(8.7%) with "lack of cooperation with government facilities," and 12(6.2%) with "lack of personnel," indicating that the biggest problem is the lack of knowledge or interest in using the evacuation and safety facilities[12].

Table 8. Problems in evacuation and safety facilities of infant forest experience centers(multiple responses).

<table>
<thead>
<tr>
<th>Description</th>
<th>Lack of standards and guidelines</th>
<th>Lack of the number of persons to be accommodated and size</th>
<th>Limited use</th>
<th>Poor facility conditions</th>
<th>Lack of cooperation with government facilities</th>
<th>Lack of budget to secure and maintain evacuation and safety facilities</th>
<th>Lack of personnel</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>195</td>
</tr>
<tr>
<td>Male</td>
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<td>2(8.7)</td>
<td>3(13.0)</td>
<td>4(17.4)</td>
<td>2(8.7)</td>
<td>4(17.4)</td>
<td>3(13.0)</td>
<td>1(4.3)</td>
<td>23(100)</td>
</tr>
<tr>
<td>Female</td>
<td>17(9.9)</td>
<td>21(12.2)</td>
<td>27(15.7)</td>
<td>29(16.9)</td>
<td>29(16.9)</td>
<td>13(7.6)</td>
<td>19(11.0)</td>
<td>11(6.4)</td>
<td>172(100)</td>
</tr>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>20s</td>
<td>4(9.3)</td>
<td>7(16.3)</td>
<td>8(18.6)</td>
<td>8(18.6)</td>
<td>4(9.3)</td>
<td>3(7.0)</td>
<td>4(9.3)</td>
<td>3(7.0)</td>
<td>3(7.0)</td>
</tr>
<tr>
<td>30s</td>
<td>7(12.3)</td>
<td>10(17.5)</td>
<td>10(17.5)</td>
<td>9(15.8)</td>
<td>8(14.0)</td>
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<td>8(13.3)</td>
<td>5(8.3)</td>
<td>7(11.7)</td>
<td>9(15.0)</td>
<td>11(18.3)</td>
<td>6(10.0)</td>
<td>9(15.0)</td>
<td>4(6.7)</td>
<td>1(1.7)</td>
</tr>
<tr>
<td>50s or older</td>
<td>2(5.7)</td>
<td>2(9.3)</td>
<td>5(14.3)</td>
<td>7(20.0)</td>
<td>8(22.9)</td>
<td>5(14.3)</td>
<td>3(8.6)</td>
<td>2(5.7)</td>
<td>3(5.7)</td>
</tr>
<tr>
<td>Daycare center teacher</td>
<td>5(8.8)</td>
<td>7(12.3)</td>
<td>8(14.0)</td>
<td>11(19.3)</td>
<td>8(14.0)</td>
<td>5(8.8)</td>
<td>8(14.0)</td>
<td>3(5.3)</td>
<td>1(2.3)</td>
</tr>
<tr>
<td>Kindergarten teacher</td>
<td>5(11.4)</td>
<td>7(15.9)</td>
<td>8(18.2)</td>
<td>7(15.9)</td>
<td>6(13.6)</td>
<td>4(9.1)</td>
<td>3(6.8)</td>
<td>3(6.8)</td>
<td>1(2.3)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Infant forest experience center teacher</td>
<td>7(8.8)</td>
<td>8(10.0)</td>
<td>12(15.0)</td>
<td>13(16.3)</td>
<td>16(20.0)</td>
<td>7(8.8)</td>
<td>9(11.3)</td>
<td>6(7.5)</td>
<td>2(2.5)</td>
</tr>
<tr>
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<td>1(7.1)</td>
<td>2(14.3)</td>
<td>2(14.3)</td>
<td>1(7.1)</td>
<td>2(14.3)</td>
<td>0(0)</td>
<td>1(7.1)</td>
<td>14(100)</td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>2(13.3)</td>
<td>2(13.3)</td>
<td>2(13.3)</td>
<td>4(26.7)</td>
<td>1(6.7)</td>
<td>1(6.7)</td>
<td>1(6.7)</td>
<td>1(6.7)</td>
<td>1(6.7)</td>
</tr>
<tr>
<td>1-2 years</td>
<td>7(13.0)</td>
<td>4(7.4)</td>
<td>6(11.1)</td>
<td>8(14.8)</td>
<td>9(16.7)</td>
<td>7(13.0)</td>
<td>9(16.7)</td>
<td>2(3.7)</td>
<td>54(100)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>6(8.0)</td>
<td>10(13.3)</td>
<td>17(22.7)</td>
<td>14(18.7)</td>
<td>13(17.3)</td>
<td>3(4.0)</td>
<td>7(9.3)</td>
<td>4(5.3)</td>
<td>1(1.3)</td>
</tr>
<tr>
<td>6 years or longer</td>
<td>6(11.8)</td>
<td>7(13.7)</td>
<td>5(9.8)</td>
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<td>8(15.7)</td>
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<td>5(9.8)</td>
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<tr>
<td>Total</td>
<td>21(10.8)</td>
<td>23(11.8)</td>
<td>30(15.4)</td>
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<td>31(15.9)</td>
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<td>22(11.3)</td>
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### 3.2.2. Improvements to shelters and safety facilities at infant forest experience centers

The results of the analysis on the improvements to shelters and safety facilities at infant forest experience centers are as shown in Table 9. The total number of responses was 259. 42 responses(16.2%) were "expansion of the use scope(e.g. fire, earthquake, etc.) and "expansion of the budget for securing and maintaining shelters and safety facilities," respectively, followed...
Table 9. Guidance details for shelter and safety facilities during infant forest experience programs (multiple responses).

<table>
<thead>
<tr>
<th>Description</th>
<th>Enhancement of related standards or guidelines</th>
<th>Expansion of the number of persons to be accommodated and size</th>
<th>Expansion of the use scope (e.g., fire, earthquake, etc.)</th>
<th>Conducting training for teachers related to using evacuation and safety facilities</th>
<th>Reinforcing existing facilities</th>
<th>Cooperating with related government agencies</th>
<th>Expansion of the budget for securing and maintaining shelters and safety facilities</th>
<th>Recruiting related staff</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>31(13.3)</td>
<td>35(15)</td>
<td>16(6.9)</td>
<td>38(16.3)</td>
<td>17(7.3)</td>
<td>41(1.7)</td>
<td>233(100.0)</td>
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<tr>
<td>20s</td>
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<td>8(14)</td>
<td>11(19.3)</td>
<td>8(14)</td>
<td>8(14)</td>
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<td>9(15.8)</td>
<td>3(5.3)</td>
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<td>57(100.0)</td>
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<tr>
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<td>11(19)</td>
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<td>12(20.7)</td>
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<td>1-2 years</td>
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<td>3-5 years</td>
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<td>20(18.9)</td>
<td>16(15.1)</td>
<td>15(14.2)</td>
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<tr>
<td>6 years or longer</td>
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<td>8(11.4)</td>
<td>12(17.1)</td>
<td>8(11.4)</td>
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<td>1(1.4)</td>
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<td>42(16.2)</td>
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<td>259(100.0)</td>
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4. Conclusion and Suggestion

Infant forest experience centers have so far been successfully established in Korea as part of pre-school ecological education centers[14], but since it is a place for infants and children to enjoy nature and that requires a lot of activity, safety issues for participating children are always accompanied[15]. Therefore, how to secure their safety is an important topic. In this study, the awareness survey was conducted on teachers related to forest experience centers to find more effective ways to improve evacuation and safety facilities. According to the survey on the awareness of using the evacuation and safety facilities at infant forest experience centers, the utilization level of evacuation and safety facilities was low, and there was a demand for utilization in more diverse ways. It also confirmed the limitations of evacuation and safety facilities and the demands for improvement measures.
This paper tried to investigate the current status of the infant forest experience centers operated by the local governments, the Forest Service, and the Forest Welfare Promotion Agency in Gyeongsangbuk-do and propose measures to improve the evacuation and safety facilities of infant forest experience centers based on the results of the survey conducted on teachers related to the centers. The limitations of this study and suggestions for further research that emerged in the course of the study are as follows.

First, this study was conducted only on the infant forest experience centers operated by local governments, the Forest Service, and the Forest Welfare Promotion Agency of Gyeongsangbuk-do, so the other privately operated infant forest experience centers were not covered. In the case of the privately operated centers, it was difficult to identify and check official status data, so it was not selected for this research. In the future, it will be necessary to understand the current status of privately operated infant forest experience centers and conduct research on the evacuation and safety facilities of these centers.

Second, there is a spatial limitation of the research target in that not all the infant forest experience centers in other regions established nationwide were selected for the research. Since there are infant forest experience centers run by various operators nationwide, but due to time and spatial limitations, future research is expected to expand the scope to study various problems and improvement measures.

Finally, it is necessary to study the system and status of evacuation and safety facilities at overseas forest kindergartens and discuss ways to benchmark them in Korea. In the course of the research, the research team could think of ways to develop Korea’s infant forest experience centers by benchmarking the case of overseas forest schools, but there was a limit because overseas field research was practically impossible. Provided that the team has the chance, it would like to study more to learn from overseas field trips.

5. References

5.1. Journal articles


5.2. Thesis degree


5.3. Additional references


6. Contribution

6.1. Authors contribution

<table>
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<th>Initial name</th>
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<td></td>
<td>-Set of concepts ☑</td>
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<td>-Design ☑</td>
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<tr>
<td>Corresponding Author*</td>
<td>LWH</td>
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<td>-Play a decisive role in modification ☑</td>
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|                | - Exercise Training-induced PPAR-β Increases PGC-1α Protein Stability and Improves Insulin-induced Glucose Uptake in Rodent Muscles, Nutrients, 12(652) (2020).  
| Major career   | - 2005~2014. Gyeongju University, Professor  
|                | - 2015~present. Keimyung University, Professor |