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The Effect of Altered Lexile Levels of Informational Text on Reading Comprehension

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Abstract

We examined how using five different simplified texts on the same subject would affect reading comprehension. 335 students in grades four through eight read one of five texts retrieved from Newsela.com and then completed a comprehension test. Results from a 3-way ANOVA showed no significant interaction among grade, reading level and text condition. Pairwise comparisons showed that below-level readers' scores improved only with extremely lower levels of text and on-level and above-level readers' scores did not significantly change regardless of text level. Regression analysis showed no statistically significant contribution of text level to overall comprehension scores. The findings of this study have implications for choosing leveled texts for reading instruction.

Keywords:

Reading Comprehension, Lexile, Leveled Texts, Elementary Education

Introduction

Leveled texts are common instructional materials designed to match the linguistic features of a text to the skills of the reader. The original intention of leveled texts was for guided instruction so that students could practice a reading skill without having to be overburdened by the linguistic demands of the text itself (Clay & Cazden, 1999). In theory, appropriately leveled texts would increase students' automaticity of reading, their motivation to read, and their comprehension (Hiebert & Mesmer, 2013). When the Common Core State Standards were released in 2010, they gave importance to leveled texts by including specified Lexile levels at which students were to be expected to read by the end of each grade (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

Leveled texts have increasingly grown beyond guided reading to include texts students use for independent practice and texts that are used in content subjects such as science and social studies. Some of these texts, such as those produced by Newsela (2022), Tween Tribune (Smithsonian, n.d.), ReadWorks (2020), and Scholastic News Leveled Texts



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(Scholastic Teacher Resources, 2019) in the United States, are simplified versions of original news articles, available at different reading levels. Because there has been some controversy over whether simplified texts such as these help with reading comprehension (Hiebert, 2018; Mesmer, et al. 2012; Tortorelli, 2020), we carried out this study to determine whether different levels of a simplified text from Newsela made it easier for elementary students to comprehend the text as intended.

Background

The Simple View of Reading proposes that reading comprehension is a product of both decoding and language comprehension (Gough & Tunmer, 1986). If a reader has difficulty in either process, they will be unable to fully comprehend the text. Even if students can decode the words in the text, they may have difficulty with the many aspects of language comprehension, such as background knowledge, vocabulary, language structures, verbal reasoning, and understanding of genre, especially when the texts are more complex (Scarborough, 2001). Scholars have developed models of reading comprehension that use subcomponents of comprehension, such as the direct and inferential mediation model (Elleman & Oslund, 2019). This model shows that vocabulary is the strongest predictor of reading comprehension with inference-making and background knowledge also having strong effects of comprehension. Other research shows that both vocabulary and syntactic structure affect reading comprehension (Mokhtari & Niederhauser, 2017).

In order to scaffold students' comprehension of text, publishers have adapted texts to change the linguistic features that affect comprehension (e.g., Fountas & Pinnell, 2014). In theory, this would allow differentiation by reading ability in a classroom without having to use different content for different levels of readers. In 1989, Stenner and colleagues received NIH funds to research a way to allow educators and publishers to categorically evaluate and predict the complexity of a text. They developed The Lexile Framework for Reading, a quantitative system that accounts for such factors as average sentence length, average word length, numbers of words per passage, the rareness of vocabulary, and the average number of clauses per sentence (Smith, et al., 1989). According to Metamatrix (2021), the Lexile formula is used by 20 states for reporting student reading scores on state tests. In addition to being used in the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010), Lexile levels are also used to choose texts in major published reading programs such as Amplify CKLA (Amplify Education, Inc., 2020), Into Reading (Houghton Mifflin Harcourt Publishing

Company, 2020), and ReadyGen Literacy Program (Savvas Learning Company, 2016).

Use of Digital Leveled Texts

Recent technology has allowed companies to manufacture multiple digital versions of the same text at different Lexile levels by manipulating some of the variables that lead to text complexity. Newsela.com, for example, offers news articles and other informational texts that have been adapted to produce three to five different Lexile levels of the same article. These texts range from about 300L (about the 1st grade level) to the level of the original article, which typically measures around 1200L (about the 11th or 12th grade level) (Newsela, 2022). The articles cover many social studies and science topics and are intended to be used to teach both literacy skills and subject content knowledge.

There has been little research on the efficacy of these simplified texts for aiding comprehension. It is unclear how using these formulas to alter authentic texts to score lower on a readability scale will affect students' comprehension. From the perspective of the Simple View of Reading (Gough & Tunmer, 1986), simplifying the text could improve both decoding, by using words that are phonetically simple or regular, and language comprehension, by simplifying the vocabulary and sentence structure of the text.

There has been some argument, however, that artificially changing the components of a text to decrease the complexity may inadvertently make a text more challenging to read and comprehend (Hiebert, 2018; Mesmer, et al. 2012; Tortorelli, 2020). It is possible that by shortening sentences, certain signal words are eliminated, and common syntactic structures are lost, making it more difficult to determine the relationship between ideas or recognize common grammatical patterns, especially for second-language learners (Hiebert, 2018; Mesmer, et al., 2012). By lowering the vocabulary demands of a text, the semantic complexity is changed in terms of concreteness and subtlety of meaning (Tortorelli, 2020). These simplifications of the text become especially important in upper elementary grades, when students are expected to evaluate an author's perspective or voice from a text (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Another concern is that simplifying texts for linguistic features as measured by Lexile does not address the effect of background knowledge or inference on comprehension (McNamara, Ozuru, & Floyd, 2011).

Current Study

The purpose of the current study was to examine whether changing the linguistic components of a

text to reduce the complexity at different levels made the text easier to read and comprehend (Hiebert, 2018; Mesmer, et al. 2012; Tortorelli, 2020). We chose to examine articles simplified by Newsela because these texts have become so widely used since they launched their service in 2013. Newsela claims that their website and articles are used by more than 90% of schools, including 2 million teachers and 25 million students (Newsela, 2022).

We focused on informational texts because The Common Core State Standards call for an equal amount of literary and informational texts in grades three to five and concern has been raised about past imbalances in the amount of informational text reading in elementary classrooms. (Duke, 2000; Li, Beecher, & Cho, 2018). Informational texts may be more difficult to comprehend because of their structural complexity, abstract and logical relations, and domain-specific knowledge (McNamara, Ozuru, & Floyd, 2011), although some research shows no difference in narrative or informational text comprehension (Uysal & Bilge, 2019).

We chose to examine the effect of the text level on students in grades four through eight because in these grades, there is a higher demand for reading for understanding rather than decoding (Chall, 1996; National Reading Panel (U.S.) & National Institute of Child Health and Human Development (U.S.), 2000). Children in grades four through eight are likely to need support for unknown vocabulary and complex language structures when they read. Our goal was to gain information that would help determine the degree to which providing varying levels of the same text might improve students' reading comprehension of those texts.

Research Questions

To examine the effect of Newsela's text alterations on student comprehension, we set out to answer the following research questions:

1. Is there a difference in reading comprehension scores of students who read different Lexile adaptations of the article?
2. Is there an interaction between reading ability, grade level and different Lexile versions on reading comprehension scores?
3. How much variation in reading comprehension scores is explained by the Lexile level of the text?

Methods

Subjects

We recruited all the students in grades 4, 5, 6, 7, and 8 from two urban northeastern schools in the United

States. Our subjects included 335 of the possible 496 students whose parents/guardians gave consent for them to participate (67.5% of the total students). We grouped student into three categories using their scores from the previous year's state literacy assessment that is based on the Common Core State Standards. The assessment provided scores at the following levels: Level 5: Exceeded Expectations; Level 4: Met Expectations; Level 3: Approached Expectations; Level 2: Partially Met Expectations; Level 1: Did Not Yet Meet Expectations. We grouped students whose scores fell into the Level 5 as the "above-level readers", those whose scores were Level 4 as "on-level readers" and those whose scores fell into Level 1, 2 or 3 as "below-level readers." The numbers in each category were: above level readers (89 students), on-level readers (173 students), below-level readers (73 students).

Other demographics of the subjects can be found in Table 1. The demographics of the subjects were similar to those of the school populations.

Table 1
Demographics of subjects.

Demographics of Subjects	School A	School B
Eligible for free and reduced-price lunch	37%	38%
Asian	27.4%	28.3%
Black	15.5%	10.7%
Hispanic	20%	28.9%
White	27.4%	25.9%
More than one racial/ethnic category	7.6%	5.9%
Males	53%	49%
Females	47%	51%

Materials

Newsela.com provides a variety of previously published non-fiction texts that have been adapted for educational use. For this study, we chose five articles on the same topic at different Lexile levels that were based on one original science text. The original text had the following characteristics:

1. Topic of interest to the students in grades four through eight.
2. Content not directly related to the science topics covered during the school year to minimize the role of background knowledge (Smith, et al., 2021)
3. Not used by the teachers in their classrooms that year.
4. Vocabulary that included words that students of this age would be expected to understand

We downloaded the five Newsela articles based on an article on about a robotic fish that spies on ocean life (Netburn, 2018) in the following five different levels from Newsela.com:

- Lexile Level 560 (452 words): SoFi, a robotic fish, can study real fish and they think nobody is looking
- Lexile Level 820 (735 words): Scientists spy on undersea life more easily using SoFi, the robotic fish
- Lexile Level 1060 (952 words): Quiet, you'll score the fish away! Not if you're SoFi, the robotic fish spy
- Lexile Level 1130 (929 words): Fishy looking robot SoFi is helping scientists spy on life under the sea
- Lexile Level 1250 (853 words): Scientists build a robotic fish to spy on ocean life. This was the original source article from the Los Angeles Times, written by Netburn (2018).

Comprehension Measure. Although Newsela provides a 4-question quiz with each article, we instead created a 10-question multiple choice comprehension test based on the information in the article so that we could ensure the validity of the test, and so that we could use more questions. All students completed the same comprehension assessment regardless of the Lexile level of the article.

To examine the validity of the comprehension test, we considered different types of validity. Face validity was established by creating a multiple-choice test that was a familiar format to all the students in the study. Content validity was first established through alignment of the questions with the Common Core State Standards for Reading Informational Text as the content domain. See Table 2 for the alignment between the comprehension questions and specific standards that were used in the test. Additionally, we asked a panel of five literacy experts (educators with at least a master's degree and 10 years of experience teaching literacy in this age range) to evaluate how essential each question was for measuring reading

Table 2

Alignment of Comprehension Questions and Corresponding Common Core State Standard

CCSS Standard	Aspect of comprehension measured	Comprehension question administered
RI.1	Key Details	Question 1: What makes SoFi the first of its kind? Question 3: How do the wild fish react to SoFi?
RI.2	Main Idea	Question 4: What is the central idea of the article?
RI.3	Relationships Between Ideas	Question 7: How does the beginning and end of the article show SoFi differently?
RI.4	Interpret Words and Phrases	Question 2: Why does the scientist say the fish is "magical"?
RI.5	Text Structure	Question 6: Which of the following text structures is most represented by this article?
RI.6	Author's Purpose	Question 5: How do scientists want to improve SoFi? Question 10: What is most likely the reason the author wrote this article?
RI.7	Media Literacy	Question 9: What point in the article is most demonstrated by the illustrations?
RI.8	Reason and Evidence	Question 8: What evidence shows why the scientists released SoFi in Fiji in the South Pacific Ocean?

comprehension of students in grades four through eight. We then calculated the content validity ratio (Lashwe, 1975). All items reached a level higher than .5 and were retained. We averaged the Content Validity Ratio of all items to arrive at an acceptable Content Validity Index value for the assessment instrument of .84 (Tilden, Nelson, & May, 1990; Wilson, Pan, & Schumsky, 2012).

In addition, we examined the construct validity by comparing the pattern of scores on our comprehension test of the subjects in the study to the expected pattern of scores by students performing above level in reading, on-level and below level. We hypothesized that if our test were valid in terms of difficulty, the above level readers would have the highest score, followed by the on-level readers and the below level readers. We found that the means of our subjects in different reading level groups were significantly different from one another, $F(2, 330) = 21.497, p < .001$. Out of 10 total possible points, the mean for the above level group was 8.02, the mean for the on-level group was 7.29, and the mean for the below-level group was 6.19. This demonstrates that our comprehension test functioned to differentiate student ability in the way we expected.

Procedures

First, we worked with each teacher to determine the reading level of each student in the study as described above. Each teacher had a list of the students in their class with these levels designated. We reviewed the protocol in person with each teacher and then provided a written copy of the protocol for distributing the articles and script for giving directions to students. Each teacher received a stack of articles with equal numbers of each level of article mixed into the pile so that they were distributed randomly. The texts were coded in a way that neither the teacher nor the

students could tell the level of any article. Teachers passed out the articles with the assessment attached to them to the student in order of where they were sitting around the room, drawing from the top of the pile and working their way around the room. Because the piles of articles were randomly mixed, the distribution of articles to students was randomly done.

Students were given 40 minutes to read the article and answer the ten comprehension questions. They were told the questions would count as a quiz grade. All the students in the study had previously read Newsela articles and answered comprehension questions as classroom assignments, so they were familiar with this type of assignment. The students put their name on the cover sheet. When they handed in their assignment, the teacher removed the cover sheet to protect confidentiality, and then the teacher put a code on the back of the test for the students' performance level in English Language Arts (above grade level, on grade level, below grade level). Then the teachers put the completed packets into an envelope, sealed it, and then one of the researchers picked up the envelope from the teacher.

Results

The data sources used to answer our research questions included comprehension test scores that ranged from 0-10 as the dependent variable, text level (five levels of Lexile versions), reading ability level (above level, on level, below level) and grade level (4, 5, 6, 7, or 8) as independent variables.

To answer our first research question as to whether there was a difference in reading comprehension scores of students who read different Lexile versions of the article, we conducted a three-way ANOVA to determine the effects of Reading Ability Level, Grade Level and Text Level on comprehension score. There was no statistically significant three-way interaction between Reading Ability Level, Grade, and Text Level on the 3-way ANOVA, $F(24, 180) = .971, p = .507$. Group

means were not significantly different and, therefore, there was no evidence in this sample to show that, overall, students who read different Lexile versions of the article had significantly different comprehension scores.

To answer our second research question as to whether there was an interaction between reading ability, grade level and different Lexile versions of the article on reading comprehension, we performed pairwise comparisons using a Bonferroni correction. A multiple linear regression was run to determine how much of the variation in comprehension scores was determined by the independent variables.

All simple pairwise comparisons were run for Comprehension Score with a Bonferroni adjustment applied. There was a statistically significant simple two-way interaction between Reading Ability Level and Text Level Condition for below level readers, $F(4, 264) = 3.649, p < .007$, but not for on-level readers, $F(4, 264) = .876, p = .479$ or above-level readers, $F(4, 264) = .109, p = .979$. See Table 3 for statistically significant pairwise comparisons of Reading Level and Test Condition on Comprehension Score. See Figure 1 for a chart of estimated marginal means by reading level for each text condition.

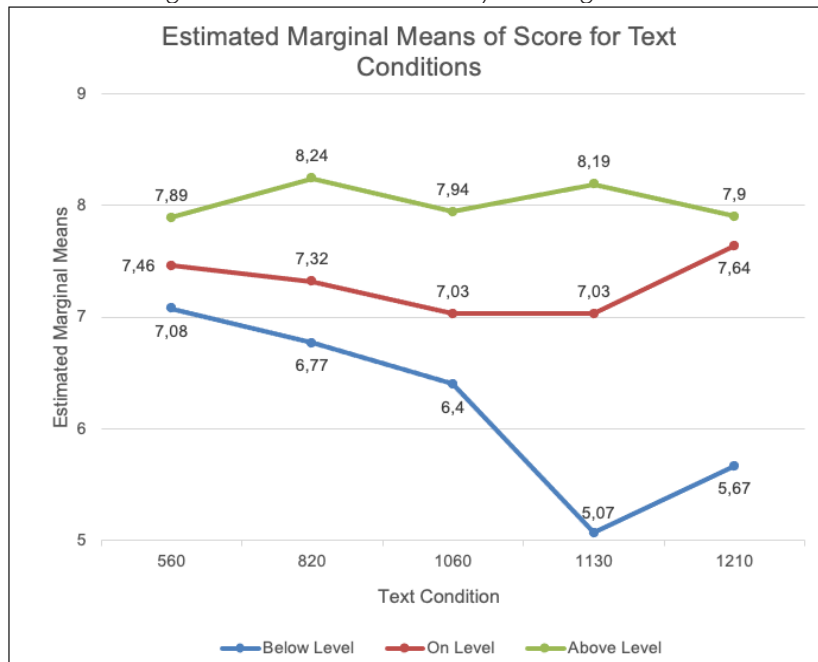
When we looked at only the difference between reading ability and text level, we found a significant difference in comprehension scores of below level readers between those who read articles at the 560 Lexile level and those who read articles at the 1130 Lexile level ($p < .008$) and between those who read 820 and those who read 1130 Lexile levels ($p < .024$). There was no difference in scores of below level readers who read articles at closer Lexile levels, for example 530 compared to 820 or 1060. The difference was only statistically significant when there was a larger variation in Lexile range.

To answer our third research question as to how much variation in reading comprehension scores

Table 3
Statistically Significant Pairwise Comparisons of Reading Level and Test Condition on Comprehension Score

Reading Ability Level	Pairwise Comparison with Text Level Condition	Significance
Below Level	Text Level 560 *Text Level 1130	.008
	Text Level 820*1130	.024
Text Level Condition	Pairwise Comparison with Reading Ability Level	Significance
Text Level 820	Below Level * Above Level	.041
Text Level 1060	Below Level * Above Level	.008
Text Level 1130	Below Level* On Level	<.001
	Below Level * Above Level	<.001
Text Level 1250	Below Level * On Level	.002
	Below Level *Above Level	.001

Figure 1. Estimated Marginal Means of Test Score by Reading Level for Each Text Condition



was explained by the Lexile level of the text, we conducted a multiple linear regression to see how much difference in the comprehension scores was explained by the independent variables. The R^2 for the overall model was .211% with an adjusted R^2 of .204%. This is a small size effect according to Cohen (1988). The three independent variables combined, Reading Ability Level, Grade Level and Text Level, statistically significantly predicted reading comprehension scores, $F(3, 330) = 29.459, p < .001$. However, Text Level condition was not a statistically significant predictor of Comprehension Test Score. The slope coefficient was $-.109$ showing that for every 1 level decrease in the Text Level (which ranged from 70-250 Lexile points), the comprehension test score increased by $.109$ points on a 10-point scale, not enough to be statistically significant.

Discussion

This study examined the effect of Newela’s text alterations on student comprehension in grades four through eight. Our first finding was that there was no overall difference in reading comprehension scores of students who read simplified versions of articles at different Lexile levels on the same topic. Our second finding was that there was a significant interaction between reading ability, grade level and different Lexile versions of the article on reading comprehension scores. For on-level and above-level readers at all grade levels from four through eight, there was no significant difference in comprehension test scores across the five different texts. However, using a lower Lexile article improved the scores of below-level readers. Finally, we found that as the articles became more simplified, this affected comprehension scores by an average of $.1$ on a scale of 0-10, which was not statistically significant.

There was some evidence in the current study that for below-level readers, having a lower-level text improved their comprehension scores. This also aligns with the research that shows that generally lower-leveled texts positively affect the reading comprehension of less-skilled readers (Amendum, et al., 2018; Crossley & McNamara, 2016). However, in this study, the positive effect of increased comprehension was very small and only present when the text complexity was very low compared to the original.

These results are supported by the research findings that the process of simplifying texts to lower the readability might reduce or eliminate some of the syntactic and semantic information that helps certain aspects of comprehension, especially inference and evaluation and does not attend to the background or vocabulary knowledge of the reader (Crossley & McNamara, 2016; Reed & Kershaw-Herrera, 2015; Xu, Callison-Burch, & Naples, 2015). For example, Reed & Kershaw-Herrera (2015) found a significant increase in comprehension when the simplified texts had high cohesion rather than low cohesion. In texts with high cohesion, the text explicitly provides background information and cues to help readers understand without needing to make as many inferences (McNamara, Ozuru, & Floyd, 2011). A text with low cohesion places more demands for background knowledge on the reader. Quantitatively simplifying the linguistic elements such as those measured by Lexile does not take into consideration the effects of text cohesion or the reader’s background knowledge (Arya, Hiebert, & Pearson, 2011).

These results for on-level and above level readers align with Crossley, Yang and McNamara’s (2014) findings, in which second-language learners with high background knowledge comprehended authentic

texts better than they comprehended simplified texts. They suggested that this was because the ability to make inferences and connections between ideas was easier in original texts than simplified ones.

Another variable to consider was the length of the articles. The results of this study showed that students scored highest on reading comprehension questions when the article was the shortest—at Lexile level 560 with 452 words. The second-longest version of the article, at Lexile level 1130 with 929 words, showed the lowest comprehension scores. Hiebert (2014) suggests that stamina becomes a factor in readability only when texts are more than about 500 words. The only version of the article that fell under that limit was the 560L version, in which students scored the highest. While length is a factor of simplification, research should examine whether the length of text is a more relevant for student comprehension than simplified language features alone.

Implications

Although this study examined a limited number of texts, it shows the importance of continued research in this area. Examining the effects of simplifying authentic texts is important because it adds to our decision-making ability in choosing texts for reading instruction and practice. Teachers are currently using texts for literacy and content learning, including Newsela, that have been simplified to achieve different readability levels (Amendum, Conradi, & Hiebert, 2018). Yet, there have been criticisms of these altered texts because they short-change struggling students in terms of access to high-quality and sophisticated texts, they don't account for background knowledge or vocabulary knowledge differences between students, and they may make texts more difficult, not less difficult, to read (Hiebert, 2018; Lupo, et al., 2019; Tortorelli, 2020).

Beyond the issue of diminished comprehension when reading a lower-level text, there is also an issue of the inequity caused if these texts only increase comprehension a small amount. The downside of leveling is that lower-leveled texts are shorter than their original counterparts. There was a difference of 500 words between the longest and shortest article. If lower-level students are interacting with that much less text each day of the school year, it would amount to reading 90,000 words fewer than their on-level peers for a single year. They also have fewer academic and disciplinary vocabulary words (Beck & McKeown, 1985) and they reduce the exposure of students to sophisticated syntax. Determining the efficacy of these simplified texts is crucial because if they are not helping students in the way they were designed to, then students are simply being shortchanged on the

amount of text they are given to read, the number of vocabulary words they have access to, and the level of linguistically sophisticated texts they see.

This study has limitations and therefore calls for more research to be done to add to our understanding of the effects of altering Lexile levels on comprehension. We tested only five articles that could have had anomalies, such as readability features or background knowledge not familiar to this sample of students. Different groups of students, such as second-language learners, students who read several grade-levels higher or lower than expected for their grade, or students from different cultural backgrounds may comprehend these leveled texts differently. The Common Core State Standards acknowledge that one of the aspects of text complexity is the knowledge and experience of the individual reader, yet there is little information about how the individual reader differs in their experience with simplified texts. In addition, other websites may be using different simplification methods or use different content and achieve different rates of comprehension.

Educators need a better understanding of how reader characteristics affect readability and more research on the differences that may exist in complexity between authentic texts of a given reading level and altered texts at a parallel reading level. Moving forward, researchers should examine other types and topics of simplified versions of authentic texts with more student populations to be able to generalize any findings. More research is also needed in how other factors besides text complexity affect reading comprehension, such as the reader's background knowledge, the cultural relevance of the text, the motivation of the reader (e.g. Kasper, et al., 2018), or the reader's embodiment of the text (e.g. Glenberg, 2017).

Every day, students are being given simplified leveled texts with good intentions but little research support. Educators need enough research to ensure that simplified texts are effective for improving students' comprehension.

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Think-Pair-Share and Roundtable: Two Cooperative Learning Structures to Enhance Critical Thinking Skills of 4th Graders

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Abstract

Critical thinking skills are essential for success in life and work, and it is essential that learning strategies enable the development of critical thinking skills from the early years of schooling. The objective of this study is to evaluate the effectiveness of cooperative learning using the RoundTable and Think-Pair-Share methods in the development of critical thinking skills such as observation, inference making, interpretation, analysis, and argumentation, in 4th graders students. The study employed a quasi-experimental design with a pretest and posttest using equivalent experimental and control groups. Results show that the use of cooperative learning, compared to a more traditional teaching methodology, was more effective in developing the critical thinking skills under study.

Keywords:

Cooperative Learning, Think-Pair-Share, Roundtable, Critical Thinking Skills, Four-Grade Students

Introduction

In everyday life we are forced to make countless decisions. Most of the time we end up doing that automatically and spontaneously, since our brain uses mental shortcuts to save energy (Kahneman, 2011). However, if we think critically and deliberately while situations occur, we are more likely to make better decisions, which in turn will affect our lives (Butler, 2012).

Decisions are often made based on how we treat information. In a world where information has become increasingly accessible due to technological developments, it is essential that people develop skills such as organizing and selecting the information that is made available, as not all of it is credible, important, or even reliable (American Management Association, 2012; Stobaugh, 2013). Individuals must be able to critically evaluate the information to which they have access so that they can select the valid, reliable and important information, discarding those that are not, always keeping in mind the objective that they intend to achieve with that information (Schneider, 2002). This requires critical thinking skills, considered indispensable



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for success in life and work in the world we live in. Associated with this competence, communication, cooperative group work, and creative thinking are also necessary conditions for children to become self-determined, participative, and free citizens (Johnson & Johnson, 2014; Vansieleghem, 2005; Partnership for 21st Century Skills - P21, 2011; OECD, 2018).

Critical thinking has been characterized as being a structured thinking that allows one to avoid making crucial mistakes and that promotes the generation of ideas and solutions to problems that expand the opportunities for success (Massa, 2014). For Ennis (2015), critical thinking is "a rational, reflective thinking focused on deciding what to believe or what to do" (p.15). It is thus viewed as the personal ability to think for oneself reliably and to make responsible decisions that may affect individuals' future life (Ennis, 2015). For Halpern (1999), critical thinking is purposeful, rational, and goal-oriented thinking. It is a type of thinking that is involved in problem solving, in formulating inferences, calculating probabilities, and making decisions (Azmat, 2016; Cruz et al., 2019; Facione, 1990; Klimovienė et al., 2006; Molina-Patlán et al., 2016).

For Florea and Hurjui (2015), critical thinking is a complex cognitive process that is related to language and is developed through activities that for younger students involve reading, writing, speaking, and listening. The authors also point out that critical thinking is the result of the product of interactions between ideas and information.

The importance of interactions for the development of critical thinking makes cooperative learning a good strategy for its development (Gokhale, 1985; Wincel, 2013). Cooperative learning is a teaching and learning strategy in which students organized in small heterogeneous groups, in terms of academic achievement and gender, cooperate with each other by evaluating the performance of their group, in order to achieve common goals (Johnson & Johnson, 2014; Lopes & Silva, 2009; Slavin, 1995). To this end, each member of the group is responsible for learning, as well as for contributing to the learning of the other members of the group, creating an atmosphere in which everyone feels fulfilled (Balkcom, 1992).

According to Johnson and Johnson (2016), cooperative learning groups' work is based on five basic elements: positive interdependence, individual and group accountability, promotive interaction, social skills, and group processing. These characteristics make each of the group members individually stronger through collaborative learning, that is, students learn together to get stronger and better individually (Lopes & Silva, 2009). Positive interdependence is based on the conviction that the success of each member is linked to the success of the group, and that the group is only successful if all members are successful (Cecchini et al, 2020; Johnson & Johnson, 2005); individual and

group accountability allows the group to reduce the possibility of one member taking advantage of the work of others. In order for the group to achieve its goals, its members divide tasks or perform roles and each one is responsible for doing their part well (Johnson & Johnson, 2002; Silva, Lopes, & Moreira, 2018; Slavin, 1995); promotive interaction, preferably face to face is the essential condition to move from individual group work to group work, since working in groups requires that, during the tasks performance, students promote and facilitate each other's learning, through mutual help and support and stimulation of the efforts that each one makes to learn (Johnson & Johnson, 2002; Silva et al. , 2018; Slavin, 1995); social skills - students must possess the social skills necessary for cooperation, as these enable them to work effectively in groups. Candler (2021) states that a lack of social skills is probably the main inhibiting factor to success of cooperative groups. Examples of basic social skills are, speaking each in turn, listening attentively, managing conflict, making decisions, respecting the opinions of others (Johnson & Johnson, 2009; Lopes & Silva, 2009; Silva et al., 2018); group processing - the effectiveness of cooperative learning depends largely on the establishment of evaluation procedures that serve to regulate the groups' performance. Each member of the group individually and the group as a whole reflect on their own functioning, on how to overcome difficulties and resolve conflicts. This allows the group to become more autonomous and effective in achieving common goals (Johnson & Johnson, 2002; Johnson & Johnson, 2009; Silva et al., 2018). When these five characteristics are present in the functioning of a cooperative group, students share and synthesize ideas, argue about their points of view, and establish agreements, thus promoting critical thinking skills.

Cooperative learning group activities require students to confront different perspectives and analyze their importance so that they can synthesize information and negotiate to reach agreements. Paul and Elder (2001) and Dennicka and Exley (1998) argue that group discussions are effective in the sense that they stimulate thinking and develop ideas. For Paul (1995) when students are in groups discussing and arguing their views, they are developing critical thinking. For the European Commission (2007) and Fitzgerald (2012) it is very important that students are engaged in learning activities that involve making observations, analyzing, explaining, asking questions and planning, all of which are skills associated with critical thinking. Johnson et al. (2008), Patesan et al. (2016) and Valverde and Navarro (2017) claim that cooperative learning brings students the opportunity for students to develop new learning attitudes, as they become the center of their learning rather than assuming a passive attitude of mere recipients of knowledge (Cunha & Uva, 2017; Johnson & Johnson, 2016).

There are several cooperative learning techniques that promote students to participate in group

discussions, to confront information, think critically about issues and to be able to defend them (Facione, 2000). Think - Pair - Share (TPS) enables great oral and written argumentation, the discussion of different perspectives, and increases the quality of responses by increasing the waiting time (Johnson & Johnson, 1998; Lyman, 1987). Students have more time to think, become more involved in discussions, thus improving the quality of their answers (Rowe, 1974). Several authors such as Carinih (2020), Fauzi et al. (2021), Hunt et al. (2018), Kaddoura, (2013), Kurjun et al, (2020) consider that this method has a great impact in the classroom, increasing critical thinking, quality of learning and creative writing.

TPS evolves along three phases: (1) Thinking. The teacher forms heterogeneous groups of four students and states a topic to discuss or a problem to solve, giving the students "time to think individually" about the answer; (2) Pairing. The teacher forms two pairs in each group so that students share and discuss their answers in order to achieve a common answer; (3) Share. The pairs share their answers with each other for a few minutes, having to come up with a common answer. Then the teacher calls on one member of each group to SHARE the answer of the group with the rest of the class (Azizah et al., 2020; Silva et al., 2018).

Another of the cooperative learning methods that can be used in promoting critical thinking is the Round Table (Kagan, 1994). This method helps students solve complex conceptual problems as they can discuss them with each other, enabling the development of analysis, synthesis, and evaluation skills (Sari et al., 2021). In this method, the teacher organizes heterogeneous groups of three or four people and distributes a pen and a sheet of paper per group. He presents a task that requires more than one answer and stipulates the time for its completion and a time for each member of the group to write an answer or idea about it. After each person writes, he/she passes the paper and pen on to the next person in the group. The activity ends when the time allotted by the teacher has elapsed. Then, each group shares the final product with the class (Lopes & Silva, 2008; Lopes & Silva, 2009).

Although cooperative learning is one of the methodologies mentioned in the literature for promoting critical thinking at any level of education, most research has been conducted in secondary and higher education (Cottrell, 2017; Slater & Groff, 2017) and the Round Table and Think - Pair - Share methods have been little used (Kaddoura, 2013), even more so when it comes to primary 1 (Chew et al., 2020; Daniel & Gagnon, 2011; Florea & Hurjui, 2015; Huang, 2020). However, several researchers suggest that there is no specific age at which children are apt to think in more complex ways (Silva, 2008) which is the case with critical thinking. This perspective is in line

with the sociocognitive theory of learning and the recommendations of the Delphi Report by Facione (1990). In this report it is stated: "from early childhood, people should be taught, for example, to reason, to seek relevant facts, to consider options, and to understand the opinions of others" (Facione, 1990, p. 27). According to this perspective, the effectiveness of educational interventions to improve critical thinking does not depend on the level of education (Abrami et al., 2015; Bailin et al., 1999; Ennis, 1989; Florea & Hurjui, 2015; Lai, 2011; Massa, 2014; Willingham, 2008).

In Portugal, the development of critical thinking skills is foreseen from preschool to the end of compulsory education, respectively in the Curriculum Guidelines for Pre-School Education (Silva et al., 2017), in the Profile of Students Leaving Compulsory Education (Martins et al., 2017) and in the Essential Learnings documents (Direção Geral da Educação/Ministério da Educação, 2018). In these documents, cooperative learning is one of the strategies that is recommended for early childhood.

Taking in consideration all what has been said previously, the goal of this research is to evaluate the effectiveness of cooperative learning using RoundTable (Kagan, 1994; Suryani et al., 2021) and Think-Pair-Share (Lyman, 1987; Sari et al., 2019) in the development of critical thinking skills of 4th grade students (in Portugal) in the first cycle of basic education, namely observation, interpretation, analysis (inferences) and argumentation when compared to traditional teaching. The aim is to contribute to a necessary knowledge about the use of these cooperative learning techniques at this level of education, still little studied.

Method

Participants

The participants in this study were 41 students from two 4th grade classes of the 1st cycle of basic education in the North of Portugal. The experimental group consisted of 24 students, 10 females and 14 males with average age of 9.3 years ($SD = 0.48$). The control group was composed of 17 students, 5 females and 12 males, aged between 9 and 11 years old with average age of 9.6 ($SD = 0.60$).

Participants were from different schools and belonged to two equivalent classes (in terms of gender and results in the Critical Thinking Test for Basic Education, CTTBE, pretest).

Research design

The study employed a quasi-experimental design with a pretest and posttest (Cohen et al., 2018) using an experimental and a control group, with equivalent

groups in terms of the proportion between males and females ($\chi^2(1, N = 41) = 0.644, p = .422$) and with no significantly different total score in the pretest ($U = 187, p = .652$).

Instruments

As there is no test in Portugal to assess the critical thinking skills of basic school students, a test based on the definition of Critical Thinking in "The Profile of Students at the End of Compulsory Schooling" (Martins et al., 2017) was developed for this study. To construct the test, a set of questions of the type used in the educational progress national tests in 4th grade students in the first cycle was designed and submitted to two experts in critical thinking to assess their relevance and clarity. The experts' evaluation resulted in the Critical Thinking Test for Basic Education (CTTBE) that was applied for testing to a group of students identical to the one that participated in this study. From these procedures resulted a test consisting of 48 items with visual stimuli printed in color (Downey, 2009; Facione, 1990; Gelerstein et al. 2016; Joglar, 2015; Lazo & Smith, 2014) and verbal stimuli, i.e., short texts with authentic situations (Bonk & Smith, 1998; Care et al., 2018; Evans, 2020; Halpern, 1998). The items assess the following skills:

1. Observation (15 items - Restricted response items) - considered a mental activity that is experienced daily through the senses, and it can be stated that it is the most elementary and primitive thinking capacity of the human being, the basis for all other intellectual capacities. It comprises two moments, one concrete and the other abstract (de Sánchez, 2009). It is the starting point for critical thinking (Scriven & Paul, 1987; Thayer-Bacon, 1993). The grading criteria for these questions are organized by performance levels: one point for a correct answer and half a point for an incomplete answer).
2. Interpretation - the ability to understand or express the meaning or significance of data, values, opinions, facts, statements, conclusions, criteria, analogies, drawings, graphs, emotions, experiences, events, intentions, emotions, irony, causes and effects, as well as of conventions (social or business), beliefs, standards, rules, or procedures (Facione, 1990). (14 multiple-choice items - the item is scored only on those answers that unambiguously present the correct option. All other answers are scored with zero points).
3. Analysis - identify conventional and real inferential relationships between statements, questions, concepts, descriptions, or other forms of representation to express beliefs, judgments, experiences, reasons, information, or opinions (Facione, 1990). (18 multiple-choice items - the item is scored only on those responses that unambiguously present the correct option. All other answers are scored with zero points).

4. Argumentation - Ordering and communicating to others the results of one's reasoning; justifying the reasoning and its conclusions in terms of evidence, concepts, methodologies, criteria, and contextual considerations; and presenting the reasoning in a clear, convincing, and persuasive manner (Facione, 1990). (A long-answer item - the classification criteria are organized by levels of performance, and one point is awarded for each argument presented).

The CTTBE reliability is acceptable ($\alpha = 0.72$).

This study followed the ethical requirements of EFPA - European Federation of Psychologists' Associations, as well as of the Portuguese Psychologists Association. All ethical principles were respected, ensuring that all participants knew and accepted the principles of informed consent, voluntary participation and the confidentiality of their responses.

Procedures

Pedagogical context

This study lasted four months during 2019.

Experimental group:

The teacher had over 10 years of experience and attended 20 hours of training on cooperative learning before the beginning of this study, orientated by the authors of this article.

At the beginning of the period the following activities were done in the first class:

1. the students answered the CTTBE test (pretest);
2. the teacher organized heterogeneous groups of four students;
3. different roles were assigned to each member of the group, on a rotating basis and adjusted to the objectives of the activities.

Throughout the following classes 21 cooperative learning activities were implemented using Think-Pair-Share (Cooper, 2018; Lyman, 1987) and RoundTable (Kagan, 1994) with a similar frequency. These activities had the objective to promote the assessed skills by the CTTBE test: observation, interpretation, analysis (inferences) and argumentation in Language Arts, Environment Study and Mathematics (1st Cycle) disciplines (through the observation, reading, writing, discussion and elaboration of Venn diagrams from images, texts, videos on topics like fishing and livestock, pollution, children rights, Portugal revolution of the 25th April, community life of bees and ants).

These learning activities were structured in such a way that the characteristics of cooperative groups were always present, namely, positive interdependence, individual and group responsibility, stimulating interaction (preferably face-to-face), social skills and, occasionally, assessment of the group process. These two methods were used because both allow all group members to freely express their opinions and ideas equally and because they complement each other, enabling the development of oral and written arguments.

At the end of the study, in the last class, the students answered the CTTBE test (posttest).

Control group:

The teacher had over 10 years of experience and did not have any training in cooperative learning

At the beginning of the period, in the first class, the students answered the CTTBE test (pretest).

During the four months duration of the study, the students executed the same learning activities that were performed by the experimental group. The method used to approach the content was traditional teaching, centred on the teacher, focusing on individual work and with some class discussion.

At the end of the study, in the last class, the students answered the CTTBE test (posttest).

The data collection was done in both classes at the same moment by the authors of this paper.

Data processing and analysis

The research data were analyzed using inferential analysis methods. The aim was to examine whether the students' scores of critical thinking skills in the 4th year of schooling in the 1st cycle of Basic Education (namely observation, interpretation, analysis (inferences) and argumentation) of the experimental group with cooperative learning were higher when compared with the group where traditional teaching was used (control group). Before the hypothesis testing was performed, normality and homogeneity tests were done. The comparison of the paired scores' means was performed with a t-test whenever the normality condition was verified. The Wilcoxon signed-rank test was used otherwise. The data were analyzed with the assistance of SPSS version 25.0 for Windows at a significance level of 5%.

The results in Table 1 show that the experimental group had a significant gain in the CTTBE posttest score compared to the pretest score, while the control group had no significant gain. The observed effect size is large ($d = 1.36$). This indicates that the magnitude

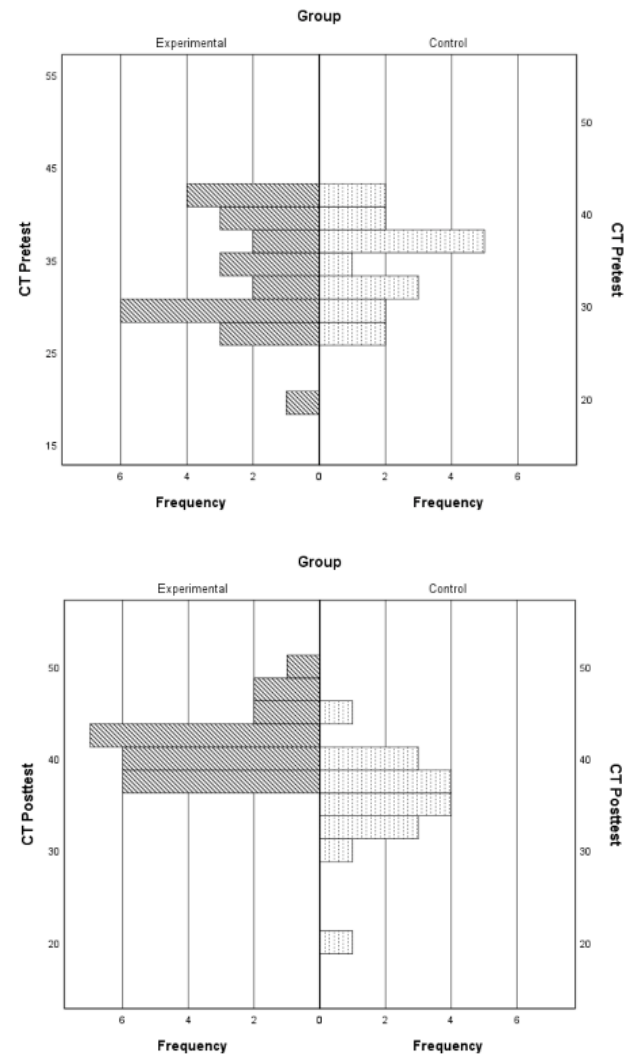
of the difference between the average gains of the experimental and the control group is large.

Table 1.
Analysis of the CTTBE pretest and posttest results for the experimental and control classes

Class	CTTBE test score		Gain in the CTTBE test score		Paired t-test
	M	SD	M	SD	
Experimental (N = 24)	Pretest	33.81	6.12		$t(23) = -7.30$ $p < .001$
	Posttest	41.42	3.34	7.60 5.10	
Control (N = 17)	Pretest	34.71	4.92		$t(16) = -0.57$ $p = .577$
	Posttest	35.32	5.21	0.62 5.21	

Figure 1 shows the distribution of the total score in the pre and posttest for the two classes. The decrease in the amplitude of the results in the CTTBE posttest for the experimental group means that the intervention led to smaller disparities between the students of that class. There is a general positive evolution of all the students of the experimental group, contrary to what happens in the control group.

Figure 1.
Results in the CTTBE test for the Experimental and the Control group



As for the skills analyzed with the CTTBE test, the experimental group had a significant increase in the score (from pre to posttest) in all skills and the control group only had a significant increase in Analysis (Table 2).

Comparing the gains obtained by the two groups in each skill, the standardized effect size, $r = Z/\sqrt{n}$, was computed. This one revealed to be large for Observation ($r = .55$) and Interpretation ($r = .63$), small for Analysis ($r = .13$), and medium for Argumentation ($r = .31$). That shows that the magnitude of the differences between the scores of the experimental group and the control group are large for skills Observation and Interpretation.

Discussion of findings

The objective of this study was to evaluate the effectiveness of cooperative learning using the RoundTable (RT) and Think-Pair-Share (TPS) methods in the development of critical thinking skills (namely observation, interpretation, analysis (inferences) and argumentation) of 4th grade students of Basic Education, when compared to traditional teaching. Students in the experimental class had significant average gains in all critical thinking skills (global gain), while the control class did not. The students in the latter regressed in their observation and interpretation skills and improved in their ability to argue and analyze, with the average differences being statistically significant only in analysis.

The comparison of the results of the two classes also shows that with the use of cooperative learning, the individual differences in the total score of critical thinking skills decreased. In the control class, with the traditional pedagogy, the individual differences

in the total score increased from pre to posttest. The decrease in the differences in the test scores in the experimental group is essentially related to the fact that the students with lower performance at the start obtained greater gains.

These results show that cooperative learning is an efficient pedagogic methodology for the promotion of Critical Thinking skills. This supports the well-known literature on cooperative learning more studied at the secondary and superior educational levels (Johnson et al. 2008; Johnson & Johnson, 2016; Patesan et al., 2016). The two cooperative learning techniques used in this study, RoundTable and Think-Pair-Share, have also shown their efficacy at those levels (Carinih, 2020; Choi & Mantik, 2017; Fauzi et al., 2021; Hunt et al., 2018; Kaddoura, 2013; Sari et al., 2021; Suryani, 2021).

The present study adds on to the existing literature focusing at the elementary educational level (level at which the literature is scarce) confirming that, at this level, it is possible to develop critical thinking skills (Florea & Hurjui, 2015; Quesnel, 2015; Willingham, 2008).

This study also reinforces the previous literature on the effect of cooperative learning that shows that although both groups of students, low-achievers and high-achievers progress (Kent et al., 2015; Sangeeta & Sunita, 2019; Slavin, 1995), the first ones benefits more (Johnson et al., 2008; Reinhard, 2021) from cooperative learning, probably due to the fact that they have the opportunity to get familiarized with the learning strategies used by the second ones, through their interaction.

In a teacher-centered classroom, some of the low-achieving students feel shy to ask questions and there are fewer opportunities to interact with

Table 2.
Statistics of the scores in the CTTBE test in experimental group

Skill	Class		M	SD	Wilcoxon signed-rank test	
Observation	Experimental (N = 24)	Pretest	9.31	2.20	Z = -3.59, p < .001	
		Posttest	11.71	1.64		
	Control (N = 17)	Pretest	9.18	1.51		Z = -0.874, p = .382
		Posttest	8.85	1.63		
Interpretation	Experimental (N = 24)	Pretest	11.25	2.57	Z = -3.42, p < .001	
		Posttest	13.42	0.72		
	Control (N = 17)	Pretest	13.00	1.17		Z = -1.31, p = .190
		Posttest	12.47	2.32		
Analysis	Experimental (N = 24)	Pretest	10.58	1.86	Z = -3.22, p = .001	
		Posttest	12.63	1.84		
	Control (N = 17)	Pretest	10.0	2.06		Z = -2.26, p = .024
		Posttest	11.29	1.76		
Argumentation	Experimental (N = 24)	Pretest	2.67	1.90	Z = -2.97, p = .003	
		Posttest	3.67	1.37		
	Control (N = 17)	Pretest	2.53	1.62		Z = -0.371, p = .711
		Posttest	2.71	1.72		

their colleagues. In turn, in a cooperative learning environment, more student-centered, low-achievers feel freer and more motivated to share their doubts and questions with their peers (Sangeeta & Sunita, 2019; Slavin, 1995). Moreover, they learn how to overcome their deficiencies in strategic and metacognitive knowledge (Hoek et al., 1999; Majoka et al., 2007). According to Ledlow (2001), TPS is a great method to actively involve students in the learning process, mainly in the Pair stage when students come together to discuss the results of their previous thinking (Surayya et al., 2014) having students involved focusing on their answers and discussions with their peers (Robertson, 2006). Our results confirm those of Alfian (2018) who concluded that students' critical thinking skills improve when the TPS methodology is used.

The Round-Table method allows students to review the work written by their peers, which determines that they develop a conceptual understanding of a topic, the ability to evaluate information and to consider other points of view (Parmawati et al., 2020).

In synthesis, our study contributes to the literature on the effectiveness of cooperative learning to develop critical thinking skills, adding evidence for the Basic Education (first cycle - grades one to four), not much studied until now. It reinforces, though, the controversial idea that critical thinking can be developed at early stages of education with young children (Slavin, 2014; Sills et al., 2016).

Limitations for this study and future investigation

It is important to stress that there is no critical thinking test validated for the level of education here in appreciation. That limitation was somewhat overcome with the creation of a test which allowed to evaluate pre and post treatment. However, for the generalization of this study, it would be important to validate this test at this level of education. The reduced number of students in both groups can also be seen as a limitation.

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Teacher Evaluation Feedback and Their Self-Efficacy in Classroom Management Skills

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Abstract

The study of self-efficacy and its role in teacher performance has intrigued the interest of many researchers over the last two decades. This study aimed to examine the perceptions of teachers regarding the role of principal instructional feedback during the process of teacher performance evaluation in increasing self-efficacy and how it affects classroom management skills. Because self-efficacy is vital in determining teacher effectiveness and student achievement, little is known about the role of the teacher evaluation process in the self-efficacy and classroom management skills development of teachers. Quantitative correlational design methods were used to conduct this research, and the sample was chosen using the simple random sampling of 379 teachers in primary and lower secondary schools in the Republic of Kosovo. Data were gathered using the Teacher Sense of Efficacy Scale (TSES) long form, adapted and modified to meet the research objectives. A moderately positive relationship between evaluation frequency and feedback frequency, feedback frequency, and teacher self-efficacy in classroom management skills was revealed in this study. Additionally, a strong positive correlation between feedback on classroom management and teacher self-efficacy in classroom management skills was also observed. The more frequently teachers go through the performance evaluation process and the more feedback they receive, the more their self-efficacy grows and they develop classroom management skills.

Keywords:

Classroom Management, Instructional Feedback, Teacher Self-efficacy

Introduction

The role of feedback during the performance evaluation process for teachers in increasing self-efficacy at work has long been a variable in numerous studies in the social sciences. Harris et al. (2014) stated in their research that evaluations are critical to teachers because of the feedback they receive from evaluators. According to Darling-Hammond (2015) this type of evaluation serves several purposes. The most important purposes are giving and receiving feedback, implementing feedback, and improving student achievement, which affects the teacher's self-efficacy.



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Klassen and Tze (2014) found that self-efficacy is related to teacher performance at work and acts as a mediator between student stress management and the engagement of teachers in instructional practice. Fackler et al. (2021) mention that self-efficacy is related to teacher performance at work and serves as a mediator between student stress management and teachers' engagement in instructional practice.

A solid foundation for beliefs and perceptions of teachers about the importance of self-efficacy in teaching is provided in the research by Brouwers and Tomic (2000) and Stein and Wang (1988). These authors emphasise, in particular, that teacher self-efficacy should be evaluated as a result of the educational process, with variables such as student engagement, use of learning strategies, and classroom management, rather than as a determinant variable, as is often done in interdisciplinary studies.

The interrelationship of these factors in the work of teachers, which has not been sufficiently recognised and given the required importance, has been influenced by global developments and the circumstances of different nations. Education systems worldwide are undergoing ongoing reforms to create a more appropriate system to improve teaching quality and meet the demands of the twenty-first century. According to Saqipi et al. (2014) reforms in transitional countries should be viewed from the perspective of what kind of professionalism of teachers is needed and by paying close attention to the historical and social contexts that foster their professionalism. The professionalism of teachers should not be viewed linearly but rather through a careful examination of the contextual framework in which their reality is embedded.

With the implementation of the Kosovo Curriculum Framework, the primary responsibility for the outcomes of successful education reform has shifted to teachers. According to Vula et al. (2015) successful reform depends on how teachers perceive curriculum change and how prepared they are to act as change agents and develop professionally to respond to professional demands.

In this regard, it is necessary to first examine the actual situation in education, including their problems, challenges, and workplace difficulties. The best way to accomplish this is through teacher evaluation, continuous monitoring, observing teacher work in the classroom, professional development, collaboration with colleagues, students, parents, etc. Effective and highly qualified teachers must improve the teaching process and student engagement in lessons. To enhance these qualities, the Ministry of Education and Science has enacted legislation governing the criteria and qualifications that teachers must possess to be hired and increase their work efficiency. Furthermore,

after Administrative Instruction No. 14/2018, the conduct of the Teacher Performance Assessment to identify the needs for professional development and support them in improving teaching was called for (MASHT, 2018).

This research will focus on the evaluations made by the school principal at least twice during the school year by monitoring lessons using special forms and informally through mentoring, as needed and at the request of teachers. Formal evaluation is divided into three stages. In the first phase, a consultative meeting is held before the monitoring, where the assessor and the teacher discuss the expected results, the teaching methodology to be used, methods, strategies, forms of work, and the evaluation of artefacts (e.g. lesson plans, professional files of teachers), personal assessment diaries of students, etc.). Then, in the second phase, the progress of the lesson is monitored, and the assessor keeps detailed notes on the progress of the work. A formal meeting to discuss the results achieved, setbacks and the need for improvement, where the teacher receives feedback from the assessor, is scheduled when the lesson is over, in the third phase. With such a meeting, the teacher will be helped to improve their work to develop more effective teaching. According to Good et al. (2009) this process is defined as an effective way of engaging students, using effective learning strategies, and implementing appropriate classroom management methods while engaging all students in lessons.

More detailed studies are needed to identify the role of the feedback received by principals during the performance appraisal process. With such studies, it will be possible to increase the self-efficacy of teachers in teaching, focusing on developing classroom management skills. This gives significant importance to this research, and in this case, the social science literature would be further enriched. Particularly, the social science related to education would benefit, providing even more importance to the role of feedback received by teachers.

Literature Review

Teacher performance evaluations have undergone a long transition. During this process, teacher performance was adapted with time. In Kosovo, since the end of the war, the government has constantly worked to reform the education system with the help of other national and international organisations. Still, it is shown in the Matura exam results, PISA (Programme for International Student Assessment) results, and unemployment rates that the education system that the desired results are not being obtained. One of the reasons for this is that it was not done enough to build a sustainable teacher performance evaluation system, leading to a lack of responsibility and accountability. For this reason, this area has not

yet been studied. There are no factual data that could be used to build such a system.

With the beginning of the implementation of the Kosovo Curriculum Framework, the main burden of successful reform in education has fallen on teachers. Considering their importance in this regard, it is necessary to first see the actual situation in education, problems, challenges, difficulties, etc. The best way to do this is through performance evaluation, observing the work of teachers in classrooms, organising the professional development activities of teachers, and cooperating with colleagues, students, parents, etc.

Sullivan and Glanz (2013) stated that supervision is an ongoing, non-judgmental, collaborative process that engages teachers in a dialogue that encourages deep reflective practices to improve teaching and student learning. In their conception of the clinical supervision process, the authors emphasised the importance of implementing a multistage process for principals to engage teachers in the supervision process. This includes an initial meeting before the conference, classroom observations, a meeting after the conference where the teacher receives instructional feedback, collaborative reflection and planning for instructional action.

The evaluation process provides teachers with meaningful information that encourages professional learning and growth. Hinchey (2010) says that policymakers should consider building an assessment system aimed at the continuous improvement of teachers and the counselling or suspension of teachers who cannot or do not want to improve. This evaluation system creates a basis for improving the education system, achieving student outcomes, and sustainable development. An integral part of the evaluation is feedback. In their research, Donaldson and Stobbe (2003) say that feedback is provided during the evaluation process. It informs the teacher and evaluator about what should be done to analyse the way towards improved effectiveness and to build the self-efficacy of teachers. According to Bandura et al. (1999), self-efficacy refers to the belief in one's own ability to complete tasks and reach goals and increases the effort, persistence, goal setting and performance of employees. A key attribute of effective teaching is the sense of self-efficacy of the teacher. This attribute influences the realisation of the teaching process, effective ways of engaging students, using effective learning strategies, and implementing appropriate classroom management methods by providing engagement of all students (Allinder, 1994).

Recent educational research conducted by Hallinger et al. (2018) and Murphy et al. (2013) found that teacher evaluation is crucial in improving efficiency and building a functional school management system. Also, the feedback that principals provide in building

the capacity and skills of teachers for classroom management has been defined by many researchers as one of the essential elements of successful school leadership (DiPaola & Hoy, 2018), these findings are supported by the research of Altun et al. (2021), were teachers insist on receiving detailed feedback regarding their work, with suggestions in each stage regarding teaching process, what they did wrong and how to improve those mistakes. Consequently, by improving the work process in the school, the opportunities for professional development of teachers and improvement of achievement increase for students. However, teachers must implement the feedback and recommendations they receive during the assessment process to achieve this. The implementation of teachers is based mainly on the level of self-efficacy of teachers, according to Harris et al. (2014).

Hattie and Timperley (2007) define feedback as 'information provided by an agent [e.g. a principal] regarding aspects of one's [teacher's] performance'. In the context of professional teacher supervision and evaluation, we positioned principals as the agents responsible for facilitating instructional feedback conversations with teachers that were being evaluated. Instructional feedback focused on improving the instruction of teachers has been determined to be an essential element of instructional leadership and, more specifically, the instructional supervision and evaluation process (DiPaola & Hoy, 2018; Goldring et al., 2015; Hattie, 2009). It was revealed in previous research studies that evaluators are challenged when providing consistent, timely and meaningful instructional feedback (Arlestig, 2008; Blase & Blase, 2010). On the other hand, Stein and Nelson (2003) add that they must be able to recognise intense instruction when they see it and encourage it when they do not.

According to Dicke et al. (2015) classroom management refers to teaching procedures that aim to create a positive climate and social atmosphere of teaching that inspires, helps, and influences student outcomes. At the same time, the self-efficacy of teachers in classroom management is defined as confidence in their ability to perform classroom management tasks successfully and responsibilities. Such responsibilities include controlling distracting behaviour in the classroom, preparing students to follow classroom rules and managing time for learning to implement foreseen activities (Pfitzner-Eden et al., 2014).

Almong and Shechman (2007) described the self-efficacy of teachers in classroom management as confidence in their ability to manage the challenging circumstances presented to them during lesson implementation. In such cases, they add that high-self-efficacy teachers use a variety of strategies

and techniques, including praise and support, and implement classroom management strategies to motivate students to feel responsible for their behaviours. These strategies, and others, such as building their learning routines, and developing skills to overcome difficulties while controlling self-management, influence students to have greater engagement in lessons (Bruce et al., 2010). According to them, students develop appropriate learning routines, problem management skills, and self-management. Hemmeter et al. (2012) added that some students, especially those with special needs, often show behavioural problems and difficulty managing them. Therefore, increasing the attention of teachers is required to keep their condition under control (Fox & Lentini, 2006). Thus, teachers who have mastered good classroom management skills have been described as leaders who can influence the behaviour of students, create productive learning environments and meet the needs of students to feel safe (Aloe et al., 2014). In this regard, the self-efficacy of teachers helps them apply a more effective system of rules to improve student behaviour and engagement and build their confidence in managing their classroom (Zee & Kooman, 2016).

Materials and methods

Research design

This quantitative study aimed to analyse the role of instructional feedback that teachers receive from their principals in increasing their self-efficacy in teaching with a focus on classroom management skills, based on evaluations and recommendations derived from their performance evaluation. This study was based on prior studies, such as those of Klassen and Tze (2014) and Dicke et al. (2015) suggesting that the effectiveness of teachers increases based on their sense of self-efficacy.

Research questions

In our research, we aimed to answer the main and sub research questions:

1. What is the role of the instructional feedback teachers receive during the performance evaluation process in increasing their self-efficacy in teaching?
 - 1.1 What is the relationship between the frequency of evaluation and the frequency of instructional feedback?
 - 1.2 What is the relationship between the frequency of feedback teachers receive from their principals and their self-efficacy?
 - 1.3 What is the relationship between the instructional feedback that teachers receive during the performance evaluation process and their self-efficacy in classroom management?

Sample and Data Collection

The population in this research is primary and lower secondary teachers of the Republic of Kosovo. To select participants, data from the report "Statistical data on pre-university education–2021/2022" prepared through the Information Management System in Education (MASHT, 2022) were used. Based on this report, it was seen that the total number of primary and lower secondary teachers working in all schools was 17,211, of which 10,654 were female teachers and 6,557 were males. The reason for selecting all teachers was to generalise the research findings. According to Crano et al. (2014), the power of a phenomenon, which has been previously identified, can be reidentified in other countries, provided that the population has been previously identified. Therefore, the environment and context were similar.

The sample was chosen based on Cohen et al. (2018). According to this study, a confidence interval of 95% and a margin of error of 5% were estimated to be 280 primary and lower secondary education teachers. The research respondents were selected according to the simple probability method (Crano et al., 2014).

The Teacher Sense of Efficacy Scale (TSES) questionnaire was adapted and modified to collect data to achieve the research goals. The TSES was developed by Tschannen-Moran and Hoy (2001) and had 24 questions. The items were measured on a 5-point Likert scale from 'nothing' (1) to a 'great deal' (5). It was demonstrated in the results that the acceptable reliability of the questionnaire was measured by Cronbach's alpha ($\alpha = 0.94$). This instrument was used to collect data on the general sense of teacher effectiveness, as well as on three specific areas of teaching: (a) teacher effectiveness in the use of teaching strategies, (b) the effectiveness of teachers in engaging students, and (c) the effectiveness of teachers in classroom management. A 5-item section was added to this questionnaire to analyse the role of feedback in raising teacher self-efficacy, focusing on the self-efficacy of teachers in classroom management. The adapted questionnaire was applied first in a pilot study with 35 teachers.

Results and Findings

To examine the main research question – 'What is the role of instructional feedback teachers receive during the performance evaluation process in increasing their self-efficacy in teaching?', we used a Pearson correlation analysis to see the relationship between the two variables (Table 1). There was a moderate positive correlation between instructional feedback and the self-efficacy of teachers ($r = 0.521, p = 0.005$).

Table 1
Pearson Correlation Results in the Sense of Efficacy and Instructional Feedback of Teachers

		Total sense of efficacy	Instructional feedback
Total sense of efficacy	Pearson correlation	1.000	0.521
	Sig. (2-tailed)		0.005
	N	376	375
Instructional feedback	Pearson correlation	0.521	1.000
	Sig. (2-tailed)	0.005	
	N	375	375

The analysis of Pearson correlation for the first research sub question, ‘What is the relationship between the frequency of evaluation and the frequency of instructional feedback?’ is shown in Table 2. It was shown in the results that there was a moderate positive correlation between the frequency of performance evaluation during a school year and the frequency of receiving feedback ($r = 0.631, p = 0.003$).

Table 2
Pearson Correlation Results for Frequency of Performance Evaluation During the Year and Frequency of Received Feedback

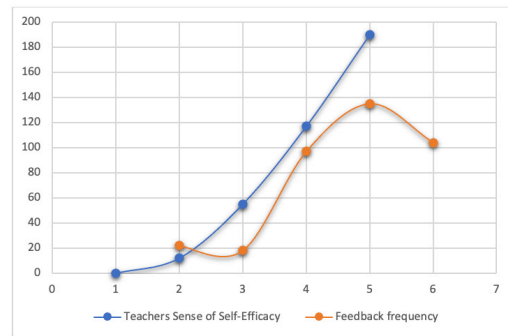
		Frequency of evaluation performance during a school year	Frequency of receiving feedback
Frequency of performance of evaluation during a school year	Pearson correlation	1.000	0.631
	Sig. (2-tailed)		0.003
	N	377	374
Frequency of receiving feedback	Pearson correlation	0.631	1
	Sig. (2-tailed)	0.003	
	N	374	376

The frequency of receiving feedback was used as an independent variable, and the self-efficacy of teachers was used as a dependent variable. The results of the analyses are shown in Table 3. A moderate positive correlation between the frequency of receiving feedback and the self-efficacy of teachers is shown in the results ($r = 0.572, p = 0.012$). The relationship between these variables is shown in Figure 1.

Table 3
Pearson Correlation for Frequency of Feedback Teachers Receive and Their Total Sense of Efficacy

		Frequency of receiving feedback	Total sense of efficacy
Frequency of receiving feedback	Pearson correlation	1.000	0.572
	Sig. (2-tailed)		0.012
	N	376	376
Total sense of efficacy	Pearson correlation	0.572	1.000
	Sig. (2-tailed)	0.012	
	N	376	376

Figure 1
Relationship Between Feedback Frequency and the Self-Efficacy of Teachers.

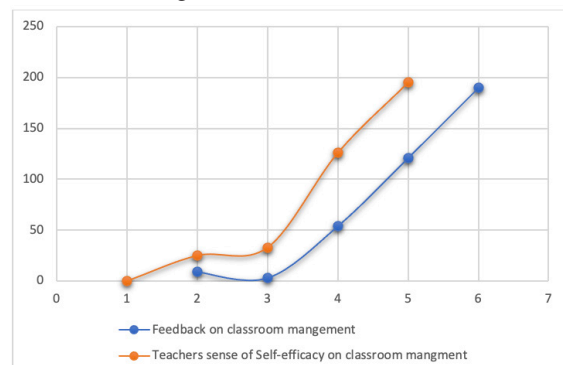


We used a Pearson correlation analysis to determine the relationship between feedback on classroom management, used as an independent variable, and the self-efficacy of teachers in classroom management, used as the dependent variable. This analysis was used to analyse the third research sub question, ‘What is the relationship between the instructional feedback that teachers receive during the performance evaluation process and their self-efficacy in classroom management?’. There was a strong positive correlation between the dependent and independent variables ($r = 0.720, p = 0.007$). The relationship between these two variables in this analysis is shown in Figure 2.

Table 4
Pearson Correlation Results for Feedback on Classroom Management Skills and the Self-Efficacy of Teachers on Classroom Management Skills

		Feedback on classroom management	Self-efficacy of teachers in classroom management
Feedback on classroom management	Pearson correlation	1.000	0.720
	Sig. (2-tailed)		0.007
	N	374	375
Self-efficacy of teachers in classroom management	Pearson correlation	0.720	1.000
	Sig. (2-tailed)	0.007	
	N	375	375

Figure 2
Relationship Between Feedback on Classroom Management and the Self-Efficacy of Teachers in Classroom Management.



Discussion

The relationships between the variables of instructional feedback and the self-efficacy of teachers in classroom management were examined in this study. According to the results, instructional feedback was positively correlated with classroom management self-efficacy, showing that when teachers receive feedback during the performance evaluation, their self-efficacy in classroom management will increase. In this regard, similar results have been reported in some studies. These findings are in line with the other studies conducted, through which transformational leadership and communication with teachers proved to be correlated and predicted the self-efficacy of teachers (Walker & Slear, 2011; Kurt et al., 2011; Bay, 2020).

Concerning the main research question of the study, which was 'What is the role of instructional feedback that teachers receive during the performance evaluation process in increasing their self-efficacy in teaching?', it was shown in the correlational analysis (Table 1) that the more feedback that teachers receive from their evaluators, the more their self-efficacy is increased. Similar results have been reported in different studies. According to Fields (2020), teachers are helped by the instructional feedback they receive during the performance evaluation to improve their instruction and obtain more confidence in applying new learning methodologies. Donaldson and Stobbe (2003) and other studies (e.g. Maclellan, 2001; Carles, 2006) added that teachers see instructional feedback as an indication of addressing their needs for professional development.

As for the first sub question, we aimed to challenge the 'this is better' assumption. The question 'What is the relationship between the frequency of evaluation and the frequency of instructional feedback?' was shown by the results of the correlation analysis that the frequency of evaluation and frequency of instructional feedback were moderately related ($r = 0.631$; Table 2). The more teachers go through their performance evaluations, the more instructional feedback they receive. Based on the responses of teachers, we suggest priorities for policymakers and education agencies to consider as they make adjustments to evaluation and support systems for teachers. Kang & Fredin (2012) add that the objective of evaluating feedback from teachers is to improve the effectiveness of the decision-making process and their instruction.

To analyse the second sub research question, 'What is the relationship between the frequency of feedback that teachers receive from their principals and the self-efficacy of teachers?', we used Pearson correlation analysis, and a moderate correlation of $r = 0.572$ was found. These data are essential because

they contribute to the existing literature and raise a question to study further on the types of feedback that help teachers build their self-efficacy.

Regarding the Pearson correlation analysis related to the third research sub question, 'What is the relationship between the instructional feedback that teachers receive during the performance evaluation process and their self-efficacy in classroom management?', there was a strong correlation ($r = 0.720$) between instructional feedback and the self-efficacy of teachers in classroom management. These conclusions are in line with Mireles-Rios et al. (2014). Those authors stated that it is crucial to provide feedback in specific domains of teaching, such as classroom management, instructional strategies and student engagement. After such feedback, it is possible to provide a comprehensive teacher evaluation. When teachers are given specific feedback, they are allowed to enhance and develop their abilities to be effective with students.

Conclusion

Teacher performance evaluations and instructional feedback during such a process have undergone a long transition. Trying to adapt to time and considerable research has examined the correlation between instructional feedback by principals and the self-efficacy of teachers.

The role and relationship between instructional feedback as an independent variable and the self-efficacy of teachers in classroom management as a dependent variable were thoroughly investigated in this study, extending prior research. First, the relationship between instructional feedback and teacher self-efficacy was emphasised. A moderately positive correlation between these variables was shown in our findings, implying that teachers who received instructional feedback from their principals were more confident in their instruction. Second, evaluation frequency was positively related to feedback frequency, indicating that teachers who went through the evaluation process received more feedback than those who did not. Third, instructional feedback on classroom management had a strong positive correlation with the self-efficacy of teachers in classroom management. After such a result, we concluded that classroom observation and the feedback teachers receive to improve their classroom management skills helped them build their self-efficacy.

Limitations and Recommendations

The first limitation is that all variables in this study were measured based on the self-perception of teachers on the role of performance evolution in their self-efficacy. It was explained to the teachers that their

personal information and answers would not be shared with anyone, that they would be anonymised, and that the data would only be used for the study. Despite this, they may not have accurately answered the questionnaires.

The second limitation of the current study was the quantitative nonexperimental correlational design. Based on that design, it was impossible to infer cause-and-effect since these variables can only be determined in experimental studies (Mertens, 2019). For future research, employing an experimental design to determine these effects would be recommended.

Finally, the third limitation is the research context. Despite the growing interest in this concept and research on the reactions of evaluators and teachers to the evaluation of the performance of teachers, new systems are limited, particularly in developing countries. For future research, it is recommended to conduct a comparative quantitative experimental, correlational study in which different contexts and educational systems would be analysed and compared, and the findings would be more generalisable.

Data Availability

All the data used to support the findings of this study are included in the article.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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“We're Trying to Find Cool Things in the Forest” – Exploring Children’s Curiosity and Creativity in the Outdoors

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Abstract

Curiosity and creativity are crucial for children's learning and engagement within their worlds. However, research on creative teaching that also addresses children's curiosity is quite limited. In this case study, we adopted visual methods in combination with video-stimulated recall dialogue (VSRD) to explore children's experiences in a Forest School (FS) program in Southern Ontario. As researchers, we were particularly interested in the nexus of children's curiosity and creativity in the process of learning. Participating children, aged 6-12 years, wore GoPro cameras to document their lived experiences in the FS. Informed by constructivism, we examined data vignettes, querying the role of curiosity and creativity within children's entanglements in the natural environment. The results indicate that open-ended materials within nature invited and sustained curiosity and creativity. Children tended to gravitate to the complexity and ambiguity offered within the natural environment. The research findings have implications for educators, namely the importance of the choice of materials and approaches to support and prioritize children's curiosity and creativity in learning processes. Implications for inviting educators to capitalize upon inquiry moments and the unknown were also evident.

Keywords:

Creativity, Curiosity, Outdoor Learning, Forest School, Pedagogy

Introduction

Sam¹, an 8-year-old child states, “we're trying to find cool things in the forest so we can videotape it and see if anyone knows what it is. So that's what we did with the fur we found in the video” (Video Data Transcript).

Sam is engaging in a video-stimulated recall dialogue (VSRD)² (Morgan, 2007) with a researcher as part of a larger comprehensive case study (Yin, 2009) of children's experiences in a Forest School³. The children of this Forest School program range in age from 6 to 14 years and attend an immersive program in a natural wooded area in the Niagara region of Ontario. At the time of the data collection of the study (2020-2021), this program was considered



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an alternative to public school programs and was attended by children on a full-time basis. The outdoor nature program's approach was comprehensive. It included daily explicit language and math instruction as well as all other provincial curriculum expectations embedded within the approach of nature explorations of the children and educators. The program self-described itself as an "innovative, project-based, child-led program" (Nature School Website). The Forest School program was delivered by three educators, two of whom were full-time Ontario-certified teachers with extensive knowledge of Forest School pedagogy⁴. The third educator was a first-year pre-service teacher education student. This third educator was also employed as a research assistant for the project and supported both the program and data collection one to two days each week.

Forest Schools align with a constructivist theoretical orientation of learning, whereby children construct knowledge through experiences with real-world learning in the outdoors (Coates & Pimlott-Wilson, 2019; Harris, 2017). Although somewhat contested, the Forest School approach upholds specific principles related to process-learning, unhurried child-directed experiences, immersion in outdoor natural spaces, and repeated contact with the natural environment (Leather, 2018; Müller et al., 2017; Waite & Goodenough, 2018). Barrable and Arvanitis (2018) discuss how participation in Forest Schools can be linked to children's development of autonomy, decision making, communication, and problem-solving skills, as well as a sense of competence and risk-taking, fostering an important sense of connectedness to others within the common world (Latour, 2005).

Specifically, in this paper, we re-examine data fragments from the case study to explore the nexus of curiosity and creativity in nature as two important caveats for learning. Purposefully, we aim to illuminate how learners, educators, and nature are entangled in a process of co-learning whereby children's cooperative or self-directed inquiries can help support more participative ways of knowing. Here, we focus on two thought provoking questions: 1) How does the forest invite children's curiosity and creativity? and 2) What would a relational-responsive pedagogy that prioritizes children's curiosity and creativity in a Forest School entail?

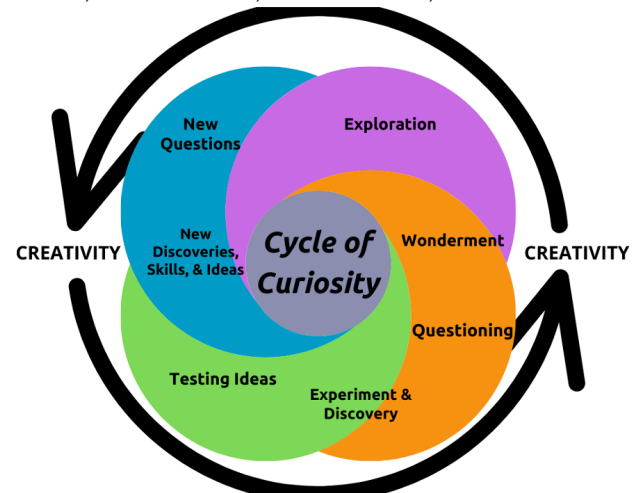
The Role of Curiosity and Creativity

Theoretically, curiosity and creativity appear closely linked. Curiosity "involves the pursuit of new knowledge and experiences" and creativity "involves transforming existing knowledge, ideas, or objects into something novel and interesting" (Gross et al., 2020, p. 77). Here, we think of curiosity as a cycle upon which children move seamlessly throughout various overlapping phases of exploration, wonderment,

questioning, experimenting, discovery, repetition, and testing ideas leading to discoveries, new ideas, and skills, while also building confidence, and generating new questions and ideas. How curiosity and creativity are possibly linked is further discussed later in the article, here we present our conceptual model of the cycle of curiosity (adapted from Dietze & Kim, 2021) as intricately linked with creativity (Figure 1).

Figure 1

The Cycle of Curiosity and Creativity as Linked



Albeit not readily understood, curiosity seems innate and part of human cognition (Kidd & Hayden, 2015). Many scholars would argue young pre-linguistic children's relations and knowledge of the world are felt and experienced through their bodies and emotions (Gibson et al., 2017; Hodgkin, 1976, 1985; Ingold, 2021; Tuan, 1977). As Gurholt and Sanderud (2016) suggest for the child "the self and the environment are sensed, experienced and embodied relationally as coherent and meaningful entities or life-worlds" (p. 320). Hodgkin (1976) proposes that children are particularly curious about challenging, new, or difficult tasks. The young toddler is drawn to the unfamiliar and explores an acorn or blade of grass by looking, touching, tasting, and smelling. The older school-age child wonders and experiments with the force of the wind, perhaps using string, sticks, paper, materials, and their bodies to react and respond to the blustering movements of the wind. For children, much of this sense-making occurs through playful experimentation which can be defined broadly as any voluntary, self-directed activity that is spontaneous with imaginary and curious qualities (Dabaja, 2022; Gurholt, & Sanderud, 2016). It is through play that children's curiosities, discoveries, and questions are unleashed (Hodgkin, 1985). Children begin formulating questions at birth and as Hodgkin (1976, p. 21) emphasized, it is somewhat credulous that curiosity is apparent in children given the many constraints of formal education. Gurholt and Sanderud (2016) have described a distinct type of 'curious play' that unfolds for children in nature, viewing "life [as] a process of continuous creation of play-actions and

interactions, thoughts, and meanings, inextricably linked with the child's physical and socio-cultural surroundings and imagination" (p. 321).

How might curiosity and creativity be linked? Craft (2002) refers to creativity as "possibility thinking". Certainly, creativity and imagination are closely linked (Vygotsky, 2004) and are present in early childhood as young children begin to internalize language and thought. Throughout children's school years and into adolescence, creativity, and imagination "combines with conceptual thought and can reach its peak in adulthood through artistic, scientific and technological innovation" (Johnson & Watts, 2018, p. 4).

From a 21st Century perspective, creativity can be viewed as central to the inventive and flexible thinking needed for the "innovation economy"; particularly important are dispositions such as "learning to learn, readiness to collaborate, seeing from multiple perspectives, initiative, persistence, and curiosity" (Patston, 2016, p. 21). The school curriculum of Scotland (2013) equates creativity with the 'successful learner' emphasizing the importance of curiosity, open-mindedness, imagination, and problem-solving. Similarly, in the Ontario Ministry of Education's (2016) policy document entitled, *Towards Defining 21st Century Competencies for Ontario*, curiosity, and creativity are prioritized as important 21st-century competencies that are foundational in supporting children's current and future success.

We propose that the outdoors (in our study a Forest School) may offer unique and complex affordances (Gibson, 1986) to support a pedagogy of relational attunement⁵ where intuitive teaching is predicated in part upon children's curiosity, imaginations, and creativity. In this article, we re-examine data vignettes to focus on the creativity-nature nexus of one Forest School program. By querying school-age (6-12 years) children's experiences and relations with others⁶ in the forest we explore the following: What sparks children's curiosity? How is curiosity sustained? What creativity processes are enacted? What understandings are fostered? And what intuitive approaches can educators embrace to engage more wholly with curiosity and creativity in the learning process? We aim to gain an in-depth understanding of the relationship between curiosity, creativity, and learning in a natural environment to help inform educators' praxis and better prepare educators for outdoor teaching.

Forest Schools

Although approaches and labels differ around the world (Power et al., 2015) generally a Forest School is considered a philosophical approach to teaching and learning in the outdoors. Originating from Scandinavia in the 1950s, the philosophy is

predicated on the notion that children should spend extended time in nature learning through unhurried exploration and inquiry (Blackwell, 2005). Over the past several decades, the Forest School approach has been readily implemented in many parts of the world (Beams et al., 2020; Cumming & Nash, 2015; Galbraith & Lancaster, 2020; Kemp, 2020; Maynard et al., 2013; Nedovic & Morrissey, 2013; Ridgers et al., 2012) and more recently, within Canadian early years programs (Carruthers Den Hoed, 2014). The approach has become quite commonplace among the early learning educational communities (age 3-6) where a focus on holistic development, decision-making, risk-taking, communication, and collaboration skills align well with the Forest School ethos (Cummings & Nash, 2015; Maynard et al., 2013).

Much of the research attention has focused on the early years as many Forest School programs target preschool and kindergarten (ages 3-6 years). These studies have reported increases in motivation, concentration, confidence, knowledge of the natural environment, autonomy, and an awareness of others for preschool children (O'Brien & Murray, 2007; Sandseter, 2009). Longitudinal examinations of children who participated in a Forest School in the early years also report higher retention and success rates later in schooling, less occurrence of attention-deficit/behavioural disorders, less chance of obesity, greater cooperation with classmates, and positive psychological and emotional effects on children (Maynard et al., 2013; Nedovic & Morrissey, 2013; Ridgers, et al., 2012; Sandseter, 2009). Ridgers et al. (2012) studied children who participated in Forest School, and they found notable increases in social skill development, confidence when interacting with the natural world, greater understanding and interest in learning, and heightened motor and leadership skills. Furthermore, Kuo et al. (2019) found that when children were engaged in lessons in nature, versus traditional indoor lessons, there were statistically significant effects on children's engagement, concentration, and fewer redirections (where the educator needs to cue a child to refocus back on the task at hand). Educators also reported being able to teach for longer periods uninterrupted, spending half as much time redirecting children's attention and behaviour (Kuo et al., 2019). Despite these notable benefits, describing (and naming) outdoor pedagogies is fraught with confusion and misunderstandings and can be a barrier for many educators.

Pedagogies of Relational Attunement

We have opted to describe teaching and learning in the outdoors as a pedagogy of relational attunement⁷. Although this study was not focused on the educators explicitly, nor do we claim that the pedagogies enacted countered the "distorting effects of narrowly

conceived educational methods, theories, and practices that often disconnect teachers from what is important in teaching—the relational” (Foran et al., 2021, p. 21). Instead, we offer readers the invitation to consider pedagogies of relational attunement as an entry point into the lived experiences of children’s worlds, whereby educators are engaged in “seeing, hearing, and feeling pedagogical significance in the moment, despite grasping at, or lacking the language to capture, their encounters with children and young people” (Foran et al., 2021, p. 22). Educators must remain intuitive, curious, playful, experimental, and wholly responsive to the ‘becoming-with’ possibilities of ‘thing-matter-child’ encounters (Tesar & Arndt, 2016). In the forest, pedagogies of relational attunement require educators who embrace paradoxes, relational complexities, improvisational co-learning, and teaching opportunities, as well as the capacity to affect and be affected by all others of the common world (ideas by theorists such as Haraway, Spinoza, Dewey). Like Stengel (2018) proposes the goal of education should be attunement:

Learning to listen, to attend carefully and relentlessly, to unexpected others ... is a single disposition that renders education what it can and must be: the interaction quite literally constituting (ethical) community (p. 27).

Later, we discuss the implications of educators’ relational attunement with children’s creativity-nature nexus as one possible pedagogical entry point.

Methodology and Techniques

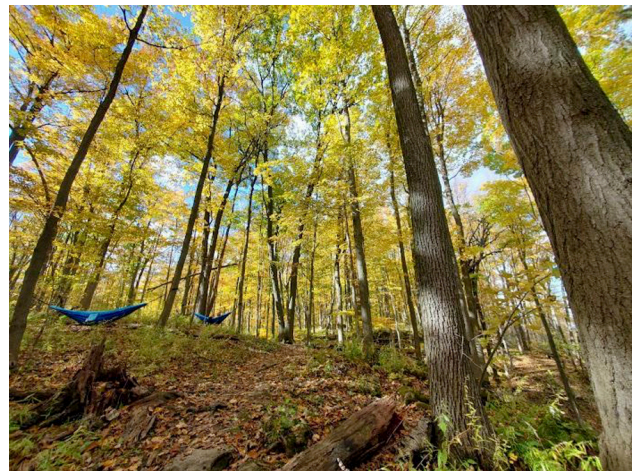
Given the need to closely examine the phenomenon of the Forest School experience, a case study methodology (Yin, 2009) informed by visual methods (Clark, 2010) framed the research project. The case study involved multiple sources of evidence collected between March and June of 2021⁸. Visual methods within case studies involving children are an important means of including children’s voices and broadening understandings of their lives (Clark, 2010). Like Harwood and Collier (2019), GoPro videos were used as a data generation tool to help better understand the children’s experiences. Additionally, the children’s GoPro recordings were used as the basis of video-stimulated recall dialogues (VSRD) (Morgan, 2007). VSRD is a process where video clips (in this study chosen by the researcher) are used to stimulate dialogue and understanding between the child and interviewer. All data were transcribed and thematically analyzed (Smith & Firth, 2011).

The Forest Classroom

The outdoor spaces central to the children’s daily explorations consisted of a forest, a field, and a natural creek. The Carolinian Forest on the edge of

the Niagara Escarpment was marked with trails and signage that led children and educators to their home base, also known as the forest classroom (Figure 2). A clearing, under a lush canopy cover, provided space to set up materials educators transported to the site including hammocks, tools, rope, tarps, magnifying glasses, resource books, and more. A few fallen trees and natural rock formations offered opportunities for climbing or relaxing. This space was familiar and offered safety and comfort for the children to engage in exploration, play, and discovery.

Figure 2
The Forest Classroom



In addition to the forested area, a nearby creek and field were visited frequently (Figure 3). The creek was accessible by a passage through a field and ran alongside a hillside; both areas were home to many creatures and plant life.

Figure 3
Creek and Field Spaces



The Children and Educators

At the time of the data collection (and based on COVID-19 restrictions), all participants were children who attended the Forest School on a full-time basis. Seven school-age participants ranging in age from 6 to 12 years participated. Three educators, two full-time Ontario certified teachers and one part-time assistant teacher, interacted with the children regularly with two of the three accompanying the children on their explorations during the collection of the GoPro video data. The part-time assistant teacher was also a research assistant who was trained in collecting video data and conducting interviews.

Methods

Several methods of data collection were used throughout this study, namely observations, surveys, GoPro videos, pictures (from the GoPro cameras), and video-stimulated recall dialogues (VSRD). Here, we focus our discussion on the data associated with the GoPro videos and the VSRD. Before data collection began, the children were given a short introduction on how to use the GoPro cameras. Each day of data collection, all the children were invited to wear one of the two GoPro cameras for a portion of their exploration time. The GoPro camera wearer would then be responsible for operating the camera for a duration of time of their choosing, recording, and/or taking photographs based on their interests. Once a child was finished using the GoPro, they were instructed to return it to the teacher who would then offer it to another child to wear. The batteries tended to last one hour and would require switching by the educator. Thus, the maximum total video length in any one day was two hours. Children were reminded each day in the woods that wearing the camera was an option. During the four months of data collection, each child wore the camera at least once, with six children opting to wear the camera several times (the seventh child did not complete the school year resulting from COVID-19 complications). Once blurred images and corrupted videos were vetted and deleted, the data set for analysis included 97 artifacts, comprising 10 photographs and 87 videos.

Video Analysis

Children were asked to state their names at the beginning of their recordings for the researchers to identify and organize the video data. All video data was uploaded to password-protected cloud storage that was accessible only to members of the research team. Videos were examined regularly during the data collection period and weekly by members of the research team. The video data were analyzed thematically (Smith & Firth, 2011). Once videos were transcribed via a process of notetaking⁹, the field research assistant/educator conducted the first level

of interpretation of the video given this individual was in the field both observing and collecting data. A second research assistant (the second author) completed second-level coding. The first and third authors contributed to the process by reviewing and partially coding video data. The analysis resulted in several codes being agreed upon by the research team, namely, significant understanding of the topic, concept knowledge, misunderstandings, connections to nature, connection to the world, elements of play (i.e., attunement play, object play, body play, social play, pretend, storytelling, and creative play¹⁰) fantasy, inventive thinking, and imagination. Several of these codes were collapsed into the theme of curiosity and creativity.

VSRD

Video-stimulated recall dialogues are beneficial to ensuring children's voices and meanings are included within research and credited as the most knowledgeable individuals about their own lives (Mayall, 2000; Clark, 2010). The process involves a participant being "shown a video of an interaction that they have taken part in and when prompted by the researcher to reflect on their role within it" (Haw & Hadfield, 2011, p. 55). Similar to the evidence of video-interviewing among elementary students (Schneps & Libarkin, 2017), VSRD has been increasingly impactful within early childhood educational research queries (e.g., Määttä et al., 2016; Myrtil et al., 2021). And given that the method can be perspicacious when exploring social settings identified as "complex, interactive contexts characterised by novelty, uncertainty and non-deliberative behaviour" (Lyle, 2003, p. 861-862), VSRD was well suited for gaining insight into children's experiences in a Forest School.

Video clips from the children's self-recorded GoPro videos were chosen as the focus of the stimuli for the interviews. Each video clip was selected based on the child's active engagement within the natural environment. Typically, a researcher would sit side-by-side with the child participant and watch the video as often as the child wished, prompting questioning and dialogue more conversationally. Seven children participated in the video-simulated recall dialogues. Six of the children experienced VSRD in person with one additional child interview occurring over Zoom (COVID-19 disrupted some planned research procedures). All interviews were recorded and transcribed immediately following the interviews. Typically, each child requested to watch their videos twice. Question prompts used during the VSRD included:

1. Tell me about this video. What were you doing?
2. Why did you choose to take this video?

3. Why did you want to explore or investigate this aspect?
4. Tell me what you know about it.
5. What are you planning to do next in the video?

Analysis of the VSRD data followed the same process detailed above. The data set associated with the project is vast, thus we have carefully selected two vignettes (described below as the glass world and wonder with the hill) to highlight the nexus of creativity and curiosity within the pursuit of learning within a Forest school model.

Emerging Ideas

Children’s imaginations and curiosities were consistently provoked within the natural environment. Nature provided inviting and open-ended materials that lent themselves to curiosity and creativity. Items such as pieces of fur, holes in the ground, rocks, water, animal tracks, and more piqued children’s interest and invite exploration, wonderment, and experimentation.

The forest itself varied in landscapes and various features offered a plethora of invitations for exploration and wonderment (Figure 4). Interestingly, not all the features the children explored in the woods were natural elements with rusted car parts, cement culverts, bridges, garbage, glass, and various debris found in the woods also provoked the children’s interests. Below, we showcase two slices of data to illustrate how being with nature in a relational way might offer new ways of teaching and learning (Warden, 2022).

Figure 4
Varied Landscapes in the Woods



The Glass World

“This forest is amazing; we went on a detour to glass world and we loved it!”

Elisha’s GoPro Video May 5th

A rocky area in the forest shows signs of human encounters, broken glass, rusted machinery, and remnants of a firepit. The area is also covered with a plethora of broken glass (i.e., garbage) and has been dubbed the ‘glass world’ by the children (Figure 5). Although not an area the children could always explore freely, it appeared to intrigue and provoke children’s imaginations. Who was here? Why did they leave it this way? What about the animals that live here? What should we do? The children wrestle with complex ideas and notions about their role within the woods. Simultaneously, the place invites ‘magical’ thinking and serves as a landmark to navigate the woods somewhat independently. The children know that from the glass world they must return to ‘base camp’ following a certain pathway. The glass world is referenced in conversations and ideas about space, time, and roles. Their familiarity and reverie for the glass world also highlight the discovery possibilities and hint at the confidence the discovery presents to generate new questions and ideas. The glass world is a reminder of the entangled ways in which humans are part of nature and the many tensions that outdoor teaching and learning can present.

Figure 5
The Glass World



Wonder with the Hill

Wonder with the hill is depicted in Figure 6 where children’s bodies explore and entangle fully with the hill’s dirt, rocks, roots, and angle. The dirt and hill are an invitation to explore, wonder, experiment, and test out ideas.

Extra rocks placed by the children onto the hill slow their descent whereas more dirt tossed provides the children with the sense they are going faster. The two

children once at the bottom navigate to the top of the hill using trees along the way to anchor and propel themselves upwards. Small saplings bend and strain from the children's grasp and they quickly anchor themselves to larger trees and propel themselves upwards. The small child at the top pushes along the dirt a few centimetres with their hands, eyeing the other children, and evaluating his own decision to slide or not slide (Researcher Notes, Transcribed Video-June 1, 2021).

In this instance of playful engagement, children are toying with concepts of gravity, mass, and acceleration. Most importantly the learning experiences appear to be interdisciplinary, exploratory, flexible, open-ended, experiential, and meaningful for the children. Here, the landscape invites opportunities for exploring and testing ideas. In this instance, the educator is off camera, but nearby, presumably satisfied with the co-constructed learning that is happening between the children themselves.

Figure 6
Full Body Creativity



Both curiosity and creativity were evident within the sustained learning in the forest and repeated visits to favoured and familiar spaces within the forest (e.g., the creek, glass world, and familiar paths). Children's experiments were also relentless. Natural materials in the forest were available for the children to fully experience and explore, often combining the open-ended materials in creative and novel ways. Each aspect of the cycle of curiosity was nurtured by children's relations with nature, fostering and supporting creativity in their play, thinking, and actions.

Implications

"We learn best as teachers, we teach best as learners" (Hodgkin, 1976, p. 3).

The study yields important implications on the potential significance of curiosity and creativity in the learning process. The role of nature as a caveat for learning seems evident, but clearly, additional research is needed. Utilizing the interrelations present in all aspects of the natural world (including the child) and recognizing the dynamism, flux, and movement that is ever-present in what Ingold labelled as

'meshwork' (Ingold, 2021), ways of being with nature can be fostered. For educators (both in-service and pre-service), this implies a need for shifts in thinking about the static nature of the curriculum and how learning experiences are designed.

Although not fully explored in this study, the study also hints at the relationship between creative learning and teaching and the importance of learning experiences that are interdisciplinary, exploratory, flexible, open-ended, experiential, and meaningful to children. The children of this study benefitted from the opportunities inherent within the creativity-nature nexus of the forest. Thus, we foresee a need for educators to be relational and attuned to this nexus as one important pedagogical entry point for designing learning experiences. By paying attention to children's questions, curiosities, and intra-actions within a space, new avenues for teaching and learning will be provoked.

Suggestions for preparing educators for a creative teaching approach are implicated. Most importantly learning experiences should be designed to support interdisciplinary, exploratory, flexible, open-ended, experiential, and based on meaningful and relational experiences for children, with an ethos of being with nature (Warden, 2022). We encourage educators to value the outdoors and nature in an integrated way, allow time for curiosity and creativity to flourish, and ensure children have access to repeated experiences as well as ample time to engage and collaborate in whole-body learning that focuses on their self-directed queries.

Footnotes

1. All participants' names are pseudonyms.
2. See methodology section for a full description of VSRD.
3. Forest Schools around the world have varied names, depending on the context. For example, the approach is referred to as Bush Kindy in many places in Australia, udeskole in Denmark, and enviroschools in New Zealand.
4. The teachers were guided by the forest and nature pedagogical principles set out by Child & Nature Alliance of Canada.
5. Here we invite educators to think of relational attunement as a relational-responsive pedagogy which resists discrete and concrete categorization, instead moving "toward a more intuitive approach charged with seeing, hearing, feeling more wholly" (Fuscher as cited in Blades & Bester, 2014, p. 5).

6. Here, we include both humans and nonhumans as equally important and consider all matter as essential sentient and agentic (Haraway, 2016).
7. Like others (Blades & Bester, 2014; Fuchser, 2006; Stengel, 2018) we extend the notion of relational attunement beyond the child's relationships with educators or other children and consider the primacy role of materials, flora, and fauna within the web of relations.
8. Although planned as a yearlong study from September to June, COVID-19 negatively impacted the operation of the Forest School and constrained many of the planned methods of research.
9. Transcribing GoPro videos is a challenging task given the constant movement of the camera and video captures that do not include dialogue. Thus, the 2nd author created summaries of the video contents and researcher notes to help guide the analysis process. These summaries were verified by the first and third authors.
10. These broad-based patterns of play are defined by the National Institute of Play <http://www.nifplay.org/science/pattern-play/>

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Bibliometrics of Scientific Productivity on Physical Activity in Children and Adolescents With Autism Spectrum Disorder and Down Syndrome

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Abstract

The aim of this study was to compare bibliometric indicators of scientific productivity in physical activity (PA) in children and adolescents with Autism spectrum disorder (ASD) and Down syndrome (DS) in the PubMed database. A bibliometric study was conducted for the last 5 years (2017 to 2021). The data collected for each article were: year of publication, language of publication, country, journal name, and type of paper. The results showed that there was higher scientific productivity in the population with DS (20 studies) relative to their counterparts with ASD (31 studies). The language of publication in both cases was English. There were 10 countries that published on PA in ASD and 14 countries that published on DS. Overall, the greatest interest in publishing on PA in children and adolescents with ASD was in North America (6 studies), followed by Asia (5 studies) and Europe (4 studies). In the DS population it was in Europe (13 studies), North America (9 studies) and South America (4 studies). Nineteen journals were identified that published in the ASD population and 29 journals in DS. Six experimental studies were identified in ASD and 7 in DS. There was a higher scientific productivity with original studies. There was a positive trend of increasing scientific productivity over the years in both populations. We suggest the need to promote research on PA in both populations, regardless of the type of study, as it is an indicator of overall health status.

Keywords:

Physical Activity, Bibliometrics, ASD, Down Syndrome, Children and Adolescents.

Introduction

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2020). It is characterized as featuring a range of human movements, from competitive sports and exercise to hobbies or activities related to daily life (Miles, 2007), and even considers modality, frequency, intensity, duration, and context of practice (Caspersen et al, 1985), as its guidelines. Overall, participation in PA plays a crucial role in promoting and maintaining a healthy lifestyle at all ages (Liang et al, 2020).

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and the presence of restricted interests and repetitive behaviors (APA, 2013). On the other hand, DS is a genetic disorder that occurs due to abnormal division between cells resulting in a complete or partial extra copy of chromosome 21 (Cabeza-Ruiz et al. 2019). This condition causes various physiological, functional and intellectual limitations (Winnick, 2011).

Indeed, the benefits of PA for children and adolescents with ASD and DS are well documented in the literature. For example, in children with ASD, PA is associated with improved academic performance, enhanced communication skills, cooperation, self-control, and improved quality of life (Oriol et al. 2011; Chan et al. 2013; Zhao & Chen, 2018; Toscano et al. 2018). In the case of youth with DS, it improves self-efficacy, motivation, mood, satisfaction, quality of life, (Wilson et al. 2012; Lee & Kim, 2014), increases cardiovascular and muscular endurance, reduces the percentage of total body fat mass (Mendonca et al. 2011) and improves functional fitness for work performance (Terblanche & Boer, 2013).

Therefore, studying the scientific productivity of PA in children and adolescents with ASD and DS should be considered a priority, as it helps prevent obesity, helps maintain physical fitness (Alghamdi et al. 2021), reduces the risk of secondary health problems, and improves quality of life (Brown et al. 2014).

Consequently, to our knowledge, no bibliometric study has compared scientific productivity on PA in children and adolescents with ASD and DS, as this information can help in the development of public policies to boost research in school populations with disabilities and special educational needs.

In fact, bibliometric studies have achieved great importance in scientific and management policy, given the rise of the culture of evaluation and accountability, to the extent that scientific knowledge is seen as a strategic value (Bordons & Zulueta, 1999), so, in recent years it is becoming an important research method to evaluate national and international research productivity, international cooperation, citation analysis, research trends and the development of specific fields (Hu et al. 2020).

Therefore, the aim of this study was to compare bibliometric indicators of scientific productivity in physical activity in children and adolescents with ASD and DS.

Methodology

Type of study

A documentary (bibliometric) study of scientific productivity on PA in children and adolescents with ASD and DS was conducted. Bibliometric mapping is used to visualize trends in various research and create a descriptive visual environment of terms commonly included in studies on a specific topic or population (van Eck & Waltman, 2010).

The published articles were retrieved from PubMed of the U.S. National Library of Medicine (<https://pubmed.ncbi.nlm.nih.gov/>), which is a database of biomedical and biomedical and life sciences literature containing more than 33 million records (National Library of Medicine, 2022). It was queried from January 15 to January 20, 2022.

Search strategy

The search strategy covered the period from January 1 to December 31, 2021. To achieve relevance with this bibliometric review, search keywords included the following components: (1) physical activity, exercise, exercises, activities, physical, physical exercises, aerobic exercise, exercise training; (2) Down syndrome, chromosomal disorder, trisomy 21, mental retardation; (3) Autism spectrum disorder, dysfunction, autism; (4) Children, adolescents, schoolchildren, youth. Physical inactivity was included as a reverse term for BP.

Initially, keywords and the Boolean operators "OR" and "AND" were used. Subsequently, words were grouped to combine them in pairs or threes, as appropriate, and a new search was performed, for example, physical activity AND down syndrome AND children.

Data management and extraction.

The following were considered as indicators of scientific productivity: language and year of publication, country, continent of publication, name of the journal and type of document published. The technique used for the extraction of indicators was observation.

The terms indicated were reviewed in the title, abstract and keywords of the manuscripts. The inclusion criteria were (i) peer-reviewed articles related to health sciences areas; (ii) articles on PA; (iii) articles in population with DS and ASD; (iv) articles that provided all the required bibliometric indicators listed in the period from 2017 to 2021; and (v) published in English and Spanish, (vi) original research articles and documentary studies (literature reviews, systematic, with or without meta-analysis).

Articles whose topic was not related to physical activity and health, published outside the period from 2017 to 2021, that did not include children and adolescents, and if they involved research on animals or in vitro samples were excluded from the analysis.

The procedure for extracting the bibliometric indicators was carried out by two researchers in this study (PPF and RGC). Each of the observers recorded the information separately on a card. A third observer (MACB) collated the records of the first two observers. This ensures the process of abstraction of the information. In cases where there was no coincidence, this third observer verified each of the indicators and made the pertinent corrections. A general matrix of the studies was then obtained, which made it possible to analyze the bibliometric indicators considered.

The PRISMA guidelines (Moher, Liberati, Tetzla, & Altman, 2009) were used to identify and extract the data for the bibliometric review. Figure 1 illustrates the steps performed.

The search was performed both for articles related to PA and ASD and for PA and DS. In the case of PA and

ASD articles, a total of 78 scientific articles were initially identified, then 39 studies were eliminated because they were not related to the study topic. Next, the titles and abstracts were read and thoroughly evaluated to be certain that they corresponded to the purpose of the research (eliminating 19 articles). Finally, 20 studies were considered for bibliometric analysis. In the case of PA and SD articles, a total of 89 articles were initially identified, of which 36 were eliminated because they were not related to the topic. Subsequently, after reading the titles and abstracts, 22 were eliminated, leaving 31 studies considered for bibliometric analysis.

Data analysis

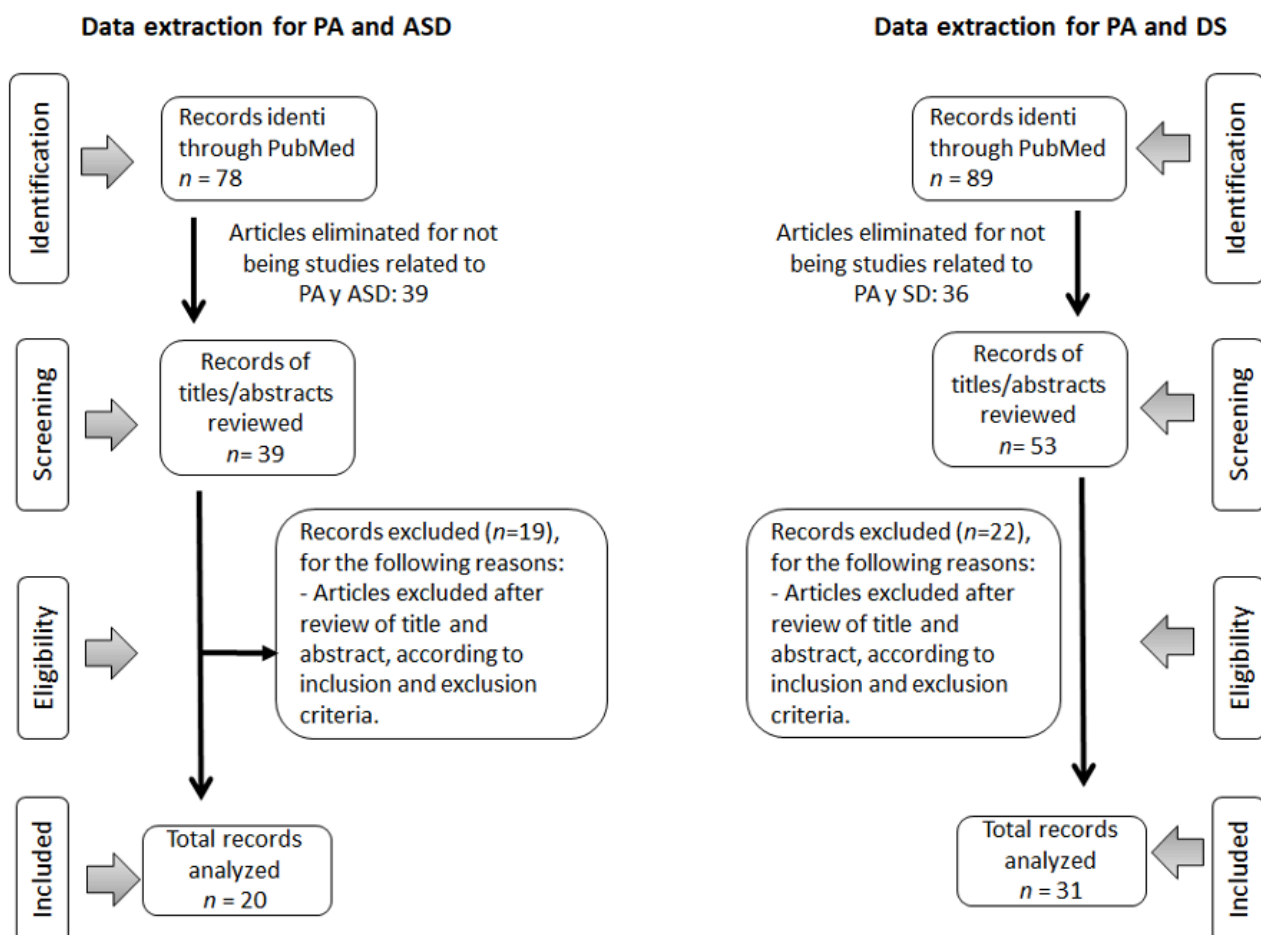
The data extracted from the bibliometric matrix were recorded as spreadsheets in Microsoft Excel (Office 365 suite; Microsoft, Redmond, WA, USA). They were subsequently quantified through descriptive statistical analyses, such as frequency, range and percentage (%).

Results

The bibliometric indicators that characterize the scientific productivity of the studies conducted in PA

Figure 1.

Screening and selection process for the records according to the PRISMA (Preferred Reporting Items for Reviews and Meta-Analyses) flowchart.



in children and adolescents with ASD and DS can be seen in Table 1. In summary, it is highlighted that, in the last 5 years, there was greater scientific productivity in the population with DS (20 studies) in relation to their ASD counterparts (31 studies). It also stands out that the language of publication in both cases was English (19 studies in ASD and 30 in DS). In addition, we can observe that a total of 10 countries published PA topics in ASD (USA, China, Argentina, Brazil, Italy, Belgium, Australia, Iran, Spain and the United Kingdom). However, 14 countries were identified as having published in SD (USA, China, Brazil, Italy, Australia, Spain, Germany, Canada, Egypt, Poland, Portugal, South Africa and Switzerland). Overall, the greatest interest in publishing on BP in ASD children and adolescents was in North America (6 studies), followed by Asia (5 studies) and Europe (4 studies). On the other hand, in the DS population it was in Europe (13 studies), North America (9 studies) and South America (4 studies).

In relation to the number of journals that published topics on BP in children and adolescents with ASD and DS, we were able to identify 42 scientific journals in total. For example, in the ASD population, 19 journals published a total of 20 articles, while in the population with DS, 29 journals published 31 scientific articles. We can also highlight the presence of six journals (International journal of environmental research and public health, Disability and health journal, Disability and rehabilitation, Journal of bodywork and movement therapy, Medicina, and Physical & occupational therapy in pediatrics), which are the ones that published in both ASD and DS populations. In general, it is evident that there is a greater number of PA publications in the DS population and consequently a greater number of journals that promote such content in relation to the ASD population.

Table 3 shows the results related to the types of studies (original and documentary). Six experimental studies were identified in ASD and seven in DS. However, no cross-sectional and longitudinal studies were found in both populations. Regarding documentary studies (e.g., literature reviews, systematic reviews, meta-analyses, systematic review-meta-analyses), in both ASD and DS there was greater scientific productivity in relation to original studies. In fact, we identified 14 studies in ASD and 24 in DS, so that in both populations systematic review studies have been prioritized (6 in ASD and 16 in DS).

Figure 2 shows the trend of scientific productivity in PA in children and adolescents with ASD and with DS in the last 5 years (2017 to 2021). In both populations, a positive trend of increasing scientific productivity is evident (in ASD an $R^2 = 0.95$ and in DS $R^2 = 0.92$). In young people with DS, a trend of decreasing productivity is observed from 2017 to 2019, but then, in 2020 and 2021, it reaches the productivity of 2017, reflecting a

recovery of scientific productivity. On the other hand, in the ASD population, a similar trend is observed in the first two years (2017 and 2018). However, after 2019 to 2021, there is a greater increase in scientific productivity in relation to the ASD, whose trend is to continue to increase in the coming years.

Table 1.
Bibliometric indicators used in the study.

Indicators	PA ASD		PA DS	
	f	%	f	%
Language of publication				
English	19	95	30	96.88
Spanish	1	5	1	3.12
Total	20	100	31	100
Country				
USA	6	30	7	22.6
China	3	15	1	3.2
Argentina	1	5	0	0
Brazil	2	10	4	12.9
Italy	1	5	1	3.2
Belgium	1	5	0	0
Australia	2	10	2	6.5
Iran	2	10	0	0
Spain	1	5	6	19.4
United Kingdom	1	5	0	0
Germany	0	0	1	3.2
Canada	0	0	1	3.2
Egypt	0	0	1	3.2
Poland	0	0	2	6.5
Portugal	0	0	2	6.5
South Africa	0	0	1	3.2
Switzerland	0	0	2	6.5
Total	20	100	31	100
Continent				
Asia	5	25	1	3.2
Europe	4	20	13	41.9
South America	3	15	4	12.9
North America	6	30	9	29
Africa	0	0	2	6.5
Oceania	2	10	2	6.5
Total	20	100	31	100

Legend: f: frequency, %: percentage

Table 2.

Number of journals that published scientific articles on physical activity in ASD and Down syndrome children and adolescents.

N°	Journals	PA ASD		PA DS	
		f	%	f	%
1	BMJ open	1	5		
2	Brain sciences	1	5		
3	Disability and health journal		0	1	3.2
4	International journal of environmental research and public health	1	5	2	6.5
5	International journal of medical sciences.		0	1	3.2
6	The Cochrane database of systematic reviews.		0	1	3.2
7	Advances in therapy		0	1	3.2
8	African journal of disability		0	1	3.2
9	Aging cell		0	1	3.2
10	American journal of human biology		0	1	3.2
11	American journal of lifestyle medicine		0	1	3.2
12	BMC cardiovascular disorders		0	1	3.2
13	Clinical practice and epidemiology in mental health	1	5		0
14	Computer methods and programs in biomedicine		0	1	3.2
15	Cureus	1	5		0
16	Current osteoporosis reports		0	1	3.2
17	Developmental medicine and child neurology		0	1	3.2
18	Disability and health journal	1	5	1	3.2
19	Disability and rehabilitation	1	5	2	6.5
20	Disease markers		0	1	3.2
21	Frontiers in pediatrics	1	5		0
22	Gait & posture		0	1	3.2
23	International journal of environmental research and public health		0	1	3.2
24	Journal of autism and developmental disorders	2	10		0
25	Journal of bodywork and movement therapi	1	5	1	3.2
26	Journal of intellectual disability research		0	1	3.2
27	Journal of orthopaedic surgery and research		0	1	3.2
28	Journal of prevention & intervention in the community	1	5		0
29	Journal of science and medicine in sport		0	1	3.2
30	Medicina	1	5	1	3.2
31	Medicina clinica		0	1	3.2
32	Nutritional neuroscience	1	5		0
33	Osteoporosis international		0	1	3.2
34	Pediatric physical therapy		0	1	3.2
35	Physical & occupational therapy in pediatrics.	1	5	1	3.2
36	Physical therapy		0	1	3.2
37	Plos one	1	5		0
38	Preventive medicine reports	1	5		0
39	Research in developmental disabilities.		0	1	3.2
40	Revista de salud pública (Bogotá)	1	5		0
41	Sleep medicine	1	5		0
42	Sports medicine (Nueva Zelanda)	1	5		0
Total		20	100	31	100

Legend: f: frequency, %: percentage, PA: Physical activity

Table 3.

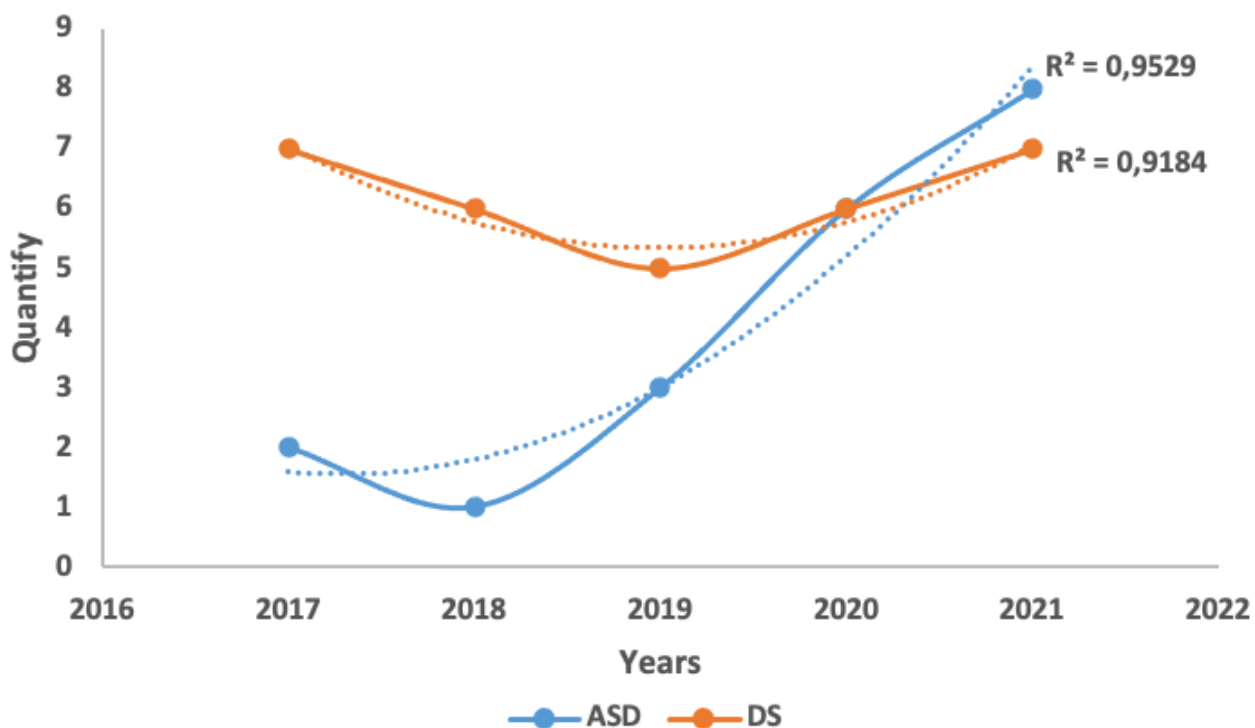
Types of studies that have published topics on physical activity in ASD and Down syndrome children and adolescents.

Type of document	PA ASD		PA DS	
	F	%	f	%
Original articles				
a) Cross-sectional	0	0	0	0
b) Longitudinal	0	0	0	0
c) Experimental	6	100	7	100
Total	6	100	7	100
Review Articles				
a) Review	3	21.4	7	29.2
b) Systematic review	6	42.9	16	66.7
c) Meta-analysis	1	7.1	1	4.2
d) Systematic review and meta-analysis	4	28.6	0	0
Total	14	100	24	100
Total	20	100	31	100

Legend: f: frequency, %: percentage, PA: Physical activity

Figure 2.

Trend values of bibliometric studies on PA from 2017 to 2022 in ASD and Down syndrome.



Discussion

This study aimed to compare bibliometric indicators of scientific productivity in PA in children and adolescents with ASD and DS. These results indicate that during the period 2017 to 2021 there was higher research productivity related to PA in children and adolescents with DS, evidencing a total of 31 studies in relation to their similar with ASD that had a total of 20 studies.

Perhaps one of the reasons for the low productivity in PA in children and adolescents with ASD could be related to deficiencies in social communication, as this could significantly limit direct participation in physical activities and "group" sports and forming relationships with peers (Srinivasan et al. 2014), which consequently, prevents participation in PA programs organized by institutions whose main objective is to study PA patterns in children and adolescents with ASD. However, in the case of youth with DS, adaptive behaviors have evidenced greater capacity for socialization than their peers with ASD (Loveland & Kelley, 1991), which would explain a greater participation in recreational, physical and social activities (MacDonald et al. 2016).

We also verified the presence of five specialized journals (International journal of environmental research and public health, Disability and health journal, Disability and rehabilitation, Journal of bodywork and movement therapy, Medicina, and Physical & occupational therapy in pediatrics), which are the ones that published PA topics in both populations (ASD and DS). For one of the functions of scientific journals in health sciences is to share data and materials generally accepted in the scientific community and is fundamental for scientific development and progress (US, 2003).

In fact, these identified journals can serve not only professionals working in the area, but also students and researchers who deepen research in PA topics, since the use of the bibliometric technique is an important, feasible and systematic means to make judgments about the importance of published works, to examine the productivity and influence of individuals and institutions and to compare different disciplines and scientific journals (Haddad, 2017).

Regarding the types of study, we also verified that the largest number of articles published in both populations were systematic reviews in relation to original studies. This finding is striking, as it seems that researchers' preferences are to publish documentary articles in relation to original studies. Although, both types have their advantages, for example, original outcome-based publications are important for the advancement of science and for professional development (Huston & Choi, 2017). However, documentary studies contribute specifically in articulating clear goals, showing evidence of adequate preparation, selecting

appropriate methods, communicating relevant results, and engaging in reflective critique (Hofmeyer et al. 2007), thus, reviews are relevant for grounding theory and even, for organizing the theoretical basis and conceptual framework, which can help to interpret the types of original studies and their results (Bordage, 2009).

Consequently, regardless of the types of articles published in PA in populations with ASD and DS, it is vital to recognize that both types of publications contribute to the development of scientific knowledge, since we currently live in the era of scientific knowledge production, which is increasingly recognized as a social collaborative activity (Hofmeyer et al. 2007), which should be taken advantage of by health professionals and researchers.

In relation to the trend of publications during the period 2017 to 2021, the results show that scientific productivity in both populations decreases in the first years. Then from 2018 in young people with ASD and from 2019 in young people with DS the research ostensibly increases its productivity until 2021. This pattern, showed a polynomial relationship, reflecting a greater tendency to scientific productivity in PA in the population with ASD with respect to their similar with DS.

These increases in publications in the last 5 years, it is possible that it is due to the establishment of goals in the 2030 agenda for sustainable development (United Nations, 2015), which establishes specific goals for reducing inequalities, promoting the inclusion of persons with disabilities, ensuring equal opportunities and reducing inequality of outcomes. As well as achieving safe, non-violent, inclusive and effective learning for all students with disabilities.

In fact, one of the ways to achieve these goals is through PA, which, helps to decrease negative behaviors and on the contrary promotes positive behaviors in youth with disabilities (Prupas & Reid, 2001). For example, both in ASD, and DS improve motor skills, cognitive skills, general physical fitness, quality of life (Mendonca et al. 2011; Li et al. 2013; Zeng et al. 2017; Sefen et al, 2020) among other aspects.

In essence, this bibliometric study presents some strengths, given that it is a first study comparing bibliometric indicators that have been produced in PA in children and adolescents with ASD and DS. In addition, the information documented in this study can be used to create thesauri (taxonomies) to judge interdisciplinary impact and improve automated searches (Cooper, 2015). So too, they can help identify the most researched journals and types of studies over time. This evidence may be essential for raising awareness and developing public policy priorities in the field of disability and special educational

needs. We should also highlight some limitations, for example, we used only one database (PubMed), and we compared a 5-year period. It is possible that future studies will expand the range of search years and use other databases to complement this study.

Conclusions

In conclusion, this study verified that the bibliometric indicators of scientific productivity (2017 to 2021) in PA in the school population with DS was higher relative to the population with ASD. In addition, we were able to identify that most journals have published documentary research (systematic reviews) regarding original studies, and the trend of scientific productivity in PA in both populations is increasing in both cases, reflecting a greater tendency to increase scientific productivity in the population with ASD compared to DS. These results suggest the need to promote PA research in both populations.

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The Perceptions of the Children Attending the Preschool Education about Nature and Nature Pollution

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Abstract

The perceptions of 20 preschool children about nature and nature pollution were investigated. Data were collected through interviews and by studying the children's drawings. The results show that most children perceived nature together with living things. The children expressed that nature was most polluted with garbage and that all living things would be harmed in case of nature pollution. Children emphasized behaviors toward a sustainable environment to protect and not spoil it. Teachers should provide children with opportunities for environmental education through real-life experiences in nature-friendly settings and include their families in these educational activities.

Keywords:

Nature, Nature Pollution, Environment, Environmental Problems, Preschool Period

Introduction

I ncreasing environmental problems in our country and worldwide disrupt the balance of nature and cause negative effects on living things. It is crucial to be aware of our conception of the environment and our assumptions about the causes and consequences of environmental problems to prevent and solve them (Kıřođlu et al., 2010). According to Erođlu (2017), the environment concept refers to nature and the system it contains. The main components of this system in nature are water, air, soil, and all living and non-living beings. To Engin and Demiriz (2022), nature provides raw materials for people to continue their lives. Moreover, it provides opportunities for education and permanent learning, and at the same time, it contributes to mental and physical health. In this regard, investigating the human-nature relationship and the evolution of this relationship over time will illuminate the understanding of the causes of environmental problems.

How people perceive nature forms the basis of the human-nature relationship. The relationship between human beings and nature has evolved (Hollstein, 2022; Hollstein & Smith, 2020; Kavaz et al., 2021). The industrial revolution in the 18th century considered nature a raw material in production. Several challenges followed it, i.e., the problem of global warming toward the end of the 19th century and rapid urbanization in the 20th century. Thus, humans moved



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away from the natural environment and continued to harm the environment with unconscious consumption and destruction (Engin & Demiriz, 2022; Karabiçak & Armağan, 2004; Kutgi 2016). As Önder (2016) suggests, “50% of the environmental pollution in the world has occurred in the last 35 years” (as cited in Kete et al., 2017, p.174). The rapid increase in the world population and the rise in welfare-related consumption caused unpredicted environmental challenges. Today, measures during the pandemic, like stay-at-home orders, less road traffic, and decreased economic activity, created positive effects, especially on the air, sea, and beaches. However, an increase in domestic and medical waste has existed. Although the ongoing destruction of nature has partially decreased during the COVID-19 period (Zambrano-Monserrate et al., 2020; Bashir et al., 2020), the destruction of nature and environmental problems continue to progress rapidly with the “normalization” process.

International steps have contributed to the formation of environmental education approaches and principles, and it has become essential to provide children with the necessary attitudes, values, and skills within the scope of environmental education in the countries’ education policies (Doğan & Simsar, 2018; Fernández et al., 2019; Tanriverdi, 2009). The Turkish environmental education strategy aims at providing children with awareness, knowledge, attitudes, and skills to protect the environment and create environmental awareness (Kavaz et al., 2021; Soydan et al., 2013).

Preschool years are the most suitable period to inspire environmental education. These are the critical ages when children’s language, cognitive, social-emotional, and psycho-motor developments are intense (Erkan et al., 2021). The awareness of creating a sustainable environment can be gained by providing experiences enabling children to see themselves as a part of nature. Providing educational experiences will also allow them to recognize and enjoy the environment and raise awareness about environmental problems while dealing with activities (Öztürk Samur, 2018). According to Aaron and Witt (2011), children’s understanding and perceptions of nature affected their behaviors. Early childhood understandings and perceptions of nature substantially affect the lifelong development of positive attitudes and values toward environmental problems.

It is necessary to focus on the perception of nature in the studies on environmental education and in gaining positive attitudes and behaviors toward the environment for children, considering the effect of the human-nature relationship on environmental problems. Understanding children’s perspectives on nature and the elements in the system they contain and providing environmental education focusing on

real life and emotions in this direction are important to create highly environmental-conscious societies (Bolat, 2020; Karataş & Aslan, 2012; McNichol, Davis, & O’Brien, 2011; Phenice & Griffore, 2003).

When we look at the studies on the nature perceptions of preschool children, they seem limited (Keliher, 1997; Phenice & Griffore, 2003; Tillmann et al., 2019; Mol, 2019; Köşker, 2019). Keliher (1997), in her study on nature perceptions of 6–7-year-old children, stated that children have well-formulated perceptions of nature, and school and out-of-school experiences affect their perceptions of nature. Phenice & Griffore (2003) stated in their research with 32–72-month-old children that children partially understand the human-nature relationship and build new understandings with their educational experiences. In their research investigating how rural Canadian children define, experience, and perceive the benefits of nature, Tillmann et al. (2019) concluded that children conceptualize nature as a “whole community” and know about nature’s health benefits. Mol (2019) examined the nature perceptions of preschool children through drawings and found that the children included nature figures, natural events, animals, people, vehicles, objects, planets, cannibals, and giants. Köşker (2019) conducted a study to investigate how preschool children perceive nature. She concluded that children perceive nature as an environment where animals and plants exist outside human life. She also emphasized that children without a sufficient level of perception about the fundamental relations in nature have a more object-oriented understanding of nature.

Based on the studies above, we can say that a need exists for in-depth studies investigating the perceptions of children about nature, components of nature, and nature problems in the preschool period. Our present study can be seen as a crucial contribution in this direction.

The Purpose of the Study

This study aims at revealing the perceptions of children attending preschool education about nature and pollution. We will seek to find answers to the following questions:

1. How do children define nature?
2. According to children, how is nature polluted?
3. According to children, how are living things affected by nature pollution?
4. According to children, what can be done to protect nature?
5. What kind of nature do children want to live in?

Method

A qualitative case study design was used to investigate the children’s perceptions of nature and pollution in detail through interviews and by studying their paintings.

Our research study group comprised 20 children aged 60–72 months attending a preschool education institution. The convenient sampling method, one of the non-random sampling methods, was used to determine the study group. Easy access and time factors were considered while choosing the working group. Necessary permissions were obtained before the study. Preschool teachers and school administrators were informed about the study. The parents’ permission of the children participating in the study was obtained. Children with parental consent and willingness to participate were included in the research process. 50% of the children in the study group were girl, and 50% were boy.

Data Collection Tools

Data were collected through semi-structured interviews and by studying the children’s drawings. The first part of the study involved presenting open-ended questions to the children and obtaining their opinions on nature and pollution. The related literature was reviewed, and seven questions were prepared to investigate the children’s perceptions of nature and pollution. The prepared questions were presented to three faculty members for expert opinion. Based on the feedback from the experts, one question was removed from the form, and the final version comprised six questions. Before the main study, the clarity of the questions was checked by conducting a preliminary study with five children. Then, open-ended questions were updated, and the questions were finalized.

In the second part of the study, the children were asked to explain what kind of nature they wished to live in through the pictures they drew. Children’s drawings reflect the content and how they think (Yavuzer, 2009). Drawings are used as a method to help the children express their opinions and experiences (Fargas-Malet et al., 2010). We talked with the children about the drawings they made to avoid problems in the interpretation/analysis of the drawings of children (Leonard, 2006). Therefore, each child was interviewed to interpret the drawings from the children’s perspectives, and they were asked to describe their drawings. The interviews with children and their descriptions of their drawings were recorded.

Data Analysis

Content analysis is “a systematic and repeatable technique in which some words of a text are

summarized with smaller content categories with coding based on certain rules” (Büyükoztürk et al., 2013, p. 240). The content analysis method, a qualitative data analysis method, was used to analyze the interview data and children’s drawings. According to Yıldırım and Şimşek (2018), similar data are compiled in content analysis within the framework of certain concepts and themes, and these are organized and interpreted such that the reader can understand.

The recordings of the interviews with the children were converted into written text (transcript). The written texts were read repeatedly, and categories were determined accordingly. The data were arranged according to codes, categories, and themes. The data were coded, aligning with the information obtained from the children. The themes related to the categories were created. Moreover, tables were created to explain the codes, and the findings were interpreted. The data were analyzed, and research findings were presented.

The emerging themes were noted in this process by examining the children’s drawings. Children’s sentences were read repeatedly, and the elements in the children’s expressions of the drawings were evaluated.

The two researchers coded the data separately, and the percentage of agreement was calculated as 90% using a formula developed by Miles and Huberman (1994).

Abbreviations and coding indicating the number of sequences (C1, C2...) were used for presenting the descriptions and children’s drawings.

Findings

Findings Regarding Nature Perceptions

This section evaluated children’s perceptions of the natural environment (nature). Accordingly, Table 1 presents the findings regarding the themes, categories, and codes of children’s perceptions of the natural environment.

Table 1
Themes, Categories, and Codes for Children’s Descriptions of Nature

Theme	Categories	Codes
Living elements	Plant	Tree, flower, leaf, greenery, grass
	Animal	Animals
Non-living elements	Human	Human being name
	Natural	Soil, mountain, forest, fresh air, snow, seasons
	Human	Where we live, outdoors

The findings suggest that most children ($n = 9$) perceived nature together with living elements, considering the children's definitions of "nature." Those children perceiving nature and living things included words such as "trees, flowers, greenery, leaves, and animals" in their definitions. Some children ($n = 4$) perceived nature with inanimate elements such as "soil, mountain, forest, fresh air, snow, seasons, and outside, where we live." Interestingly, none of the children perceived nature as a place where humans, animals, and plants lived together. Per the definitions of nature, only one child (C17) used expressions about nature and relationships. Some children ($n = 4$) reported that "they did not know." Some of the expressions of children about nature were as follows:

C17: "Animals and nature are important to all of us because we cannot breathe without nature. Trees are part of nature. We would die if it were not for the trees."

C20: "It is the living space of human beings. We should not consume everything in nature."

C8: "A friend's name. Greenery is just like nature."

C12: "Outside, where the animals are."

Findings Regarding How Nature is Polluted

Children's perceptions of how nature is polluted were evaluated, and the findings show that majority of the sample ($n = 16$) used the expression "with garbage, by littering." A few ($n = 3$) expressed that nature is polluted with "mud." Some children's expressions of pollution and how nature is polluted were as follows:

C1: "It is damage to trees and flowers."

C8: "When mud gets on the tree, and when rain and snow fall on it, it becomes polluted. Nature becomes polluted when papers are thrown on the ground."

C11: "By littering. There are masks and bottles on the ground. I want to collect them when I see them. People are constantly littering."

C16: "It becomes polluted if not washed a lot."

C17: "Nature gets polluted when you do not throw garbage in the trash. People should not litter."

C20: "If we throw litter in nature, it will harm animals and humans. If our nature is polluted, we will not be able to live long in our world."

Findings Regarding Soil, Water, and Air pollution

Table 2 presents the findings regarding the children's perceptions of soil, water, and air pollution.

Table 2

Themes, Categories, and Codes for How Soil, Water, and Air are Polluted

Theme	Categories	Codes
Soil pollution	Natural	Mud and water
	Human	Garbage, batteries, glass bottle, plastic, harmful substance, mask, paper, explosive materials, bombs, robot wheels, dirty glass, dirty things, and poisonous seed
Water pollution	Natural	Soil, mud, stone, and moss
	Human	Pet bottles, glass and plastic plates-cups, garbage, waste, paint, and toxic-harmful substances
Air pollution	Natural	Darkening of the sky and clouds, rain, smoke, steam, flames from the volcano, wind, storm, and tornado
	Human	Dirty gases, car gas, harmful gases, and foul odors

As depicted in the table, only a few expressed that the soil is polluted by natural objects such as "mud" and "water." Some think the soil is polluted with "garbage, batteries, glass bottles, plastics, harmful substances, masks, paper, explosive materials, bombs, robot wheels, dirty glasses, dirty things, and toxic seeds." Some of the children's expressions were as follows:

C5: "When we do evil."

C11: "If there is no grass, the soil becomes polluted when someone litters."

C20: "The soil becomes polluted if we dispose of a toxic seed."

More than half of the children ($n = 15$) mentioned household wastes such as "pet bottles, glass- plastic plates- cups, garbage, waste, toxic - harmful substance, and paint," considering the perceptions of how and what the water is polluted. At the same time, some children ($n = 7$) mentioned that the water is polluted with natural substances such as "soil, mud, stone, and moss."

Some of the children's expressions were as follows:

C2: "It gets polluted with soil. Sometimes people are careless and add paint."

C4: "If we put soil in it, if we put toxic substances, it will become polluted. The animals run away."

C13: "When we litter the water, its color changes. It would have a very dirty color."

C16: "If the water becomes polluted, it becomes clean again."

A considerable number of children (n = 8) believed that the air is polluted by natural events such as “darkening of the sky and clouds, rain, wind, storm, tornado; smoke, steam, and flames from the volcano,” considering the perceptions of air pollution and with what the air is polluted. Furthermore, half of the group (n = 10) believed that the air is polluted by factors associated with people, such as “dirty gases, car gas, harmful gases, and bad odors.” Some of the children’s expressions about air pollution and with what the air is polluted were as follows:

C3: *“It gets polluted if there are storms, tornado messes everything up as it spins.”*

C6: *“It gets polluted if the sun shines. When the sun comes up, people litter on the ground.”*

C13: *“It gets polluted when something like oil, water, etc., is spilled.”*

C17: *“When it is out of breath, it gets polluted. Breath comes with the wind and clouds. If we do not breathe with the clouds, we will be out of breath and die.”*

C19: *“It gets polluted with the bad odors. The air will be polluted if people are not clean.”*

Findings Regarding the Effects of Nature Pollution on Living Things

Children’s perceptions of the effects of nature pollution on living things are rather diverse: Some (n= 5) had a perception that life would end. Some children (n=3) believed that living things would be offended in case of nature pollution. Others (n= 6) believed that living things would be harmed, they would get sick, and the plants would wither because of nature pollution. Three expressed that living things would “escape to their houses or the zoo” because of nature pollution. Another group of three children reported that “they did not know.”

Some expressions of children about the effects of nature pollution on living things were as follows:

C1: *“The world would be destroyed; we would die. The amount of honey would decrease.”*

C5: *“They might faint.”*

C6: *“Animals would die. People would live, but they would be polluted.”*

C11: *“The plants would wither. Animals would not find food. Both human beings and animals would be upset.”*

C12: *“They would run away to another nature, to a clean zoo.”*

C19: *“There would not be trees. Animals would die.”*

Findings Regarding the Effects of Soil, Water, and Air Pollution on Living Things

Table 3 presents the findings regarding the perceptions of the children participating in the study on the effects of soil, water, and air pollution on living things.

Table 3
Themes, Categories, and Codes for the Effects of Soil, Water, and Air Pollution on Living Things

Theme	Categories	Codes
Soil pollution	Human being	Their feet would get muddy; their hands would be dirty.
	Animal	Ants would get sick; insects would die.
	Plant	Flowers cannot grow; we cannot plant plants.
Water pollution	Human being	They would become dehydrated, get sick, get poisoned, become polluted, and die.
	Animal	They would get sick, die, and leave.
	Plant	They would become dehydrated and die.
Air pollution	Human being	They cannot breathe; they would die and should wear masks.
	Animal	Birds would get poisoned; they could not breathe and die.
	Plant	Plants would not bloom.

Considering children’s perceptions about the effects of soil pollution on living things, some children (n = 3) believed that animals would be affected. In contrast, some (n = 4) believed that plants would be affected in case of soil pollution. Some (n = 7) believed that soil pollution would affect humans. Five believed that all living things, such as humans, plants, and animals, would be affected. Few (n = 3) expressed that “they do not know.” Some expressions of children about the effects of soil pollution on living things were as follows:

C1: *“Ants would get sick. We should throw the empty glues in the bin. If we throw it on the ground, the world will become lifeless.”*

C9: *“Our feet would get muddy.”*

C12: *“Children cannot play; their hands would be dirty and dry.”*

C13: *“The soil would become very polluted. It would become dark black. The soil would smell bad, and the living things would run away.”*

C15: *“They cannot plant anything.”*

Almost half of the children (n = 11) believed that all living things, including humans, plants, and animals, would be affected by water pollution. Almost one-third of the children (n = 6) believed that animals would be affected while some (n = 4) believed that plants

would be affected in case of water pollution. Another small group ($n = 4$) believed that water pollution would affect humans.

Some expressions of children about the effects of water pollution on living things were as follows:

C4: "Human beings would get poisoned."

C8: "The creatures that can get out of the water would be saved. Fish would be affected because they cannot get out of the water. We can put the fish in the aquarium or a bucket and raise them there."

C10: "Living things will leave if the water gets polluted."

C14: "If living things drink water, they will get sick."

C17: "Water becomes evil water. It will become dark. Fish do not like muddy water; they would die. All animals living in water would die."

C18: "We would get dirty when we got into the water."

Findings related to the children's perceptions about the effects of air pollution on living things reveal considerably diverse views: some children ($n = 3$) believed that animals would be affected. Conversely, one child ($n = 1$) believed air pollution would affect plants. Four believed that human beings would be affected in case of air pollution. Almost one-third of the group ($n = 7$) believed that all living things would be affected in case of air pollution. A few ($n = 3$) reported that "they did not know." Some expressions of the children about the effects of air pollution on living things were as follows:

C2: "We cannot breathe; we would die."

C3: "If the air were polluted, it would become dirty. Living things would smell bad odors and have bad breath."

C6: "Gases would pollute the air. Animals would die. Plants would not bloom."

C12: "People cannot go out; the air would stink. It would be necessary to wear a mask because of the bad odor."

C15: "Living things would be scared and leave."

C19: "Living things would get sick."

Findings Regarding What Can be Done to Protect Nature

When we look at the children's expressions about what should be done to protect nature, more than half ($n = 13$) expressed that "garbage should be collected and thrown into the bin." Only a few ($n = 2$) said that "they did not know." Some of the children's expressions were as follows:

C7: "We should collect the garbage."

C8: "I wear gloves and put all the garbage in the bin with my mom. We should tell people that they should throw the garbage in the bin."

C14: "We should throw the garbage in the wastebaskets. I do not litter."

Findings Regarding What to Do to Protect Soil, Water, and Air

Table 4 presents the findings regarding the children's perceptions of what can be done to protect soil, water, and air.

As seen in the table (Table 4), most children (17) used behavioral expressions about what should be done to protect and not pollute the soil. Some are as follows:

Table 4

Themes, Categories, and Codes for What Should be Done to Protect Soil, Water, and Air According to Children

Theme	Categories	Codes
Not to pollute the soil	About behaviors	Protect the soil, not litter, not step on the grass, not create mud, plant trees, protect trees, and not pollute the environment.
	About explaining the reasons	When you pour water constantly, the soil melts and becomes mud. We will plant the seeds and water them. Then, they will grow.
Not to pollute the water	About behaviors	Mud and soil should not be poured into the waters, should not drop litter, should clean toxic waste, and should not waste water.
	About explaining the reasons	If the fish wear a mask, they will not get the virus. Garbage in the water should be collected to protect aquatic animals.
Not to pollute the air	About behaviors	Should not use toxic gases, should be careful when starting a fire, should keep the forests clean, should not drop litter, it should not rain; tornadoes should be prevented.
	About explaining the reasons	Tree leaves clean the air. Toxic gases are dangerous.
		If it does not rain, the air will be polluted. We should wear a mask to prevent the steam from coming out of our mouths. If we do not pollute the forests, the air will remain clean.

C2: "To protect the soil, we should not plant and detonate bombs. We should not throw away food or drink."

C5: "We need to use it cleanly. We should not step on the grass."

C14: "We should not throw batteries. We need to throw the battery in the waste bin."

C18: "We should protect the trees. We need to plant trees. We will plant the seeds and water them. Then, they will grow."

C16: "I do not set foot on the ground. The soil is cleaned with water, but we should not mud it."

Similarly, most (17) used behavioral expressions about what should be done to protect and not pollute the water.

Some of the children's expressions about what they should do to protect and not pollute the water were the following:

C3: "We should not spill food coloring or throw garbage."

C6: "We should not waste water."

C9: "We need to get the dirty water."

C10: "I pick up the garbage with a net and throw it in a wastebasket."

C17: "To protect aquatic animals, divers can collect garbage from the water. Marines can collect, too."

C18: "We should not throw mud; we should not throw dirty things."

Furthermore, almost half (11) used a similar behavioral expression about what should be done to protect and not pollute the air. Some (n=3) reported that "they did not know."

Some of the children's expressions about what should be done to protect and not pollute the air were as follows:

C1: "We use the leaves of trees; we protect the air. The leaves should be intact; the dried leaves have holes. Therefore, they do not clean the air."

C5: "We should not create steam. The steam coming out of our mouths in the cold pollutes the air. We need to wear a mask."

C10: "We take the bad air and throw it in the wastebasket. The bad weather disappears."

C13: "Forests clean the air. If we do not pollute the forests, the air will remain clean."

C15: "I would go up to the cloud and put the bad smell in the air in a bucket."

C20: "When there is a tornado, it stirs the bad things around into the air. The air becomes polluted when it rains badly. We should prevent the tornadoes. There will not be a tornado unless there is a very strong wind."

Findings Regarding Elements in Children's Paintings

This section evaluated the drawings made by children (n= 20) aligning with "What kind of nature would you like to live in?" and the elements in their expressions about their drawings. Table 5 presents the findings regarding children's drawings' themes, categories, and codes.

The items included by children in their paintings were studied under the themes of living things, non-living things, and descriptions. Almost the entire group (n = 19) included drawings of human beings, animals, and plants under the theme of living things. Most (n = 15) included natural and humane elements under

Table 5
Themes, Categories, and Codes for What Kind of Nature Children Want to Live in

Theme	n	Categories	Code	n
Living things	20	Human being	My mother, my father, myself, my daughter, Atatürk, and human beings	9
		Animal	Fish, butterflies, birds, ladybugs, rabbits, pigs, and dogs	7
		Plant	Tree, apple tree, grass, flower, daisy, orange, grape, apple, blackberry, and carrot	16
		Other	Virus	1
Non-living things	15	Natural	Sun, cloud, black snow, wind, rainbow, earth, and dry leaf	13
		Human	House, treehouse, hut, stairs, balloon mailbox, umbrella, pop-it, colored ball, bird shoes, scarecrow, and police car	13
Description	12	Place	Zoo, forest, underwater, a colorful world, and endless greenery	4
		Emotion	Hearth, a loving place, beautiful, colorful, and clean	5

the theme of non-living things. However, nearly half ($n = 12$) had elements of space and emotions in the "description" theme.

The children ($n = 9$) expressed the elements coded in the "human beings" category under the theme of living things as "my mother, my father, myself, daughter, Atatürk, and human beings." They ($n = 7$) expressed the elements coded in the "animal" category "fish, butterfly, bird, ladybug, rabbit, pig, and dog." The children ($n = 16$) stated the elements coded in the "plants" category as "tree, apple tree, grass, flower, daisy, orange, grape, apple, blackberry, and carrot." One child included the "virus" element in their statement. The researchers evaluated this element under the "other" category. Some expressions of the children about the theme of living things were as follows:

C1: "I would like to live underwater to see the fishes. There are viruses and light fish underwater. The light fish scares the small fish at night. The light fish caught the samba virus. There are three samba viruses here."

C3: "There are trees, flowers, butterflies, clouds, and sun. I run to get flowers and give them to my mom, dad, and older sister."

C8: "There are colorful grasses made of pop-it. I drew Atatürk in the sun. There are beautiful clouds, beautiful weather, colorful rainbows, colorful umbrellas, and a beautiful pop-it house."

C11: "There are trees, flowers, and grass in the forest. A girl is wandering in the forest."

Considering the "natural" category within the theme of non-living things, the elements coded by children ($n = 13$) were "sun, cloud, black snow, wind, rainbow, earth, and dry leaf." Regarding the "human" category, the elements coded by children ($n = 13$) were "house, hut, stairs, balloon mailbox, umbrella, pop-it, colored ball, bird shoes, scarecrow, and police car." Some expressions of the children about the theme of non-living things were as follows:

C4: "I would like to live in a nature where black snow falls, silvery flowers, a house with eyes, and stairs leading to my room."

C9: "There are clouds and sun: Grape, orange, blackberry, apple-colored balls, ladybug, and bird. The bird has shoes."

C19: "There is a setting sun, clouds, trees, plants, and carrots. The tree has a trunk and dry leaves. There is also an irrigation system. The sun raises the trees. There is a pink pig on top of the trees. There is no mud because it is not raining."

In the category of "place" within the theme of descriptions, the elements coded by children ($n = 4$) were "zoo, forest, underwater, a colorful world, and endless greenery." Under the category of "emotions," the elements coded by children ($n = 5$) were "hearth, a loving place, beautiful, colorful, and clean." Some

expressions of the children about the theme of descriptions were as follows:

C12: "There is a sun and clouds. There are rabbits, scarecrows, and human beings in the zoo. Here, I love the bunnies and feed them with carrots."

C19: "There is a sun and clouds. There is a small cottage and an endless amount of greenery."

C20: "Everywhere is clean: A place with beautiful, loving hearts and daisies."

Discussion and Conclusion

This study evaluated children's perceptions of nature and pollution. Interviews were conducted with 20 children attending preschool education institutions, and they were asked to draw pictures of what kind of nature they would like to live in.

Evaluating how children perceive nature and how they position themselves within the system of nature is essential concerning nature education (Keliher, 1997). According to Çelik (2009), the evaluation of the balances in the ecosystem with an objective point of view contributes to creating sustainable environmental awareness in education about the environment and nature. In line with the interviews to evaluate children's perceptions of nature, we found that many children in our sample ($n = 9$) perceived nature together with living things. Conversely, some children ($n = 4$) perceived nature together with non-living things. Littlelyke (2004) and Haktanır (2020) also concluded in their studies that young children described the environment as living things or as a place including both living and non-living things. According to Halmatov (2012), children perceive the environment as a place at an early age, while they assess it as a medium in which living and non-living things interact in later years. In our study, some children ($n = 4$) similarly defined it as "the place where we live." However, the children did not use expressions for the integrity of the systems in nature. According to Halmatov (2012), children perceive the concrete objects they encounter in their lives and independently consider them. Therefore, children included descriptions of the items they discovered, such as trees, children, flowers, and birds. Our findings show that children similarly expressed nature with objects they could observe. In a study, Phenice and Griffore (2003) concluded that young children could partially describe the place of humans in nature. In another, Shepardson et al. (2007) reported that almost half of the children considered the environment a place where animals and plants lived. Contrarily, the perception of the place where humans, plants, and animals lived together was the least common perception among others. Our findings reveal that children partially perceived the nature-human relationship (C2: The place where we live. C19: We should not pollute nature. C20: It is the living space

of human beings. We should not consume everything in nature).

According to a study by Özkul (2018), the children's primary environmental problem is environmental pollution based on behaviors. Similarly, Taşkın and Şahin (2008) conducted a study. They reported that children's perceptions of nature included objects such as trees, children, flowers, and birds. However, they could not express the relationships between these objects or elements. Concerning their perceptions about how nature is polluted, most children ($n = 16$) used the expression "with garbage, by littering." Only a few expressed that nature is polluted with mud.

Our study's results were similar to those of Keliher's (1997), in which children believe garbage causes pollution. Only a few children included fog or oil spills in their pollution definition. Considering children's perceptions of what pollutes nature, they listed human factors as the most expressed factors. In line with children's perceptions, the primary things polluting nature are the problems related to human behavior.

For children's perceptions of the effects of nature pollution on living things, some children ($n = 5$) believed that life would end. A few ($n = 3$) believed that living things would be offended in case of nature pollution. Others ($n = 6$) believed that living things would be harmed; they would get sick, and the plants would wither due to nature pollution. Few ($n = 3$) expressed that living things would escape to their houses or zoos because of natural pollution. Ayvaci et al. (2021) investigated preschool children's metaphorical perceptions and opinions on environmental problems and obtained similar results. They reported that children had five metaphors for the concept of environmental problems: bad smell, crying plant, black cloud, unhappy animal, and nausea.

Considering children's expressions about what should be done to protect nature within the scope of our study, more than half ($n = 13$) reported that garbage should be collected and thrown into the bin. Ayvaci et al. (2021) disclosed that children mostly suggested setting rules, punishing, and educating people to prevent environmental problems. In our study, only one child (C8) mentioned the importance of education to protect nature by saying, "we should tell people that they should throw the garbage in the bin."

Children were observed to emphasize behaviors toward a sustainable environment in their statements about what should be done to protect and not pollute soil, water, and air. Similarly, Grodzinska-Jurczak et al. (2006) reported that almost all the children participating in their study were respectful to animals and plants, cared about the cleanliness of their environment, attached importance to saving water, saved energy and paper, and helped animals in the

winter season. Furthermore, Ertürk Kara et al. (2015) reported that children generally had environmentally-centered attitudes toward paper consumption, environmental protection, recycling, and living habits.

Within the scope of the research, children were asked to paint a picture of what kind of nature they would like to live in. The items they included in their paintings were examined under the themes of "living things, non-living things, and descriptions." Almost all children ($n=19$) included drawings of humans, animals, and plants under the theme of living things. Similarly, Keliher (1997) conducted a study by asking children to make a drawing of what they considered nature and concluded that 6–7-year-old children perceived nature as flowers, trees, and animals. Phenice and Griffore (2003) reported that children found it relatively easy to identify trees and animals as a part of nature. In contrast, only a few children perceived humans as a part of nature. In our study, as in the studies conducted by Keliher (1997) and Phenice and Griffore (2003), only a few children ($n = 9$) included the human element in their paintings.

Teachers in early childhood classrooms must offer environmental education programs supporting a positive view of nature and the environment and allowing children to explore their environment at their own pace. According to Ertürk Kara et al. (2015), children can acquire nature-friendly attitudes and behaviors on sustainability, recycling, respect for living things, and environmental protection with environmental education in early childhood education institutions. Based on the nature awareness that children have already had, the vitality of the programs to be prepared on subjects such as nature, ecosystem, and sustainable environmental education in the preschool period should not be overlooked. Moreover, considering that the family's perception of nature affects the child's perception, families should be included in the environmental education at school and be guided on how to spend time with their children in nature (Erol & Ogelman, 2021; Haktanır, 2020; Kahriman, 2020). According to Bolat (2020), the aim of environmental education is "not to be fully in nature, but to belong to nature" (p.1).

Recommendations

In line with the results of this study:

- Teachers are recommended to provide children with opportunities for environmental education through real-life experiences in nature-friendly environments, including nature, ecosystem, and sustainability issues in science and nature studies aligning with the development, interests, and needs of children and involving families in these educational processes.

- School administrators should be innovative about environments where children can engage with nature, such as nature trips and school gardens, and support an environmental education program in their schools.
- Researchers wishing to work on children's nature perceptions and environmental education can conduct studies aiming at investigating the effects of demographic characteristics of children and families on nature perception. Furthermore, longitudinal studies can be conducted on the childhood nature perception levels' effects on future attitudes and behaviors.

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Teaching is a Story Whose First Pages Matters – Four Type Narratives From The Beginning of a Teaching Career

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Abstract

From a broad perspective, the entire time spent in teacher training can be characterized as a period of professional growth. Specific professional growth and development are realized when the students enter the advanced stage of master's studies to independently practise their profession in their own class of pupils. The uncertainty of a novice teacher and, on the other hand, the 'burden of competence' gained from teacher training make this induction phase very sensitive and critical, as all the competencies they have obtained during teacher training should culminate in this specific phase.

The development of a student into an independent teacher is a growth story in which each person's identity, experiences of teaching, and the knowledge structures gained from teacher training determine how they experience their growth, how their multiple skills develop, and how their individual growth story evolves.

In this study, we look at the writings of primary school teacher students who have just entered working life. In their writings, the students who are in the beginning of their teaching career highlight their experiences, critical points, decisive moments, meaningful experiences, and professional growth in different ways. What can we, as teaching practice supervisors, learn from our students' experiences? What conditions and actions strengthen or destabilize the teacherhood of a newly graduated teacher? This study examines these questions through type narratives specific to narrative research by summarizing the students' experiences in four different type narratives.

Keywords:

Student Supervision, Peer Support, Collegiality, Professional Growth, Professional Support

Introduction

"All of a sudden, I was in a new school, alone among 25 pupils and new colleagues. The safe and familiar small group with which I had solved many problems during the studies was now gone. Each member of the group was now facing the same kind of situation. This was not a showcase nor a survival test but my first day in a profession that I had dreamt about and trained for. All at once, all that I had learned seemed to have disappeared from my head: planning, objectives, contents, assessment - those words



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were swimming in my mind without finding a place to anchor to. The start of my work was also the start of my final teaching practice. I would carry out the teaching practice in my own class of pupils. Was I ready for this after all? I wanted to press the panic button and discontinue the practical training. What if I don't make it?"

These words and thoughts summarize quite well the feelings and experiences of students who are just beginning their career as teachers. They have just completed their studies in teacher training, which has prepared them to support and promote the pupils' learning and competence development, to help the pupils become independent and responsible members of the society and possess the knowledge and skills needed in changing environments. However, the suddenly increased responsibility, requirements and expectations feel too big: the students feel that they are only beginners and novices as teachers, but at the same time they feel the pressure to appear as curriculum experts and digital specialist with the latest knowledge. (cf. Husu & Toom 2016, 9–10.)

During the years we have worked in classroom teacher adult education, we have become aware that the induction phase where the students take responsibility for their own class of pupils is very crucial:

"A new workplace with new practices, a challenging new class of pupils and, moreover, a very demanding teaching practice to be completed. At some point, I was ready to give up. The teacher who supervised my teaching practice saved me by reassuring and supporting me and by going through the assignments piece by piece."

As the student feedback above shows, starting in a new job is not always easy - even when one has dreamt about it for a long time. The transition to working life is a phase where the students' teacherhood - which they have developed during their studies - can easily be either reinforced or crumbled.

This phase is especially sensitive since most adult students in the class teacher education already have a long career behind them when they start their studies, and certain practices have become routine to them. During teacher training, the students' theory-in-use must be examined anew, which adds new dimensions to it as regards how learning, teaching and the factors affecting these are seen in the light of the latest research. In most cases, this new information changes the existing theory-in-use in a considerable way. The students' theory-in-use and their goals as teachers are put to the test during teaching practice periods, where the students are supported by trained supervising teachers, a university supervisor, and the peer group of other students. However, in a teaching practice in one's own class, things are different in many ways: now the student is the only teacher in the class, in a school that may be familiar or new. If the school is new to the student, its new work environment, working

community and working culture pose challenges to the student. In a familiar school, where the student may already have worked as an unqualified teacher, the challenges are related to the expectations falling on the student. At this stage, the student's situation may be complex if his or her theory-in-use has changed significantly and no longer meets with the practices of the workplace. When one is newly graduated, it is difficult to hold firmly to one's views in case they are being challenged, the work feels demanding, or you are uncertain of your teacherhood.

At this point, a tailor-made teaching practice in one's own class and with guidance from the university helps to cross the boundary between studies and working life. In this type of teaching practice, the students work as class teachers in their own class but can also discuss matters with a supervisor from the university and a mentor teacher from the school they work in (Meriläinen, Piispanen, Valli & Valli 2012). According to studies (Soini, Pietarinen, Toom & Pyhältö 2016), this type of simulated or guided authentic on-the-job learning situation helps the graduating student to develop as a teacher and to attach to working life especially because the student is given a chance to solve problematic situations in authentic contexts and in cooperation with other students, teacher trainers and the fellow teachers in the school.

Narrative research

The development of teacherhood is a narrative of its own, which students reflect on especially by examining and creating their own theory-in-use during teacher training. At its best, this narrative is endless, as teachers are expected to revise their teacherhood during their entire career through self-reflection, explorative teaching, collegial cooperation, shared expertise, new scientific data, and their experiences. During teacher training, students' theory-in-use is put to the test during the periods of teaching practice. Students often feel that they progress in leaps and bounds during practice periods because the constant debate between theory and practice tests, challenges and strengthens their teacherhood. In the final teaching practice, the students are asked to reflect on their teacherhood once more. This is done with the help of learning diaries and assignments that direct their teacherhood, cognitive control, working culture, and the planning of teaching. The students are given guidance and feedback to the assignments by means of video recordings, written instructions, and discussion with the university supervisor during the entire teaching practice in their own class. Every student also has a tutor teacher who works at the same school and helps the student.

The data of this study consists of syntheses of the students' learning diaries and assignments, where the students elaborated on their teacherhood and

its development and the feelings they had when starting work in their own class of pupils. The data also includes the results of an anonymised survey where the participants ($n = 16$) were asked to examine the critical points and affirmative elements of their teacherhood and the situations and emotions they experienced at work. In the syntheses and in the survey, the students could write about their emotions and experiences freely and highlight matters they considered important. Both surveys included guiding questions that the respondents could use to help outline their answers. However, they were asked to write free-form answers. The university supervisor had a discussion with each student based on his or her synthesis, thus giving the students a chance to broaden and specify their reflection. The survey the students answered after the teaching practice was anonymised.

The purpose of this study is to explore the different starting points of students as newly graduated teachers and to highlight such measures the students found important in strengthening their teacherhood at critical stages. Knowing these measures gives us a chance to further develop teacher training to support students professionally when they enter working life.

The method used to examine the students' stories is narrative research. In a way, the data collected for this study are like field reports that lead us to the authentic narrative of each student in the beginning of their working life. Kaasila (2008) and Hyvärinen & Löyttyniemi (2005) point out that narratives have a great influence on the building of one's identity: telling narratives involves interpreting one's own identity, past and future. Narratives build and convey the person's view of the world and values as well as make them part of the community and the world. In this study, we as researchers were given a chance to have a close look at the students' activity and thoughts through the research data, our discussions with the students and the observations we made when observing the students at work.

According to Polkinghorne (1995, 6–8) the analysis of this type of research data can be done by using two methods: either the analysis of narratives and/or the narrative analysis. The analysis of narratives focuses on classifying the narratives into different categories with the help of case types, metaphors, and categories, whereas the narrative analysis focuses on producing a new narrative based on the narratives included in the data. Thus, narrative analysis does not classify the data but uses it to create a new narrative that aims at highlighting the important themes in the data. Such a narrative is a synthesis of the narratives in the data. (Polkinghorne 1995, 15.) In our study, the analysis of narratives and the narrative analysis alternate and support one another. Through the

analysis of narratives, we have been able to outline the meanings that students give to their experiences and the meanings they give to their theory-in-use. On the other hand, the narrative analysis gave us information about the students' professional growth and the experiences that define their attachment to the new job.

Thus, our method of analysis can be described as data oriented. Our starting point is the matters told and described by the students. The collection of data was a process with two phases: it was conducted both during the final teaching practice and after it. During the teaching practice, the students created syntheses of their learning diaries and the structured assignments, which we then discussed. After the teaching practice, the students answered an anonymised survey consisting of open-ended questions. The open-ended questions were formulated so that they would help specify the students' syntheses but also give the students a chance to talk about their experiences in their own way. During the teaching practice, we observed the students' work through a network connection, which helped us form a conception of the actual circumstances in the classroom and of the way teaching was implemented.

Teaching practice in one's own class involves that the student acts very independently in the classroom. Therefore, the supervisor must rely on the student's account of the pupils and the group structure. For this reason, the supervisor must maintain a good dialogical connection and familiarize oneself with the student's thoughts and experiences of the pupils to form a comprehension of the student's performance and experiences of teaching (Nummenmaa 2003, 47, 51).

After familiarizing ourselves with the research data, we aimed at understanding the contents of the data within their original context, which is a situation where newly graduated teachers take responsibility for their own class using all their knowledge and skills they have obtained during and prior to teacher training.

In the narrative analysis, we use the data to create a new narrative that highlights the central themes of the data. Instead of classifying the data, a narrative analysis aims at creating a synthesis of the narrative knowledge. (Polkinghorne 1995, 12.) This type of holistic and content-based reading focuses on the whole narrative, its contents, and themes. In the research data, the central themes were being an educator, building a theory-in-use, reflecting on one's competence, and strengthening of professionalism (Table 1). In other words, these themes are matters that the students considered important and focused on in their narratives. In the data of each student and in relation to each theme, we found factors that strengthen and factors that destabilize one's

teacherhood (Table 1). Destabilizing factors were uncertainty of oneself (of one's competence and coping at work), uncertainty about belonging to the teacher community, discrepancy between one's concept of learning and the school culture, time management, and uncertainty about employment. Strengthening factors were collegial support, support from the university supervisor, teaching practice assignments as means to structure work, and realizing that results are related to one's competence. (cf. Husu & Toom 2013).

As the research data consists of the written assignments and several related discussions with 16 students, we decided that we would not be able to create a narrative for each individual student. That would also have violated the ethical principles of research work, as it might have been possible to identify the students in the narratives. Therefore, we decided to develop different kinds of type narratives based on the data. These type narratives describe the different experiences teachers have in the beginning of their career. There are several models for and alternatives to creating type narratives. According to Hänninen (1999, 33), the purpose of typification is to compress the central elements and narratives of the data. Type narratives have the kind of plot structure and elements that are characteristic of stories in general and of the persons and factors involved in the stories (strengthening and destabilizing factors). It is important to see that the type narratives in this study do not represent specific students. Instead, the type narratives highlight the main themes of the research data so that the themes dealt with in the students' stories are collected together. The type narratives express the multiple ways of experiencing the beginning of a teaching career. Each type narrative is characterized by the importance of support, which was a significant factor in the study. In addition, each type narrative also includes critical points where support was crucial for the development of a growth story.

By utilizing the methods of analysis described above, we were able to create four type narratives which were related to the following themes: how the students experienced themselves as educators, how their theory-in-use developed at this stage, their sense of competence, and how their professionalism was

reinforced. The four type narratives are called Diana Doubter, Benny Booster, Cathy Conformist, and Isla Innovator. The type narratives highlight the diversity of students and the importance of individual support.

Diana Doubter

The type narrative of Diana Doubter represents a very common group of students. Doubters trust in their own skills is rather weak, and the supervisor's task is to make Doubters notice their skills and strengths in a solution-oriented way. Supervisory discussions always help the Doubter to strive, but any little factor causing uncertainty or lack of support at the right time makes the Doubter start to doubt. Doubters tend to seek reinforcement to their assignments and belittle themselves or their work. They feel that teaching practice is especially demanding, and they easily consider quitting. Doubters nearly always experience inner conflicts because they compare their own choices with the choices of others which they try to relate to. Situations where the school culture or colleagues' conceptions of learning and teaching conflict with their own conceptions are especially difficult for Doubters. In these situations, Doubters feel distressed and insecure as regards their own choices, even if they realize that their choices are well-founded and right. In these situations, it is extremely important that the supervisor supports the students and makes their work apparent. Doubters need constant support, confirmation of instructions, and feedback on their work to build up their resilience (Waugh 2014, 73.)

"The long distance between us was critical factor, but our discussions helped. The support and feedback from the teacher helped me reach all my goals. As I said earlier, the supervision process helped me in moments of uncertainty."

Positive support is crucial to Doubters' attachment to working life:

"It is like I was given a pair of glasses or a telescope through which I can see myself in a positive light. Insecurity is a growth process and an ability to reflect on one's competence."

"Support and encouragement as well as the promotion of feelings of calmness and of the attitude that everything is going to be all right have been important to me. Reflecting on things and putting emphasis on one's strengths." "Feedback that was supporting and encouraging. Especially during

Table 1.

Key elements and strengthening and destabilizing factors of teacherhood.

Teacherhood: Key Elements	Teacherhood: Strengthening Factors	Teacherhood: Destabilizing Factors
<ul style="list-style-type: none"> • being an educator • construction of one's theory-in-use • reflecting on one's competences • strengthening of professionalism 	<ul style="list-style-type: none"> • collegial support • support from the university supervisor • teaching practice assignments as means to structure work • realizing that results are related to one's competence 	<ul style="list-style-type: none"> • uncertainty about oneself (competence and coping) • uncertainty about belonging to the teacher community • discrepancies between one's concept of learning and the school culture • time management • uncertainty about employment

moments when I thought I could not handle it. Also, the feedback I got after the observation day was extremely valuable. It is sometimes difficult to see the good sides and things that need to be developed in one's work."

Benny Booster

Benny Booster is a person who radiates contentment and certainty. Already in the beginning of teacher training – or at least during it – Boosters feel that their views of and experiences about being a teacher as well as their methods have been efficient. During teacher training, this view has been promoted. Such persons can utilize and support their resources and strengths – often without realizing this (Koirikivi & Benjamin 2020).

With their own class, Boosters face any possible challenge with an attitude that their teaching methods and educational competence will produce results in time. The knowledge gained from teacher training is stored in the memory, and it is typical that Boosters reinforce their sense of competence during the final teaching practice:

"I tried to achieve the objectives set to me, and all the assignments I was tasked to do during the teaching practice led me towards them. I think I succeeded well."

"I can plan comprehensive and integrative learning wholes suitable for the age group. I have strengthened and deepened my personal and professional identity in line with the objectives."

It is typical that Boosters' learning assignments and course of action are in some respects incomplete. It may also be difficult for the reader to understand what Boosters are trying to communicate. In these critical situations, a Booster often assumes that others understand what he means or is doing. For Boosters, action comes naturally but explaining the action on a pedagogical level may be difficult. There is an interesting connection with studies on resilience and interaction, according to which a person's resilience is strengthened through reflection and interaction (Zautra 2014, 189). Boosters' central need for development is in the area of pedagogical interaction: if we as supervisors could support this interaction, Boosters' expertise would become visible, which then would build up their resilience (Zautra 2014).

"Discussions with the supervisor have helped me analyse the knowledge that I have. At first, I was not able to write it intelligibly in my lesson plans. Afterwards, when I read my plans, I realised that they were incoherent. But when I really focused on following the instructions, I was able to write my plans in a way that was intelligible."

Boosters also mentioned that a strong belief in the correctness of one's actions is a strength but also as a challenge:

"In the beginning of teacher training I wondered if I would gain anything new from it. But I can see now that it has given me the thread of the profession. I can now actually create learning phenomena and themes based on the curriculum. On a practical level I already could do that, but now it has a meaning, too."

For Boosters, moments of uncertainty are critical. In situations of uncertainty, they often give feedback on the instructions. However, this was due to their own insecurity. The other types of students did not give the same kind of feedback.

"At some point I noticed that students may misinterpret the instructions. Thus, very specific instructions and examples would help them act correctly."

"I'm just saying that the instructions are confusing at times..."

"I was confused, because I had submitted my assignment, but I could not see it there. For some reason, the assignment was not there, although I had submitted it."

Despite elements of uncertainty, Boosters typically feel that everything they experienced during training improved their sense of competence and teacherhood.

"I cannot say that my way of being a teacher changed in any way. Actually, training has made me more certain of the fact that I am acting in the right way and can continue the same way."

To some extent, Boosters are a mysterious group: It is easy to say with contentment that they were skilled teachers already when entering teacher training. On the other hand, the group may include people who tend to view everything new they have learned during training as part of the competence they already had prior to training. In psychology, this is called confirmation bias, which is a tendency to favour new information in a way that confirms one's prior beliefs or knowledge. This means that certain people tend to choose information and sources that support and promote their prior opinions. These people will also interpret ambiguous data in a way that supports their own views. (Levine 2003.)

It is often difficult to see the difference between good self-esteem and confirmation bias. However, confirmation bias means that one's trust in one's beliefs is remarkable and related to all knowledge of a theme even when the person is shown evidence proving the opposite. (Levine 2003.) A self-confident person may try to cover one's uncertainty by reinforcing one's sense of competence, which can result in a confirmation bias.

As regards Boosters, the teacher training supervisor needs to distinguish whether the Booster's competence is genuine or whether there is uncertainty or bias behind the reinforcement. These two may weaken the

quality of teaching, communication, and interaction in different contexts (e.g., when meeting pupils' parents, networks, colleagues). The student's situation can be interpreted by asking questions and mapping the situations that the student finds challenging as well as the solutions to these situations.

Cathy Conformist

Conformists are students whose environmental factors can either risk or promote their teaching career: at its best, the school culture and colleagues will embrace Conformists and let them impress with their competence. In an unfavourable situation, the environment may affect Conformists so that their competence declines. This is because Conformists try to seek sympathy for their actions and feel companionship: the support from others improves Conformists' resilience (Poulin, Brown, Dillard & Smith 2013, 1652; Zautra 2014). On the other hand, if Conformists do not get collegial support, they will start to shape their own behaviour and support the views of others even if these are very different from those of their own. For the most part, Conformists know that they tend to conform.

"I have previously worked at the school I am working at now. It poses certain challenges since my conceptions of learning and teaching have changed so much. I no longer depend on textbooks, which is rather unusual at our school. Sometimes I wonder if I have the energy to tilt windmills. My supervisor asked me about my current theory-in-use and conception of learning. I know I should stick to my own conceptions and not just go with the flow. I am excited about the kind of teacher I would like to be, but it takes courage. However, I had the courage to say that I will take charge of the Curriculum Afternoon, even though a colleague teased me about it."

"I must be a bit careful about what I say, do or reform, as I only have a temporary post and I have not been promised continuation yet. But I can do things my way in my own class, of course."

Conformists have a twofold role in their work. They have the confidence gained from teacher training and teaching practice, but they are afraid to express their own way of being a teacher. The reason for this is the pressure they feel about whether they will be accepted into the work community. Conformists feel that they need more self-confidence. In the final teaching practice, the support and questions from the supervisor can strengthen their teacherhood even when the supervisor is in another town (Brown & Okun 2014).

"The additional questions that my supervising teacher asked me made me reflect on different views, and naturally the positive feedback I got reinforced my sense of competence. The supervision sessions were well scheduled according to the assignments we had."

"The support and encouragement I got as well as the interactive discussion with the supervisor about

my experiences as a teacher. The fact that someone listened to me and promoted my ideas."

Conformists are often open about their critical points, such as being left alone in a controversial situation. In these situations, conformists are genuinely afraid that they will become the kind of teachers they were prior to their professional growth or that they will assimilate into a group that does not share their conception of good teaching and learning. Conformists are trying to find explanations that would help them move on:

"I was happy to do the teaching practice in my hometown and in a real teaching job. The practice period was over extremely quickly. Somehow, I would have liked to have such guidance and counselling for longer. But on the other hand, I think all of us wanted to complete master's studies fast. Perhaps we partly thought that we would just like to get done with it."

"The challenge in our school is that certain textbooks and software have been ordered for us, so every teacher is expected to use them, and the use is even monitored to some extent. So, they know which things the pupils have studied from textbooks. Of course, a textbook is not the same thing as the curriculum, but in our school – and I hate to say this! – textbooks guide teaching more than the curriculum."

Isla Innovator

Innovators are students who feel that they have learned a lot and want to share this expertise in their work community. Innovators' enthusiasm is catchy, and they have a genuine belief in the possibilities of their actions. Innovators do not reform the school just for reformation's sake, but they strongly believe that the work will produce results. Innovators openly share their expertise and the things they do with their pupils. They also invite others to come and see their work:

"It has been a pleasure to highlight the importance of objectives in the work community, as well as the idea that the criteria for good competence are a starting point for the objectives."

When reflecting on their actions and the results, Innovators feel that they receive continuous and timely reinforcement to their professional growth. This is an ideal situation for a newly graduated teacher. Zautra (2014, 185–193) notes that interaction is the primary foundation for the development of resilience. Situations where individuals support one another in a compassionate and encouraging way relate to the development of resilience (Poulin, Brown, Dillard & Smith 2013, 1652; Zautra 2014, 185).

"Especially the supervision process has helped me find my way of being a teacher. I notice that I have a gentle way of interacting with others and that I enjoy teaching when it forms a continuum, and each day is a clearly structured entity. Discussions about cognitive control and planning have helped me understand the role of entities in the work of a teacher. When learning consists of alternating lessons and textbooks and independent work at one's desk, it is not meaningful and comprehensive. Above

all, teaching practice helped me understand how functional and important it is for all that learning is a process and a continuum."

"I wished for and was provided with reinforcement for my views on the importance of the assessment of younger pupils. I also received tips on how to carry out self-assessment and peer-assessment with younger pupils."

The importance of instructional support

Teaching practice in one's own class gives those students who have already been offered a post as a teacher a chance to do their final practice period in their future workplace. Doing the practice in another town requires the student to take responsibility for the planning, implementation and instruction of education and teaching more independently and comprehensively. The challenges and everyday life of a novice teacher are the same as those of experienced teachers. In addition to having new pupils, colleagues and work environment, the novice teacher must conceptualise the educational content, the curriculum, and the pedagogical teaching arrangements. According to Feiman-Nemser (2001), this demands a lot of work during the first months, when the teacher has not yet formed a routine. During the practice period in one's own class, the students aim to create a whole, authentic, and contextual learning environment that improves the pupils' learning-to-learn skills and transversal competences. This is done by using the pedagogical know-how gained during teacher training. In theory, the students are familiar with all this, and the teaching practice is the real life where theory, practice and the school practices meet. In several schools, the students are met with a traditional school culture, which they counterbalance with a learning and teaching method that is based on a more comprehensive, phenomenon-based approach.

"I felt a beautiful fire crackling warmly inside of me, sparks of energy flying around. I was filled with genuine gratitude as my long-held wish was about to come true. [...]After a few days of teaching, the flame inside of me was not burning so merrily anymore. Instead, it was burning down. Having discussed with some of my colleagues, I noticed that I had started to view teaching from a quite different perspective."

In a situation described above, the student's resilience and promoting it are very important. Bradley, Davis, Kaye and Wingo (2014, 199–200) note that resilience that is promoted by the community is a significant factor in maintaining resilience in uncertain situations. Resilience promoted by the community requires the successful adoption of cognitive, emotional, and behavioural norms, which form the basis for the development of self-regulation ability, emotion regulation abilities, psychological flexibility, and social competence (Poulin, Brown, Dillard & Smith 2013; Zautra 2014).

The theoretical framework for the teaching practice in one's own class is founded on the basic ideas of educational sciences and developmental psychology: John Dewey's view that the society and school should operate according to uniform principles; Maria Montessori's view that a child's individual growth and learning should be taken into account and that learning environments should be utilized in versatile ways during the learning process; Meriläinen and Piispanen's (2018) views on the connection between contexts and pedagogy when planning a learning landscape; and Herrington, Oliver and Reeves' (2010) view on the possibilities of authentic learning.

These theories and the framework they form guide both the planning of the supervision process and the students' work as teachers. Teaching practice in one's own class differs from the earlier teaching practices in many ways. The most significant difference is that in the final practice students have entered working life and are now responsible for the independent planning and implementation of the learning landscape in the class where they do their practice. In the earlier teaching practices, the teachers at the university practice schools were responsible for planning the classroom culture and practices, for planning and implementing curriculum-based teaching, and for supporting the pupils' growth and development. In the teaching practice in one's own class, the students are responsible for these. The students are also responsible for planning and implementing successful parent-teacher cooperation strategies. Teacher's work requires a variety of skills, which are developed, extended, and deepened during the final teaching practice through guidance and by using methods of work counselling.

Soini, Pietarinen, Toom and Pyhältö (2016) examine teacher competencies from the perspective of research on teachers' sense of professional agency. According to them, the core of teacher competence consists of 1) pedagogical skills, 2) interaction skills, 3) well-being skills, and 4) skills related to school development. These dimensions of competence also correlate with novice teachers' sense of competence. Teachers who consider themselves competent in these areas also consider themselves more resilient in different situations. According to Soini et al. (2016), these dimensions are central in teachers' professional contexts: in classroom interaction and in the professional community. According to the study, success or failure in these contexts had an impact on how strong and competent novice teachers considered themselves to be as teachers.

In the teaching practice in one's own class, it is crucial that the student's own conception of learning and education is made apparent. It becomes apparent on many levels and in many ways during the teaching

practice, not only in the planning of teaching but also as the background philosophy to the class culture and practices. (cf. Soini, T., Pietarinen, J., Toom, A. & Pyhältö 2016). In addition, the student's conception becomes evident through the meticulously drawn plan for cognitive control that promotes the pupils' learning and their possibilities to succeed to the best of their potential.

"I knew I had knowledge and skills, but all of them were somehow lost and out of reach. I had no confidence and I thought I could not be the preschool teacher I had been, because I was a classroom teacher now."

The supervision process where methods of work counselling are utilized promotes the student's professional growth at the right time and enables each student to stop to reflect on matters that are current and of importance to them at that time. Scaffolding, timely support for learning, and working on the proximal zone of development create a solution-oriented framework for the supervision process (Kim 2008). As working and practising go hand in hand in the teaching practice, the supervision process has been planned so that it focuses on supporting and guiding the students in the questions and needs that are current and important for their professional development.

"After the initial awkwardness had passed, the little flame inside of me was gently made stronger. This made me feel calm and gave me permission to view classroom teacher's work in the way I, a preschool teacher, see it. With the help of my extremely skilled supervisor, I found the thread again and was able to create the learning landscape that was suitable for my pupils. Afterwards, I became even more excited about the teaching practice in my own class and had the courage to plan teaching that was not textbook based. My supervisor told me to stand on my head to shake up my thoughts (a very good advice for me) and to find the key issues."

The student's words above include an idea of shared expertise and collegial guidance that should be based on needs and provided at the right time. Furthermore, it is also important to recognise, acknowledge and highlight existing competence. It is crucial that the supervision process highlights, deepens, and extends the existing competence at the same time as the competence-related needs that the work entails are addressed.

"I will never forget the discussion we had in the beginning of the counselling process and the idea of 'a bed model' that I had. I had come across this model during teacher training, but only now the fabulous idea became understandable and concrete to me, which advanced my professional development in leaps. I have seen and experienced what difference it makes when pupils know exactly the objectives they try to achieve and the phases of the learning whole. Pursuing the goal step by step is clear and structured for both the teacher and the pupils."

Conclusion

Each person experiences being a teacher in a unique way. This experience is affected by one's own school experiences, values, the attitude of the environment and one's view on teaching that has developed during teacher training and one's work as a teacher. Teaching profession is an interesting occupation that differs from many other professions in that everyone is familiar with it from the perspective of a pupil. Many students graduating from the class teacher adult education programme have worked as teachers before entering the training. Thus, they have seen the profession from the teacher's point of view before starting the training. This is not possible in every profession. Many of the students in adult education are also parents of secondary school students. During teacher training, the students must examine and reassess their experiences of being a teacher. Some students build on their previous experiences, while some must start rebuilding their teacherhood from the beginning. The distance between these two extremes is long and includes various growth stories.

The type narratives presented in this article shed light on the large spectrum of graduating teachers and provide a meaningful perspective on the planning of the supervision process of a teaching practice that takes place in the induction phase between studies and working life. Naturally, the classification could have been different, but as we tried to group the students that we supervised in different ways after several readings of their writings and responses, the classification into the current type narratives became clear. These type narratives describe the various situations of students in the induction phase of working life.

The classification was done based on the students' learning diaries, the syntheses of their assignments, and their responses to the anonymised survey. These formed a large collection of texts, only small bits of which are presented in this article as citations. The extensive data showed that the students' professional starting points vary, which challenged us as researchers and teaching practice supervisors to reflect on the efficiency and importance of instructional support that is needs-based. How can we meet the needs of different students better and at the right time, and help them develop in their work and as teachers by working on each student's proximal zone of development? The students' needs are different, but their direction is the same: to strengthen their teacherhood.

During teaching practice, we can use assignments to draw focus on the different duties of a teacher, such as planning, creating a classroom culture, methods to

support the pupils' learning and growth. While doing this, we notice that the students feel differently about their development as teachers as regards these duties.

The supervision process that utilizes methods of work counselling enables timely support, scaffolding. In that process, the students position themselves in relation to assignments that promote the attainment of the desired competencies during the teaching practice. Instead of examining the assignment-related progress together with all the students, at the same time and in the same way, we have developed the student supervision process more towards a work counselling process, where the students themselves raise questions that are current to them. We have noticed that this promotes the professional development of the students in a meaningful way. Above all, it requires a change in us supervisors. It requires a new way of examining the teaching practice from more individual perspectives: we cannot force a locked door open or demand that a student stops at a threshold he or she has already crossed. The purpose of this study was to identify factors that promote teacherhood by examining data and the themes rising from it. The data was collected during class teacher students' teaching practice which took place in the induction phase of their teaching career. The themes rising from the data were examined through four different type narratives that all indicated that the common factors that promote teacherhood are collegial support, support from the university supervisor, learning assignments during teaching practice as means to structure work, and realizing that results are related to one's competence. This framework also applies to the professional development of the teaching practice supervisor: recognising and highlighting the student teachers' competence and timely guidance are the key factors. As supervisors, we help graduating class teachers strengthen their teacherhood in their proximal zone of development by supporting their learning and competence at the right time and help them take their first steps as teachers beginning form where each one of them is at that time. Only in this way can a story called teacherhood begin.

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