INTERNATIONAL JOURNAL OF MODERN EDUCATION STUDIES

| Volume 5 - No 2 - December 2021 - ISSN 2618-6209 |

Research

The Effects of Integrated Mathematics and Life Sciences Teaching on Primary School Students' Value Acquisition

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Article Type
Original Research
International Journal of Modern Education Studies
2021
Volume 5, No 2
Pages: 487-515
http://www.ijonmes.net
dergipark.gov.tr/ijonmes

Article Info:

Received : 22.10.2021
Revision : 04.11.2021
Accepted : 12.11.2021

Abstract:

A subject worth examining was the interdisciplinary approach's planning and application of two distinct disciplines and investigating the value acquisition inclinations of students who participated in the multidisciplinary approach. In this context, the problem sentence of the research is that: Does integrate mathematics and life sciences teaching have an effect on primary school 3rd-grade students' acquisition of honesty, respect, love, and helpfulness values?". The impact of integrated Mathematics and Life Sciences teachings in third grade on students' honesty, respect, love, and helpfulness value dispositions was studied using a quasi-experimental method with a pretest-posttest control group and the theme of "tolerance." As the data collection tools of the research, the "Honesty Value achievement Scale," "Love achievement Scale," "Respect achievement Scale," and "Helpfulness achievement Scale" was applied to the students in the sample. This research was conducted in three stages: preliminary preparations before application, integration of disciplines, lesson plan preparation, and actual application. There was a significant difference in favor of the experimental group when comparing students taught integrated mathematics and life sciences versus retrained students using a Ministry of National Education-approved course and workbook. In addition, there was a significant difference in favor of the post-test between the pretest-posttest scores of the honesty, respect, love, and helpfulness values belonging to the students in the experimental group taught integrated mathematics and life sciences.

Keywords: Mathematics teaching, life science, integrated teaching, value acquisition.

Citation:

Baş, M., Tay, B. & Işık Tertemiz, N. (2021). The Integrated mathematics and life sciences teaching affect primary school students' value acquisition—International *Journal of Modern Education Studies, 5*(2), 487-515. http://dx.doi.org/10.51383/ijonmes.2021.142

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INTRODUCTION

The primary reason for civilizations' actions toward educational movements throughout history is the need to fulfill a demand for information in the geography they live in for survival. One may argue that the desire to know exists to improve societies' welfare levels and to live in better conditions. Its goal is to provide people with the fundamental knowledge, skills, and values they need to integrate into the geography and society in which they live. In this regard, societal requirements should determine the overarching goal of education. In *Some Thoughts Concerning Education"*, Locke (1779) defines education as the most crucial phenomenon that marks the difference between societies. Indeed, when we examine the gradual changes in nations' social, cultural, and economic spheres from the past to the present, one of the primary catalysts for these changes in education. As a result, the quality-enhancing characteristics of curricula developed to raise the educational quality should be demonstrated structured.

When it comes to the twenty-first century, named the information age, society's expectations of the educational system have shifted. It is clear that, rather than learning more in alignment with the century's goals, the urge to acquire more practical skills takes precedence. With this reasoning, it is clear that how that is owned and used appropriately at the appropriate moments is as critical as the information that individuals possess today. In addition to these, it is necessary to be a civilized society to gain the civilized national values that every individual living in the community must have (Demirci Güler & Açıkgöz, 2019). Ekşi (2003) described values must haven as the process of successfully teaching students academically and instilling fundamental values.

Schools have taken on the mission of providing students with the information, skills, and attitudes essential to live in peace with their society and the rest of the world because of their practitioner nature (Sözer & Yılmaz, 2019; Fidan & Erden, 2001). In this view, the planned and successful presentation of values education in primary school, the earliest stage of students' education, is critical for the healthy development of students' character and value achievements across their lives (Tahiroğlu & Tay, 2020). However, the ordinary deduction revealed by the study standard (2006), Lee and Zhou (2015), and Wei and Eisenhart (2011) are that students' academic performance in international comparison exams such as TIMSS and PISA, as well as in school, is contingent upon a firm grasp of value-based education.

Researchers discovered many distinct perspectives on values education (Nalçac 2016; Uzunkol & Yel 2016). When various techniques are studied, it becomes clear that some seek to instill the student's value directly. In contrast, others characterize a system representing or rejecting the matter described in the student's question weight (Aladağ, 2009). While some of these techniques are a part of the schools' open and hidden curricula, others offer planned classroom activities within the curriculum (Doğanay, 2006). Five approaches have been put forward about "About values education" by Superka (1973) as follows: *in the*

calculation, moral development, value clarification, behavior learning approach, and behavioral approach" (Cited by Superka, Ahrens and Hedstrom, 1976).

Oliver and Newmann (1967-1972), Shaver and Larkins (1973), and Metcaft (1971) created the value analysis approach utilized in this study to well-organized education. Organizing to the approach's understanding, students draw logical conclusions about values and apply their scientific process skills. Additionally, teachers assist students in conceptualizing values and conceptualizing through reason and logic.

For the ideal individuals that a civilized society wants to raise, there should be an education system that aims to develop knowledgeable and skilled individuals and have social and universal values per the needs of the age. This required educational system must answer the complex and interdisciplinary challenges resulting from the developments mentioned above. In this sense, during the mid-twentieth century, as the science of epistemology advanced and the boundaries established by the complexity of knowledge investigated, scientists and philosophers began to consider the possibility of constructing various integrations within their respective disciplines.

According to a literature review, integration studies for the interdisciplinary approach are on many curriculum elements. These integration studies are performed through science (Güven, 2012; White & Carpenter, 2008; Öztürk, 2019; Tekerek & Cebesoy, 2017; Yalçın, 2020; Cervetti, Barber, Dorph Pearson & Goldschmidt, 2012), social studies (Keçe & Merey 2011; Aladağ, 2009; Bolat, 2016; Güneş;2007; Çelik, 2017; Aslan, 2017; Aladağ and Şahinkaya, 2013; Morris, 2008; Simon, 2015), Turkish (Şahbaz and Çekici, 2012; Hartzler, 2000; Demir, 2009), games and physical activities (Boyraz, 2015), visual arts (Pehlivan, 2015; Trent & Riley, 2009), life sciences (Demirel, Tuncel, Demirhan & Demir, 2008), mathematics lessons (Özçelik & Semerci, 2016; Macit, 2020; Alp, 2010; Çelebi, 2020; Tertemiz & Çakmak, 2000; İpekçi, 2018; Turhan Türkkan, 2017) and values education (Katılmış, Ekşi & Öztürk, 2010; Çelik, 2017; Aslan, 2017). In addition, some studies have been conducted directly on teacher-student views (Whisenhunt, 2009; Obradovich, 2009; Guercio, 2003; Doğanay, Karakuş, & Bolat, 2013), and some of the studies are related to the application dimension of the interdisciplinary approach (Işık Tertemiz & Aslantaş, 2018; Ayvaz Tuncel, 2009; Taylor, 2011; Morris, 2008; Campbell and Henning 2010; McKenna, 2007; Karakuş and Aslan, 2016; Chan Man 2005; Aybek & Duman, 2003; Yıldırım, 1996). Experiments have demonstrated that integrating the curriculum with an interdisciplinary approach also contributes significantly to the education dimension. When the research stated above that used a multidisciplinary approach are examined, it becomes evident that science, Turkish, English, visual arts, and social sciences were the most commonly used disciplines (Tekerek & Cebesoy, 2017; Şahbaz & Çekici, 2012; Pehlivan, 2015; Keçe & Merey 2011). A review of the research mathematics discovered that there is no integration research with another subject, which is generally associated with a skill, attitude, or value (Macit, 2020; Çelebi, 2020). In addition, there was only one study regarding life sciences lessons.

As a result, it turns out that the limited number of studies on life sciences and mathematics courses are only single-disciplinary integration studies. However, while looking at research on other classes, it has been established that different studies are building interdisciplinary connections (Hartzler, 2000; Demir, 2009; Karakuş & Bolat, 2013; Tekerek & Cebesoy, 2017; Şahbaz & Çekici, 2012). As a consequence of these studies, the interdisciplinary approach positively adds to the students' value achievement. Various integration models recognize multidisciplinary activities in the teaching processes. A model for primary schools is identified by integrating the life science lesson, which is essential for individuals to sustain their lives. The mathematics lesson, which is critical to the continuation of life, begins with the history of humanity. The parallels and contrasts in the dimensions of skills and values that these two disciplines seek to impart to the individual indicate that integration has the qualities found in the literature. A mathematics lesson connects abstract symbols and the physical world (Tertemiz, 2017). The life science lesson is defined as based on collective education and give. It gives the characteristics of being a national citizen and an international citizen in an increasingly globalizing world (Tay, 2017). Based on these definitions, an examination of the curriculum of mathematics and life sciences lessons revealed that these two lessons have many common points under the principles of approach regarding the achievements, skills, and values they aim to bring to the student.

Furthermore, the common root values provided in both lessons will serve to emphasize the significant emphasis. The program's root values include the function of education systems is to bring justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and benevolence to individuals. Root values should be given through teaching programs to fulfill this function. In this context, values were not a distinct learning area or unit in achieving the root values in the curriculum but rather as the ultimate objective of the educational process. Additionally, values education should establish a relationship with the subject, unit, and achievements (MEB, 2018). Interdisciplinary thematic studies provide students with skills that are difficult to acquire through traditional methods.

Additionally, because value judgments have begun to change in the modern-day, its significance to values education, which has gained prominence in recent years, has been proven via studies (Öztürk, 2009). When the 2017 and 2018 primary school curricula are compared, it is clear that values education is given a high priority under the title of root values (MEB, 2017; MEB, 2018). Indeed, under the title of values, included in all 2018 primary school curricula, we can state that the following definition supports the deduction: *"our values, which define our fundamental human characteristics, are the source of our power and the power that enables us to act in the routine flow of our lives and in resolving the problems we encounter"* (MEB, 2018). In this context, it is critical to employ an interdisciplinary approach, as advocated by studies (Katılmış, Ekşi & Öztürk, 2010; Çelik, 2017; Aslan, 2017) that have demonstrated a good impact on values education, particularly in mathematics and life sciences classes.

Examinations of applied mathematics and life sciences programs discovered inadequacies in analyzing the programs' accomplishments while using an interdisciplinary understanding of the subject (Pehlivan, 2015; Taylor, 2011). A subject worth examining was the multidisciplinary planning and application of two distinct disciplines around a theme and investigating the value acquisition inclinations of students who participated in the interdisciplinary context; the research problem is that: *Does Do the mathematics and life sciences teaching affect affected-grade students' acquisition of honesty, respect, love, and helpfulness values?*".

METHOD

Research Model

In the research, a quasi-experimental design with a pretest-posttest control group, designed under the theme of "tolerance," determined the effect of teaching integrated Mathematics and Life Sciences lessons in the third grade of primary school on students' honesty, respect, love, and helpfulness value tendencies. Experimental research is a type of study where the researcher examines data to uncover the cause-and-effect relationship by establishing the necessary conditions (Christensen, Johnson & Turner, 2015). As implied by this definition, the control aspect is a critical component of experimental studies, and empirical research differs from non-experimental quantitative research in this regard (Howitt & Cramer, 2004: 132). In this research, quasi-experimental design, one of the experimental designs, was used. Quasi-experimental methods are the natural practical ways of scientific value (Manion, Cohen & Morrison 1997: 298). The quasi-experimental design employ scenarios where the controls required by natural experimental techniques are unavailable or even insufficient (Creswell, 2003: 167; Howitt & Cramer, 2004: 133). Due to the impossibility of randomly assigning students to the groups for the experimental design in this study.

The Population and the Study Group of the Research

This study utilized the study population and the group study. The multi-stage sampling method identified students in the 3rd grade of primary schools in Kırşehir city center. The first step employed a purposive sampling method. In cooperation with the provincial directorate of national education, primary schools in the city center were listed as low, medium, and high, considering the socio-economic level and success dimensions. School applications were chosen randomly from middle-level schools to ensure population representation and avert excessive impacts. The second step determined the study groups. A simple random sampling method decided the study's experimental and control groups at this stage. This stage established collaboration with school administration, and value scales were used as a pretest to eight classes with 3rd graders. Pretest findings selected two types

randomly in five categories. Following that, one class was designated as the "experimental group," while the other was the "control group."

Regarding the gender distribution of the students forming the experimental group, female students constituted 59.4% of the group, while male students constituted 40.6%. In terms of gender, female students constituted 52.9%, and male students constituted 47.1% of the control group. In terms of the gender distribution of the experimental and control groups, students female students account for 62.1 % of the enrollment, while male students account for 37.9 %.

Determination of Equivalence of Study Groups

To determine the equivalence of the groups before the experimental procedure, the "Honesty Value Acquisition Scale," "Respect Value Acquisition Scale," "Love Value Acquisition Scale," and "Helpfulness Achievement Scale" were applied as pretests. The pretest results were examined to determine which test to use to evaluate group equivalence to see if they showed a normal distribution. Examination of the values ascertained that the pretest data for the experimental and control groups were statistically within the normal distribution limits. Based on this finding, the "independent sample t-test," a type of parametric test, was employed to determine the experimental and control groups' equivalence before the experiment—table 1, Table 2, Table 3, and Table 4 display the independent sample t-test.

Table 1. *Pre-Test Descriptive Statistics Scores of Experimental and Control Group Students' on the* Honesty Value Acquisition *Scale*

	N	$\bar{X}$	sd	se	sd	t	p
Experimental	32	1.50	.31	.05	64	-1.02	.310
Control	34	1.59	.39	.07			

p>.05

Table 2. *Pre-Test Descriptive Statistics Scores of Experimental and Control Group Students' on the* Love Value Acquisition *Scale*

	N	$\bar{X}$	sd	se	sd	t	p
Experimental	32	1.67	.32	.06	64	-.634	.528
Control	34	1.73	.43	.07			

p>.05

Table 3. Pretest Descriptive Statistics Scores of Experimental and Control Group Students' on the Respect Value Acquisition Scale

	N	X̄	sd	Se	sd	t	p
Experimental	32	1.67	.32	.06	64	-.179	.859
Control	34	1.69	.20	.04			

p>.05

Table 4 *Pre-Test Descriptive Statistics Scores of Experimental and Control Group Students' on the* Helpfulness *Value Acquisition Scale*

	N	X̄	sd	Se	sd	t	p
Experimental	32	1.62	.37	.06	64	-.920	.361
Control	34	1.72	.50	.08			

p>.05

Examination of Table 1, Table 2, Table 3, and Table 4 shows that the independent sample t-test used to determine the equivalence of the research groups' honesty value acquisition scores, love achievement scores, respect achievement scores, and helpfulness achievement scores showed that there is no significant difference between the research groups' honesty value acquisition scale pretest mean scores (t_{64}=-1.02; p>.05), love value acquisition scale pretest mean scores (t_{64}=-.634; p>.05), respect value acquisition scale pretest mean scores (t_{64}=-.179; p>.05) and the helpfulness value acquisition scale pretest mean scores (t_{64}=-.920; p>.05). According to this finding, the study groups were comparable in terms of honesty, love, respect, and helpfulness value acquisition scores; in other words, the research groups were equivalent before the experimental process.

Data Collection Tools and Process

As the data collection tools of the research, the "Honesty Value achievement Scale," "Love achievement Scale," "Respect achievement Scale," and "Helpfulness achievement Scale" was applied to the students in the sample. The data collection tools used in the research were from Sarmusak (2011). For all scales, the scoring of the items follows the 3-point Likert type scale as: "always" (3), "occasionally" (2), and "never" (1). In negative statements, the scoring followed the opposite direction. Comments are organized and

translated into a measurement throughout the construction of the Scale. The data collection tools and their features used in the study are below.

Honesty Value Acquisition Scale

The Scale is one-dimensional and consists of 9 items—the load values of the items in the scale range between .328 and .689. The Cronbach alpha internal consistency coefficient was calculated using item analysis to verify the reliability of the researchers' scale scores. The reliability level of the Scale is .880. In this study, the reliability level of the Scale was .869.

Love Value Acquisition Scale

The Scale is one-dimensional and consists of 14 items—the Load values of the items in the scale range between .325 and .715. The Cronbach alpha internal consistency coefficient was calculated using item analysis to verify the reliability of the researchers' scale scores. The reliability level of the Scale is .773. In this study, the reliability level of the Scale was .826.

Respect Value Acquisition Scale

The Scale is one-dimensional and consists of 11 items—the load values of the items in the scale range between .412 and .679. The Cronbach alpha internal consistency coefficient was calculated using item analysis to verify the reliability of the researchers' scale scores. The reliability level of the Scale is .732. In this study, the reliability level of the Scale was .772.

Helpfulness Value Acquisition Scale

The Scale is one-dimensional and consists of 12 items—the load values of the items in the scale range between .388 and .644. The Cronbach alpha internal consistency coefficient was calculated using item analysis to verify the reliability of the researchers' scale scores. The reliability level of the Scale is .834. In this study, the reliability level of the Scale was .851.

Application Process of the Research

This research was conducted in three stages: preliminary preparations before application, integration of disciplines, lesson plan preparation, and actual application.

Preparations before application

Before implementation, the researchers studied the literature on integrated curriculum methods and an integrated lesson plan (Fogarty, 1991; Loepp, 1999; Drake & Burns, 2004). And the shared model, one of the multidisciplinary models included in

Fogarty's (1991) interdisciplinary approach model, was used in this study. In the study, the shared model assisted in making the integrated mathematics and life sciences lesson functional. The literature review contains the class plans to be prepared and the activities included in the plans (Beane, 1991; Drake & Burns, 2004; Işık Tertemiz, 2004; Yıldırım, 1996). Additionally, a thorough examination of primary school 3rd-grade mathematics and life sciences lesson curricula consulted field experts and primary school 3rd-grade teachers. The most appropriate content and accomplishments came from expert opinions. Then the achievements were associated with an 8-week-long application curriculum, taking the time allocated to achievements and content into account. Finally, the experimental group, which received integrated mathematics and life sciences teaching, and the control group, which received instruction using the Ministry of National Education-approved course and workbook, were randomly selected from two third-grade primary school classes.

Integration of disciplines and preparation of lesson plan

The curriculum utilized the following steps: choosing a format, defining a title or topic, brainstorming using the concept wheel, generating key questions, integrating key questions with skills and assessments, organizing daily activities, and conducting final evaluations. Before designing the curriculum using an interdisciplinary approach, teacher interviews assessed the research group's students' levels, characteristics, and needs. Subsequently, tolerance was chosen as the theme name because it symbolized the shared integration model and brought the qualities of honesty, respect, love, and helpfulness together under a single framework. Mathematics and life science achievements were analyzed after conducting the required preliminary examinations and ensuring compliance with applicable environmental standards. While making these analyses, the researcher and two field expert academics determined the achievements integrated with a joint decision. Another stage was reaching a consensus with the application classes' teachers by discussing the selected achievements to be incorporated. Then, question design encouraged students to learn natural connections across disciplines. Thus, it is easier for students to understand the administrative center of the unit. During a subsequent stage, evaluation activities established natural links across disciplines and associated these links with the achieved results. The lesson plans developed with this stage began with an introduction (attracting attention, initiating prior knowledge, motivating, informing about the target) for the achievements. They included (the course duration, the theme, achievement definitions, the method, technique, and strategy). And then, it was meticulously designed, with sections for development (activities, interim summaries, interim transitions, and sections for the conclusion (final summary, re-motivation, closing, evaluation).

Additionally, activities that included value teaching according to the associated achievements were designed and distributed in conjunction with the 8-week curriculum, considering the teaching periods specified and expert opinions. At the same time, eight-week lesson plans ran concurrently with eight weeks of practice, which were within the framework of the designed theme. Each project consists of one week of integrated mathematics (5 lesson hours) and life sciences (3 lesson hours). A total of 64 lesson hours resulted from 8 lessons planned at 8 hours each. Curriculum implementation was in the

pilot within the framework of a one-week project. The results were favorable in terms of time management, the appropriateness of the activities for the students' levels, and the evaluation of students' attitudes about the lesson itself.

Actual application

This study was planned as 8-week quantitative research for 3rd graders in primary school. During the foremost application step of the study, the "Honesty Value Acquisition Scale," "Love Value Acquisition Scale," "Respect Value Acquisition Scale," and "Helpfulness Value Acquisition Scale" was applied in the experimental and control groups for pretest applications. As the application process took place, the researcher carried mathematics and life sciences lessons in the experimental and control groups. The researcher integrated mathematics and life sciences lesson activities prepared in the experimental group in this context. In contrast, the teacher's guidebooks and student books were the control group to teach the lessons. At the end of the eight-week application, the "Honesty Value Acquisition Scale," "Love Value Acquisition Scale," "Respect Value Acquisition Scale," and "Helpfulness Achievement Scale" was re-applied to the experimental and control groups as a post-test. The SPSS-26 program analyzed collected data; the results are under the heading.

Data analysis

The experimental and control groups' pretest and post-test scores identify a statistically significant difference between the dependent and independent variables in the study and normal distribution using various criteria. In this context, since the group size of each of the independent variables is above thirty (30), Shapiro-Wilk values, Skewness-Kurtosis values, coefficients of variation, histogram graphics, Detrended Normal Q.Q. Plot graphics, Normal Q.Q. Plot graphics and Boxplot graphics helped understand whether the data show a normal distribution in the analysis. In conclusion, the Dependent Sample t-Test and Independent Sample t-Test found normal distribution.

Ethical considerations

In this study, all rules fall within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive." None f the actions displayed under the title "Actions Against Scientific Research and Publication Ethics," the second part of the directive, were taken.

Ethical review board name: Kırşehir Ahi Evran University Social and Human Sciences Scientific Research and Publication Ethics Committee

Date of ethics review decision: 16.09.2021

Ethics assessment document issue number: 2021/6/11

RESULTS

Presentation of findings occurs under the following sub-headings, which correspond to the information gathered regarding the root values (honesty, respect, love, and helpfulness) discussed in the research.

Comparison of Experimental and Control Group Students' Post-Test Mean Scores on the "Honesty Value Acquisition Scale"

The sub-problem of the research is as follows: *Is there a significant difference between the post-test mean scores of the "Honesty Value Acquisition Scale" belonging to the students in the experimental group and the control group?".*

The normal distribution of the data found there was a statistically significant difference between the mean scores on the " Honesty Value Acquisition Scale" post-test of students in the experimental group and the control. The data showed normal distribution, and the "independent sample t-test" was used.

Table 5. *Independent Sample t-Test Results of Experimental and Control Group Students' Post-Test Scores of Honesty Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Experimental	32	2.78	.11	.02	64	-1.365	.177
Control	34	2.83	.17	.03			

p>.05

After conducting an "independent sample t-test," it was discovered that there is no statistically significant difference between the post-test mean scores of the Honesty Value Acquisition Scale obtained by students in the experimental group that received integrated mathematics and life sciences instruction in the third grade of primary school and the control group that received instruction based on the course and workbook approved by the Ministry of National Education (t_{64}=-1.365; p>.05).

Comparison of Experimental Group Students' Pretest and Post-Test Mean Scores on "Honesty Value Acquisition Scale"

The sub-problem of the research is as follows: *"Is there a significant difference between pre-and post-test mean scores on the "Honesty Value Acquisition Scale" for students in the integrated mathematics and life sciences of third-grade primary school?*

Normal distribution of the data examined whether there is a significant difference between the pretest and post-test mean scores of the experimental group's primary school third-grade students in integrated mathematics and life sciences on the "Honesty Value achievement Scale." The data showed a normal distribution, and the "dependent sample" t-test" was applied. Table 6 lists the dependent sample t-test results.

Table 6. *Dependent Sample t-Test Results of the Experimental Group Students on the Pretest and Post-Test of Honesty Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Pretest	32	1.50	0.31	0.05	32	-19.698	.000
Posttest	32	2.78	0.11	0.02			

p<.05

Table 6 analysis results showed a significant difference between the pretest and post-test mean scores of the Honesty Value Acquisition Scale belonging to the 32 primary school 3-grade students in the experimental group. Integrated mathematics and life sciences teaching were (t_{32}=-19.698; p<0.05). Since the post-test arithmetic mean (2.78) of the Honesty Value achievement Scale of the experimental group students is higher than the pretest arithmetic mean (1.50) of the Honesty Value Acquisition Scale, the significant difference is in favor of the post-test.

Comparison of Control Group Students' Pre-Test Post-Test Mean Scores on "Honesty Value Acquisition Scale"

The sub-problem of the research is as follows: "*Is there a significant difference between the pretest and post-test mean scores of the control group students on the "Honesty Value achievement Scale"?*

The normal distribution of the data examined whether there is a significant difference between the "Honesty Value Acquisition Scale" pretest and post-test mean scores of the control group's primary school third-grade students in integrated mathematics and life sciences. The data showed a normal distribution, and the "dependent sample" t-test" was applied. Dependent sample t-test results are in Table 7.

Table 7. *Dependent Sample t-Test Results of the Control Group Students on Pre-Test and Post-Test of Honesty Value achievement Scale*

	N	X̄	sd	se	sd	t	p
Pretest	34	1.59	0.39	0.67	33	-17.035	.000
Posttest	34	2.83	0.17	0.29			

p<.05

The pretest and post-test mean scores of the Honesty Value Acquisition Scale for the 34 students in the control group (t33=-17.035; p0.05), demonstrate a significant difference (t33=-17.035; p0.05). Since the post-test arithmetic mean (2.83) of the Honesty Value

Acquisition Scale belonging to the experimental group students is higher than the pretest arithmetic mean (1.59), the significant difference favors the post-test. This result proves that mathematics and life sciences teaching implemented in the third grade with the conventional approach significantly impact the students' achievement of honesty value.

Comparison of "Love Value Acquisition Scale" Post-Test Mean Scores of Experimental and Control Group Students

The research's sub-problem is: "Is there a significant difference between the post-test mean scores of the "Love Achievement Scale" of students in the experimental group and the control?"

To determine whether there is a statistically significant difference between the mean scores on the "Love Value Acquisition Scale" post-test of the students in the experimental group and the control group, the normal distribution of the data was checked. It was determined that the data showed normal distribution, and the "independent sample t-test" was used—table 8. List the independent sample t-test results.

Table 8. *Independent Sample t-Test Results of Experimental and Control Group Students' Post-Test Scores of Love Value achievement Scale*

	N	$\bar{X}$	sd	se	sd	t	p
Experimental	32	2.95	.28	.05	66	5.053	.000
Control	34	2.64	.22	.04			

P<.05

After conducting an "independent sample t-test," it was discovered that there is a statistically significant difference between the post-test mean scores of the Love Value Acquisition Scale obtained by students in the experimental group and the control group (t_{66}=5.053; p<.05). Because the Love Value achievement Scale (2.95) arithmetic means for the experimental group students was higher than the arithmetic means of the Love Value achievement Scale (2.64) for the control group students, the statistically significant difference was in favor of the experimental group students. Using this difference as evidence, we may conclude that integrated mathematics and life sciences activities implemented in the third grade of primary school significantly impact students' achievement of love value.

Comparison of Experimental Group Students' Pre-Test & Post-Test Mean Scores on the "Love Value Acquisition Scale"

The sub-problem of the research is as follows: *"Is there a significant difference between the pretest and post-test mean scores* of the "*experimental group students"* on the Love Value Acquisition Scale?"

To determine whether there is a statistically significant difference between the mean scores on the "Love Value Acquisition Scale" pretest and post-test of the students in the experimental group, the normal distribution of the data was checked. It was determined that the data showed normal distribution, and the "dependent sample t-test" was used. — table 9 lists dependent sample t-test results.

Table 9. *Dependent Sample t-Test Results of the Experimental Group Students on the Pretest and Post-Test of Love Value achievement Scale*

	N	X̄	sd	se	sd	t	p
Pretest	32	1.67	0.32	0.57	31	-18.062	.000
Posttest	32	2.95	0.28	0.50			

p<.05

Table 9 analysis results showed a significant difference between the pretest and post-test mean scores of the Love Value Acquisition Scale belonging to the 32 primary school 3-grade students in the experimental group was carried out (t_{31}=-18.062; p<0.05). Since the post-test arithmetic mean (2.95) of the Love Value Acquisition Scale belonging to the experimental group students is higher than the pretest arithmetic mean (1.67) of the Love Value Acquisition Scale, the significant difference is in favor of the post-test. This difference can highlight that integrated mathematics and life sciences activities implemented in the third grade of primary school significantly impact students' achievement of love value.

Comparison of Control Group Students' Pre-Test & Post-Test Mean Scores on the "Love Value Acquisition Scale"

The sub-problem of the research is as follows: *"Is there a significant difference between the pretest and post-test mean scores of the control group students on the Love Value Acquisition Scale?*

To test whether there is a significant difference between the "Love Value Acquisition Scale" pretest and post-test mean scores of the control group's primary school third-grade students who were taught integrated mathematics and life sciences; first of all, the normal distribution of the data was examined, and it was determined that the data showed a normal

distribution, and the "dependent sample" t-test" was applied. Table 10 lists the dependent sample t-test results.

Table 10. *Dependent Sample t-Test Results of the Control Group Students on the Pretest and Post-Test of Love Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Pretest	34	1.73	0.43	0.73	33	-10.883	.000
Posttest	34	2.64	0.22	0.37			

p<.05

When the analysis results are examined, Table 10 shows that there is a significant difference between the pretest and post-test mean scores of the Love Value Acquisition Scale belonging to the 34 students in the control group (t_{31}=-10.883; p<0.05). Since the post-test arithmetic mean (2.64) of the Love Value Acquisition Scale belonging to the experimental group students is higher than the pretest arithmetic mean (1.73) of the Love Value Acquisition Scale, the significant difference is in favor of the post-test. The difference shows that traditional teaching per the constructivist approach applied in the third grade of primary school substantially affects students' love value achievements.

Comparison of Experimental and Control Group Students' Post-Test Mean Scores on the "Respect Value Acquisition Scale"

The sub-problem of the research is as follows: *"Is there a significant difference between the post-test mean scores of the "Respect Value Acquisition Scale" belonging to the students in the experimental group and the control group?"*.

To determine whether there is a statistically significant difference between the mean scores on the "Respect Value Acquisition Scale" post-test of the students in the experimental group and the control group, the normal distribution of the data was checked. It was determined that the data showed normal distribution, and the "independent sample t-test" was used. Independent sample t-test results are given in Table 11.

Table 11. *Independent Sample t-Test Results of Experimental and Control Group Students' Post-test Scores of Respect Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Experimental	32	2.23	.17	.03	64	2.939	.005
Control	34	2.10	.18	.03			

p<.05

After conducting an "independent sample t-test," it was discovered that there is a statistically significant difference between the post-test mean scores of the Respect Value Acquisition Scale belonging to the students in an experimental group and the control group (t_{64}=2.939; p<.05). Since the arithmetic means of the Respect Value Acquisition Scale (2.23) for the experimental group, students were higher than the arithmetic means of the Respect Value Acquisition Scale (2.10) for the control group students; the statistically significant difference was in favor of the experimental group students. This difference shows that integrated mathematics and life sciences activities implemented in the third grade of primary school significantly impact students' achievement of respect value.

Comparison of Experimental Group Students' Pre-Test Post-Test Mean Scores on "Respect Value Acquisition Scale"

The sub-problem of the research is as follows: "*Is there a significant difference between the pretest and post-test mean scores of the experimental group students on the "Respect Value Acquisition Scale"?*

To test whether there is a significant difference between the "Respect Value Acquisition Scale" pretest and post-test mean scores of the experimental group's primary school third-grade students who were taught integrated mathematics and life sciences; first of all, the normal distribution of the data was examined, and it was determined that the data showed a normal distribution and then, the "dependent sample" t-test" was applied. Table 12 lists the dependent sample t-test results.

Table 12. *Dependent Sample t-Test Results of the Experimental Group Students on the Pretest and Post-Test of Respect Value Acquisition Scale*

	N	$\bar{X}$	sd	se	sd	t	p
Pretest	32	1.67	0.32	0.57	31	-8.129	.000
Posttest	32	2.23	0.17	0.30			

p<.05

Table 12 analysis results showed a significant difference between the pretest and post-test mean scores of the Respect Value Acquisition Scale belonging to the 32 primary school 3-grade students in the experimental group. Integrated mathematics and life sciences teaching was carried out (t_{32}=-8.129; p<0.05). Since the post-test arithmetic mean (2.23) of the Respect Value Acquisition Scale belonging to the experimental group is higher than the pretest arithmetic mean $\bar{}$(1.67), the significant difference favors the post-test. This difference shows that integrated mathematics and life sciences activities implemented in the third grade of primary school substantially impact students' achievement of respect value.

Comparison of Control Group Students' Pre-Test & Post-Test Mean Scores on "Respect Value Acquisition Scale"

The sub-problem of the research is as follows: "*Is there a significant difference between the pretest and post-test mean scores of the control group students on the "Respect Value Acquisition Scale"?*

To test whether there is a significant difference between the pretest and post-test mean scores on the "Respect Value Acquisition Scale"' belonging to the control group students; first of all, the normal distribution of the data was examined, and it was determined that the data showed a normal distribution and then, the "dependent sample" t-test" was applied. Dependent sample t-test results are given in Table 13.

Table 13. *Dependent Sample t-Test Results of the Control Group Students on Pre-Test and Post-Test of Respect Value achievement Scale*

	N	X̄	sd	se	sd	t	p
Pretest	34	1.69	0.20	0.03	33	-8.812	.000
Posttest	34	2.08	0.17	0.03			

p<.05

Table 13 shows that there is a significant difference between the pretest and post-test mean scores of the Respect Value Acquisition Scale belonging to the 34 students in the control group, whose lessons are taught according to the course and workbook approved by the Ministry of National Education (t_{33}=-8.812; p<0.05). Since the post-test arithmetic mean (2.08) of the Respect Value Acquisition Scale belonging to the control group students is higher than the pretest arithmetic mean (1.69) of the Respect Value Acquisition Scale, the significant difference is in favor of the post-test. This difference shows that teaching mathematics and life sciences with a traditional approach substantially increases students' Respect Value Achievements.

Comparison of Experimental and Control Group Students' Post-Test Mean Scores on the "Helpfulness Value Acquisition Scale"

The sub-problem of the research is as follows: *Is there a significant difference between the post-test mean scores of the "Helpfulness Value Acquisition Scale" belonging to the students in the experimental group and the control group?".*

To determine whether there is a statistically significant difference between the post-test mean scores on the "*Helpfulness Value Acquisition Scale*" belonging to the students in the experimental group and the control group, the normal distribution of the data was checked.

Then, it was determined that the data showed normal distribution, and the "independent sample t-test" was applied. Table 14 lists the independent sample t-test results.

Table 14. *Independent Sample t-Test Results of Experimental and Control Group Students' Post-Test Scores of Helpfulness Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Experimental	32	2.59	.34	.06	64	10.459	.000
Control	34	1.92	.15	.03			

P<.05

After conducting an "independent sample t-test," it was discovered that there is a statistically significant difference between the post-test mean scores of the Helpfulness Value Acquisition Scale belonging to the students in the experimental group that received integrated mathematics and life sciences instruction in the third grade of primary school and the control group that received instruction based on the course and workbook approved by the Ministry of National Education (t_{64}=10.459; p<.05). The Helpfulness Value Acquisition Scale (2.59) for the experimental group students was higher than the arithmetic mean of the Helpfulness Value Acquisition Scale (1.92) for the control group students. The statistically significant difference was in favor of the experimental group students. This difference indicates that integrated mathematics and life sciences activities implemented in the third grade of primary school significantly impact students' achievements of helpfulness value.

Comparison of Experimental Group Students' Pre-Test & Post-Test Mean Scores on the "Helpfulness Value Acquisition Scale"

The sub-problem of the research is as follows: "*Is there a significant difference between the pretest and post-test mean scores of the experimental group students on the "Helpfulness Value Acquisition Scale"?*

To test whether there is a significant difference between the pretest and post-test mean scores on the "Helpfulness Value Acquisition Scale" belonging to the experimental group's primary school third-grade students who were taught integrated mathematics and life sciences; first of all, the normal distribution of the data was examined, and it was determined that the data showed a normal distribution, and the "dependent sample" t-test" was applied. Table 15 lists the dependent sample t-test results.

Table 15. *Dependent Sample t-Test Results of the Experimental Group Students on Pre-Test and Post-Test of Helpfulness Value Acquisition Scale*

	N	X̄	sd	se	sd	t	p
Pretest	32	1.62	0.37	0.66	31	-8.398	.000
Posttest	32	2.59	0.34	0.60			

p<.05

Table 15 analysis results showed a significant difference between the pretest and post-test mean scores of the Helpfulness Value Acquisition Scale belonging to the 32 primary school 3-grade students in the experimental group. Integrated mathematics and life sciences teaching were (t_{31}=-8.398; p<0.05). Since the post-test arithmetic mean (2.59) of the Helpfulness Value Acquisition Scale belonging to the experimental group students is higher than the pretest arithmetic mean (1.62) of the Helpfulness Value Acquisition Scale, the significant difference is in favor of the post-test. This difference can highlight that integrated mathematics and life sciences activities implemented in the third grade of primary school significantly impact students' achievement of helpfulness value.

Comparison of Control Group Students' Pre-Test & Post-Test Mean Scores on the "Helpfulness Value Acquisition Scale"

The sub-problem of the research is as follows: "*Is there a significant difference between the pretest and post-test mean scores of the control group* students *on the "Helpfulness Value Acquisition Scale"?*

To test whether there is a significant difference between the pretest and post-test mean scores on the "Helpfulness Value Acquisition Scale" belonging to the control group,; first of all, examined the normal distribution of the data, which identified a normal distribution and then, the "dependent sample" t-test" was applied. Table 16 lists the dependent sample t-test results.

Table 16. *Dependent Sample t-Test Results of the Control Group Students on Pre-Test and Post-Test of Helpfulness Value achievement Scale*

	N	X̄	sd	se	sd	t	p
Pretest	34	1.72	0.50	0.86	33	-2.012	.052
Posttest	34	1.92	0.15	0.26			

p>.05

According to the results of the "independent sample t-test," it is seen that there is no significant difference between the pretest and post-test mean scores of the control group

students who were taught according to the course and workbook approved by the Ministry of National Education on the Helpfulness Value Acquisition Scale (t33=-2.012; p>.05). The mathematics and life sciences lessons taught according to the course and workbook approved by the Ministry of National Education do not significantly affect the Helpfulness Value Achievements of the control group students during the implementation.

DISCUSSION and CONCLUSION

There was a significant difference in favor of the experimental group between the primary school third-grade students in the experimental group compared to the control group students. This result shows that integrated mathematics and life sciences teaching is significantly more effective than the current practice in increasing students' respect, love, and helpfulness values. In addition, students in the experimental group favored the post-test between the pretest-post-test scores of the honesty, respect, love, and helpfulness values belonging to the students in the experiment. In this context, integrated mathematics and life sciences teaching increase the students' achievement levels of being honest, respectful, love and helpful at a positive level. Indeed, Aslan (2017) and Aladağ (2009) found that integrated education enhances students' value tendency levels in their studies. Generally, the research results are similar to the studies in the literature.

With an integrated teaching method, it is critical to approach processes in a more structured and planned manner while still taking into account the necessities of social life and the society's expectations from individuals (Weidenfeld, 2002; Coşkun & Yıldırım, 2009). The relationship between behavior and value can be evaluated in various ways, depending on the methodologies used by multiple disciplines (Keskin, 2014). As a result of this understanding, the integrated teaching approach enables students to synthesis numerous fields with distinct aspects, expanding their perspectives and increasing their achievement of honesty, respect, love, and helpfulness values. In this way, this study demonstrates that integrating life sciences and mathematics courses around tolerance matches expectations for enhancing the honesty, respect, love, and helpfulness values stated in the literature.

On the other hand, the effectiveness of the applied integrated curriculum is the significant difference in favor of post-tests between the pretest and post-test scores on the honesty, respect, and love value scales belonging to the experimental group in which mathematics course integrated with the life sciences course, and the control group (independently taught studies) according to the class and workbook approved by the Ministry of National Education. The experimental group and the control group according to the course and workbook approved by the Ministry of National Education, the student's achievement levels of honesty, respect, and love values increased significantly.

This study determined no significant difference in the level of honesty value acquisition between the experimental group and the control group. In addition, students in the control group did not increase the value of helpfulness during the application period of

the research. As a result, the cause for this is linked to the duration of the application because the acquisition of affective acquisitions may take a long time. Sam and Ernest (1997) classified values as epistemological, social and cultural, and personal. They described the importance of justice, helpfulness, and honesty, which they categorized as social and cultural values, as values that disclose individuals' responsibilities to society. In this sense, the reason for the difference between the post-test mean scores of the experimental group and the control group and the lack of significant difference between the pretest and post-test mean scores of the control group students can explain the fact that, while subjects were integrated into the experimental group using the integrated curriculum, the values were transferred to students more effectively through activities centered on the tolerance value chosen as a theme appropriate for the research. On the other hand, in the control group, we can deduce that the honesty value did not find a good place in the curriculum.

Another point of view is that effective learning takes longer than cognitive and psychomotor learning. Farrer (2000) and Ernest (1989) highlight that subject taught and the learning methods selected follow the values for students to acquire adequate understanding. Moreover, according to Hawkes (2007), it is feasible for students to learn values by developing relationships with the natural and problematic situations that arise from their participation in social life. Considering this condition, it is possible to explain why there was no statistically significant change between the pretest and post-test mean scores of control group students on the helpfulness value acquisition scale.

The applied mathematics and life sciences curricula have been created with a constructivist approach. However, the curricula' values were given as root values and were not associated with the achievements. Even though it has received a great deal of criticism in this regard, several studies have demonstrated that lessons delivered in line with the nature of constructivist understanding lead to an increase in the value tendency levels of students (Köstekçi, Kurupınar, & Kıral, 2016; Demir, 2018). As a result, the increased value tendency levels favoring the post-test t in the research's control group supports the literature. The effectiveness of the integrated curriculum applied in this study explains the significant difference between the achievement levels of respect, love, and helpfulness values of the experimental group students and those levels of the control group students.

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Author(s)' statements on ethics and conflict of interest

Ethics statement: We now declare that research/publication ethics and citing principles have been considered in all the stages of the study. We take full responsibility for the paper's content in case of a dispute.

Statement of interest: We have no conflict of interest to declare.

Funding: None

Acknowledgments: None