The effect of a problem-based learning model on high school students' human values

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ABSTRACT

Different methods are needed in the field of vocational education to ensure that students associate the knowledge they have learned with real-life situations. Considering that problem-based learning (PBL) techniques also have important effects in the context of human values, this study aimed to investigate the effects of PBL models on high school students' human values. A mixed-method approach and expansive sequential pattern were used. Quantitative data were obtained through a quasi-experimental method that employed the Human Values Scale as a measurement tool, applied to 32 vocational and technical high school students in Turkey. In the qualitative dimension, focus group interviews were conducted with six student participants. Non-parametric statistical techniques and content analysis were performed, and results showed that there was a strong relationship between the PBL model and students' human values; human values were positively affected and increased in all but one of the scale items. It was concluded that PBL can result in high-level learning outcomes and has a positive effect on learning and human values in general.

Keywords: Problem-based learning, values, vocational and technical education.

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INTRODUCTION

Almost all schools teach curriculum content using traditional methods. In the teaching process, information is transferred from teachers to students through methods such as direct instructions, questions, and answers; the student knows what the content to be learned is but does not yet have a precise idea of what that information actually is and how to use it. At all levels of education, including vocational education, methods are needed to enable students to connect the information they learn with real-life situations (Chua et al., 2016; Chien, 2020; García-Merino et al., 2020). The same is true for a new programme within the justice field of vocational and technical education in Turkey. Currently, the transfer of the subjects and modules of law and justice courses is carried out through group or individual seminars, presentations, lectures, and question-and-answer sessions that define the general principles of law and are mainly based on the transfer of written law and legislation.

Problem-based learning (PBL) is an educational model characterized by student-centered learning and classroom discussion in groups to learn about a topic using clinical-based problems (Kong, 2014). American education scientist and philosopher Dewey laid the philosophical and pedagogical foundations of PBL (Collette and Chiappetta, 1989). At the end of the nineteenth century and in the early twentieth century, Dewey (1995) stated that the school should be life itself, criticising the US's education system and the classical education approach. He believed that learning by doing, living, and experiencing real-life problems has an effect on thinking skills. PBL itself was first developed by Barrows (1980) to encourage learning by ensuring that students saw their roles and practice in the context of medical education (Beaumont et al., 2014; Torre et.al., 2016). PBL provides a student-centred learning

environment that encourages curiosity (Schmidt et al., 1987) and was later adopted by different undergraduate programmes and school levels and expanded to the fields of health sciences, mathematics, law, education, economics, business, social sciences, and engineering (Duch, 2001; Armstrong, 2008; Liu et al. 2010).

In PBL-based lessons, dialogue based on the question-and-answer technique — which dates back to Socrates — is frequently used by the teacher. Freire (1985) defined the technique of dialogue as an active process for cognition that mediates between people and objects and recreates them, by accessing previous information, linking old and new concepts, and using the elaboration of relationships to improve theoretical fiction. In the PBL process, students structure their own information, and according to Schmidt et al. (2011) argue that the model is closely related to the constructivist approach. PBL is considered constructive as its main goal is to facilitate teaching, while also emphasising cooperative and self-directed learning. According to a report from the OECD International Student Assessment Program 2003 study, the steps to be taken in the process of problem-solving can be divided into the following categories. These are the stages of determining the problem in context and determining the limitations. Then solving the problem and controlling the solution by presenting possible options or solutions is to share the results at the last stage (OECD, 2003).

Problem-solving is one of the most important skills that an individual should possess. Unlike the direct presentation of facts and concepts, PBL uses complex real-world problems to encourage students to learn concepts and principles. In addition to the course content, PBL supports the development of skills like, critical thinking, problem-solving, and communication, as well as providing opportunities for working in groups, finding and evaluating research materials, and lifelong learning (Duch, 2001). Problems should motivate students to understand concepts more deeply and require students to make reasoned decisions and defenses. It should also include content goals that link to previous learning and knowledge. In group projects, the problem needs a level of complexity that allows students to work together to solve it, while in multi-stage projects the first steps of the problem should be open-ended and interesting enough to engage students (Duch, 2001). Discussing and analysing a problem in PBL is used to initiate the learning process rather than the endpoint. According to Nilson (2010), a well-designed PBL scenario provides students with the opportunity to develop necessary skills through learning outcomes. These skills consist of fulfilling leadership roles by working in teams and managing projects. To improve the capacity for independent tasks by increasing self-awareness, and also to develop interdisciplinary working skills by improving critical thinking skills.

There is a close relationship between problem-solving

and values, which is one of today's most discussed topics. The problem of values actually appears as an issue of *evaluation* in philosophy because asking questions such as, 'What is good?', 'What is nice?', 'What is useful?', and 'What is right?' renders the evaluation activity a problem in certain respects. If the activity aims to raise questions about the aspects of interpersonal relations, such as respect, honesty, justice and equality, or to investigate the characteristics of human achievements in art, science and morale, it becomes a problem of different kinds of values (Kuçuradi, 2013: 5). Although there have been many scientific and philosophical discussions on the concept of value, a common definition has not yet been developed of exactly what values comprise. Many theorists have tried to explain values by associating them with various concepts, and the fact that the concept of value has entered many different disciplines makes its definition difficult (Dilmaç, 2007: 2). Some of these definitions include:

According to some researchers, value is the belief about whether something is desired or not (Güngör, 2001: 27; Bolay, 2007: 60). According to some researchers, it is not expressed as what something is, but as the domination of feelings and judgments about what a solution or group finds in the existing desire, value, search and conquer (Grünberg, 2011: 92). Generally accepted, it is defined as everything that we consider valuable, valuable and superior, and what we consider important (Yaran, 2010: 309).

Value is an enduring belief that a particular mode of behavior or ultimate mode of existence is preferred to a personal social or oppositional mode of behavior or ultimate form of existence (Rokeach, 1975: 5). Values cannot be treated as beliefs based on 'simple propositions'. It is based on the principle of 'preferable' to make any choice (good or bad choice) from one of his behavior (Kilby, 1993: 31). Values are the criteria people use to guide their behavior and for people and their events, including themselves; High-level concepts expressing ideals and behaviors and lifestyles are dealt with in a variety of genres, such as general principles that transcend specific concrete conditions or help individuals make correct decisions. They play a decisive role in attitude, ideology, behavior and decisions. Values are priorities that link individuals and society to specific beliefs, experiences and goals when deciding how to live and what to value (Hökelekli and Gündüz, 2007: 374). Education is the process of changing human behaviour in a desired way, based on a certain purpose, and individuals who are active in this process display many actions and behaviours. Human values are a set of principles that want to answer questions such as 'What should I do?' and 'How should I do it?' The relationship between education and human values exists in this sense: from this viewpoint, education, as the famous

philosopher Socrates expressed, can be defined as a 'self-knowledge process' throughout life.

Ensuring that the content of an education programme is suitable for the benefit of society and students constitutes an important aspect of value discussions. Consequently, evaluation and orientation processes in all areas of education should be carried out within the framework of human values. For example, students can test their problem-solving skills in real-life situations in the field of law and justice and perform an assessment based on the values to which they attach importance. PBL activities are also effective in the development of students' human values; in effect, the PBL model not only conveys the achievements in the curriculum framework to students but also includes learning and analysis in a moral, axiological, and social sense.

The present study was carried out considering that PBL techniques also have important effects in the context of human values. Using a real-life-inspired learning scenario involving a discussion of legal issues related to PBL justice professions, it intended to trigger awareness of the functioning of the law. Ultimately, diversifying our teaching and learning activities will enable teachers to use different teaching models and strategies in their lessons, increasing both the effectiveness of teaching and learning and the qualities we desire the students to have. Considering the learning and teaching processes, such as taking responsibility, helping, collaborating, taking initiative, and performing teaching tasks, it is thought that there is a close relationship between PBL and human values. The study aims to "investigate the effects of the PBL model on the human values of 11th-grade students in a high school justice department" in Turkey. For this purpose, the following questions were answered:

1. Is there a significant difference between the pre-test and post-test mean scores of the experimental group?
2. Is there a significant difference between the pretest and posttest mean scores of the control group?
3. Is there a significant difference between the post-test scores of the experimental and control groups?
4. What are the opinions of the students who participated in the study in the groups in which the problem-based learning model was applied in the "judicial correspondence" course?

METHODS

In this study, mixed-methods were used to determine the effect of problem-based learning on students' values. Mixed-methods involve the simultaneous or sequential collection and analysis of both quantitative and qualitative data in a single study (Creswell et al., 2003). The present research took a mixed-method approach since both qualitative and quantitative research can compensate for weaknesses (Creswell and Clark, 2014). The study was carried out according to the embedded design, one of the mixed-method designs. In the embedded design, the collected qualitative data becomes a secondary data source by being embedded in the data obtained from the experimental study. Accordingly, qualitative data containing the personal experiences of the participants were included in the experimental study (Creswell and Creswell, 2018: 310).

The first stage of the study was conducted using an experimental method with a pre-test and post-test control group design (Cohen et al., 2007: 276). The aim was to determine the effect of Problem-Based Learning as an independent variable on the dependent variables. In the second stage, interviews were conducted to help explain the answers given in the quantitative dimension, that is, to use qualitative data to explain the quantitative findings in more detail (Mazlum and Mazlum, 2017). In studies using mixed methods, the reason for choosing the pattern should be explained (Creswell and Clark, 2014). Quantitative data were obtained using a pre-test-post-test experimental method with two randomly formed groups, an experimental and a control group. For the qualitative data, a semi-structured, focus group interview was conducted with the student participants. The data obtained from the interview were analysed using descriptive analysis.

The credibility, transferability, and confirmability of the main functions that provide the reliability and validity of the study were secured using various tools. To increase the credibility in qualitative research, data diversification, expert assessment, and participant approval were obtained (Creswell and Miller, 2000; Meriam, 2009). Further, multiple data collection tools (quantitative = Human Values Scale; qualitative = interview form) were employed to provide data diversity. The interview was recorded and transcribed, and students confirmed whether the opinions expressed in the transcripts were their own to ensure participant approval. Themes and codings developed using the NViVO program were examined by a different researcher, and a consensus was reached with the key researcher on the codings. Pre-prepared code schemes were not used.

Participants

The sample comprised 32 11th-grade students studying at Vocational and Technical High School in Bartın, Turkey, during the 2018/2019 academic year. While determining the sample, one of the two classes in the field of justice was randomly assigned to the experimental group and the other to the control group. The fact that one of the researchers worked in this school was a factor in the determination of the school where the applications would

be carried out. It has been taken into account that the experimental study can be carried out more easily and that it can be worked in cooperation with school administrators. There were 16 female students in the experimental group and 16 female students in the control group. The reason for the selection of participants from only female students is that only female students can enroll at the school. The qualitative study group consisted of six students in the experimental group who were selected on a voluntary basis.

Data collection tools

In this study, in which the mixed method was used, quantitative data were collected with a human values scale and a semi-structured interview form. The human values scale was applied to the students as a pre-test and post-test. Qualitative data were collected through the focus group interview at the end of the experimental study.

Human values scale

The Human Values Scale developed by Dilmaç (2007) for secondary school students (adolescents) was used to determine the participants' human values. Human values included in the scale are: a) Responsibility (7 items), b) Friendship (7 items), c) Peacefulness (7 items), d) Respect (7 items), e) Tolerance (7 items), and f) Honesty (7 items). This five-point Likert-type scale can be applied individually or in groups. Internal consistency coefficients (Cronbach's alpha) were calculated to determine the scale's reliability and were as follows: responsibility = .73, friendship = .69, being peaceful = .65, respect = .67, tolerance = .70, and honesty = .69. The internal consistency coefficient for all 42 scale items was .92. The stability coefficients in each subscale were responsibility = .73, friendship =. 91, peacefulness = .80, respect = .88, tolerance = .79, and honesty = .75. The coefficient of stability for the entire scale was .87 (Dilmaç 2007).

Student interview form

In collecting the qualitative data of the research, a semi-structured student interview form was used, taking into account expert opinions. In order to support the findings after the PBL application, a focus group interview was conducted with six students who were voluntarily selected from the experimental group.

Data analysis

The SPSS 22.0 statistics program was used to analyse the study's quantitative data. Non-parametric tests were used because the number of data under each group was less than 30 (Demirgil, 2010). In order to determine any significant difference between the pre-test and post-test results within the control and experimental groups, a Wilcoxon signed-rank test was performed. Non-parametric statistical techniques were used to determine any significant difference between the pre-test scores of the experimental and control groups, and the Mann-Whitney U (MWU) test was used to determine whether there was a significant difference between the pre-test and post-test results of the control and experimental groups.

The significance level was accepted as 0.05 in the data analysis, and the r value was taken to calculate the effect size. Field (2009) and Pallant (2015) emphasised that the r value is valid for calculating the effect size in both MWU and Wilcoxon tests, while Cohen et al. (2007) stated that the cutting points should be used for low effect size ($r > 0.1$), the interpretation of the calculations ($r < 0.3$), and for large effect size ($r > 0.5$) (Kilmen, 2015: 229–249).

The analysis of the qualitative focus group interview was based primarily on the answers given by the students to the interview questions. Thereafter, themes were created and content analysis was performed. At this stage, to ensure the reliability and validity of the thematization that constituted the qualitative dimension of the study, three researchers with experience in conducting qualitative research were asked to give their opinions, and the themes were revised according to these opinions. At this stage, the data was interpreted by creating a model within the framework of themes and visual maps using NVivo 12.

Implementation

A problem scenario was created by considering the issues and achievements in the reporting module of the judicial correspondence course. The learning process had four steps: (1) defining the problem, (2) finding possible solutions, (3) collecting data, and (4) evaluating the solutions. The study lasted for eight weeks, and the control group was taught the statistical and reporting modules in the judicial correspondence course using traditional methods.

In the experimental group, the experiments were performed as follows:

Week 1

Students were informed about the study by the teacher and the Human Values Scale was applied to both the control and experimental groups as a pre-test.

Week 2

Students were presented with the overall problem by the teacher, who stated, 'Reporting is one of the most important concepts in the field of justice, and most of our profession is spent in cases that are heard in trial rooms. One of the important steps of a hearing is judicial correspondence. A case is not a process that can be carried out without parties. Knowing the parties in a case is very important for your future profession'.

This statement motivated the students before the problem was presented to them through statistics and tables. The teacher transferred the tables to the interactive board and asked students to examine the data and tell him what they saw. The teacher highlighted that the students were facing an unfamiliar situation and asked, 'What is the situation that is confusing in the information we are working on?' Students were expected to reply that the number of verdicts had increased significantly between the two dates. They were then asked, 'Why did these numbers increase over the years until 2018? This is a problem, right? We do not have enough information yet, but let us consider general questions, and redefine what problem we are working on and write it down on the board.

Week 3

Students discussed the problem in small groups, and, by clarifying the situation, they identified the problem. Thereafter, in the 'possible solutions' step, it was expected that the increase in the crime rate in the context of human values would allow students to produce hypotheses regarding the changing reasons for the increase in the number of crimes and verdicts. Students brainstormed based on previous information determined what they needed to work on the problem and what they did not know (learning problems), and created an action plan.

Week 4

Students participated in independent studies on the hypotheses they had independently developed. After hypothesis creation, the students were divided into groups of eight and the problems experienced in the context of human values in the emergence of crime, verdicts, and legal problems from the sources were determined in groups.

Week 5

After the students had clearly identified the problem, they

referred to primary resources, subject area experts, etc. Interviews were held with the lawyer, judge, prosecutor, and lawsuit parties (plaintiff, defendant, victim).

Week 6

By sharing information, students continued with peer teaching and working together on the problem.

Week 7

Students presented their solutions, discussed them in the classroom, and analysed the data they obtained regarding the problem situation. Finally, the solutions were evaluated and defended in the classroom by the groups as a presentation. They reviewed what they had learned from working on the problem, and everyone involved was assessed by themselves, their peers, and the teacher regarding the PBL process and the contribution of each individual to this process. The teacher summarised the study with the students, and it was concluded by evaluating the interview forms, which had been corrected by the students.

Week 8

Post-test application and focus group interviews were conducted and the study was terminated.

RESULTS AND DISCUSSION

In this section, quantitative and qualitative findings are presented from the study's two sub-experiments.

Quantitative findings

The pre-test average (mean) score of the experimental group was X = 3.7396 and of the control group was X = 3.6874; thus, the average Human Values Scale score of the experimental group was higher than that of the control group before the experimental study, although the two groups' average scores were similar. Since p = 0.713 and p > 0.05, it was concluded that there was no significant difference between the groups; thus, both groups were assumed as equivalent before the experiment. Table 1 shows the experimental group's pre-test-post-test attitude scores.

According to the results of the experimental group's Human Values Scale pre- and post-tests, there was a significant difference in favour of the post-test, which can be interpreted as demonstrating that a problem-based

Table 1. Experimental group pre-test-post-test results.

Sub-Dimensions	Tests		N=16	Mean rank	Total sum	r	Wilcoxon z	P
Responsibility	Pre-test-Post-test	Negative rank Positive rank Equal	2 12 2	6.00 7.75	12.00 93.00	-0.639	-2.556	.011
Friendship	Pre-test-Post-test	Negative rank Positive rank Equal	5 10 1	7.40 8.30	37.00 83.00	-0.328	-1.312	.189
Being peaceful	Pre-test-Post-test	Negative rank Positive rank Equal	2 12 2	2.00 8.42	4.00 101.00	-0.763	-3.052	.002
Respect	Pre-test-Post-test	Negative rank Positive rank Equal	4 10 2	5.38 8.35	21.50 83.50	-0.4885	-1.954	.051
Honesty	Pre-test-Post-test	Negative rank Positive rank Equal	0 14 2	.00 7.50	.00 105.00	-0.82775	-3.311	.001
Tolerance	Pre-test-Post-test	Negative rank Positive rank Equal	6 9 1	6.33 9.11	38.00 82.00	-0.31325	-1.253	.210
All scales	Pre-test-Post-test	Negative rank Positive rank Equal	0 16 0	.00 8.50	.00 136.00	-0.87975	-3.519	.000

teaching approach is effective for the development of students' human values.

When the values calculated for the effect size were evaluated (responsibility: r = 0.4 medium; friendship: r = 0.23, low; peacefulness: r = 0.5, high; respect: r = 0.34, medium; honesty: r = 0.58, high; tolerance: r = 0.2, low; full scale: r = 0.6, high), a low level of change was seen amongst friendship and tolerance, a medium effect for responsibility and respect, and a high impact for peacefulness, honesty, and across the scale. Table 2 shows the control group's pre-test-post-test attitude scores.

None of the control group pre-test-post-test results in any sub-dimension of the Human Values Scale or across the scale showed a significant difference in favour of the post-test.

A Mann-Whitney U (MWU) test was performed to determine whether there was a significant difference between the pre-test and post-test results of the control and experimental group students and, therefore, whether problem-based learning causes a significant difference in human values (Table 3).

Table 3 shows a significant difference between the post-test attitude scores of the experimental and control groups (tolerance: MWU = 100.500) in favour of the experimental group in all sub-dimensions and the overall scale, showing that problem-based learning approaches are more effective for the development of students' human values.

The calculated effect size (responsibility: r = 0.6, high; friendship: r = 0.51, high; peacefulness: r = 0.4, medium; respect: r = 0.47, medium; honesty: r = 0.3; medium, tolerance: r = 0.1, medium; full scale: r = 0.6 high) for the peacefulness, respect, honesty, and tolerance sub-dimensions revealed a medium impact, while responsibility, friendship, and the overall scale were highly impacted.

Qualitative findings

The question, 'What do students participating in the

Table 2. Control group pre-test-post-test results.

Sub-Dimensions	Tests		N=16	Mean rank	Total sum	Wilcoxon z	P
Responsibility	Pre-test-Post-test	Negative rank Positive rank Equal	8 7 1	8.25 7.71	66.00 54.00	-.345	.730
Friendship	Pre-test-Post-test	Negative rank Positive rank Equal	12 3 1	7.67 9.33	92.00 28.00	-1.834	.067
Being peaceful	Pre-test-Post-test	Negative rank Positive rank Equal	6 7 3	6.83 7.14	41.00 50.00	-.318	.750
Respect	Pre-test-Post-test	Negative rank Positive rank Equal	8 6 2	8.88 5.67	71.00 34.00	-1.170	.242
Honesty	Pre-test-Post-test	Negative rank Positive rank Equal	9 5 2	6.22 9.80	56.00 49.00	-.223	.824
Tolerance	Pre-test-Post-test	Negative rank Positive rank Equal	6 8 2	7.92 7.19	47.50 57.50	-.315	.753
All scales	Pre-test-Post-test	Negative rank Positive rank Equal	9 7 0	9.17 7.64	82.50 53.50	-.751	.453

Table 3. Comparison of the experimental and control group post-test scores.

Sub-dimensions	Groups	N	Mean rank	Total sum	r	MWU	P
Responsibility	Experiment Control	16 16	22.13 10.88	354.00 174.00	-0.85775	38.000	.001
Friendship	Experiment Control	16 16	21.28 11.72	340.50 187.50	-0.725	51.500	.004
Being peaceful	Experiment Control	16 16	20.25 12.75	324.00 204.00	-0.57	68.000	.023
Respect	Experiment Control	16 16	20.94 12.06	335.00 193.00	-0.67475	57.000	.007
Honesty	Experiment Control	16 16	20.03 12.97	320.05 207.50	-0.53725	71.500	.032
Tolerance	Experiment Control	16 16	18.22 14.78	291.50 236.50	-0.2605	100.500	.297
All scales	Experiment Control	16 16	22.63 10.28	362.00 166.00	-0.92425	30.000	.000

judicial correspondence course think of the problem-based learning model?' guided this part of the research. For this purpose, a focus group interview of approximately 40 minutes was held with six students. The following questions were employed to explore the students' opinions about the applied methods and course practices:

• What are your opinions about the judicial correspondence course?
• What are your thoughts on the applied PBL course activities?
• Do you think the applications have enabled you to learn the course outcomes better? What are your opinions on this matter?
• Do you think you have understood your lessons through the learning activities? What are your opinions on this matter?

Two themes emerged as a result of this focus group discussion, that is, 'the effects of the PBL model on student development' and 'the effects of the PBL model on the learning process' (Table 4). Eight categories related to the first theme and eleven categories belonging to the second theme were identified and presented to form an integrated model. Regarding the effects on student development, the participants in the experimental group discussed their perceptions of the quality of learning in terms of the aspects they thought they had developed. Regarding the factors affecting the learning process, their perceptions and understandings of the PBL model were revealed in the context of human values.

As seen in Table 4, the experimental group gathered the effects of the PBL model under the abovementioned titles. The students stated that the categories that had the most impact on their development were self-confidence, followed by success, tolerance, and responsibility. Other factors emphasised by the students were friendship and efficiency. The most emphasised aspects among those grouped into the 'effects on the learning process theme were entertainment and connecting with life and the profession. That the learning process was activity-based was also highlighted as an effective feature. Commenting was the least emphasised aspect.

Table 4. Themes and codes.

Themes and codes	Frequency (n = 6)
1. Effects on student development	
1.1. Success	3
1.2. Friendship	2
1.3. Tolerance	3
1.4. Self-confidence	4
1.5. Self-knowledge	3
1.6. Respect	2
1.7. Taking responsibility	3
1.8. Productivity	2
2. Effects on the learning process	
2.1. Fluency and permanence	2
2.2. Active participation	2
2.3. Research ability	2
2.4. Teamwork	3
2.5. Entertainment	6
2.6. Activity-based	5
2.7. Variety of resources and knowledge	3
2.8. Facilitation	2
2.9. Class interaction	2
2.10. Linking with real life and the profession	6
2.11. Commenting	1

Tables 5 and 6 present the experimental group's views of the PBL model via direct quotations.

The qualitative results in Table 5 demonstrate that the indicators of human values had increased satisfactorily at

Table 5. Student opinions (Theme 1).

Themes and Codes	Student opinions
1. Effects on student development	
Success	OAK6: We were bored when [we just read] from the book or only [listened to] our teacher, but the applications and activities enabled us both to interact in the classroom and to learn many things. It made me more successful in my lessons.
Friendship	OAK6: The friendship bond between students was strengthened through group work. Through the activities, the lesson became efficient and fun, which prevented us from getting bored.
Tolerance	OAK6: I developed the ability to brainstorm and make a lot of comments in our lessons. I [also] developed my ability to accept the thoughts of different thinkers by thinking rationally and from multiple perspectives.
Self-confidence	OAK1: I think the course was fruitful thanks to the activities [that helped me] learn the lesson topics better. I [got more of] an idea about the issues I did not know about, and my confidence increased.
Self-knowledge	OAK3: The research and homework provided by our teacher in the lesson helped a great deal, and I believe it will work well in the future. The lesson activities and applications were very good. I got information about my features that I was not aware of about myself. It was very efficient.
Respect	OAK3: We learnt how the division of labour and respect for our friends works in groups. This will be useful for us in the future.
Taking responsibility	OAK5: The course helped me to solve the legal problems faced by myself and those around me in daily life. I take responsibility and try to help those around me.
Productivity	OAK5: I learned different information because I used different sources during the activities. Thus, we could grasp the issues more quickly. It was useful.

Table 6. Student opinions (Theme 2).

Themes and Codes	Student opinions
2. Effects on the learning process	
2.1. Fluency and persistence	OAK2: The activities helped me to understand this difficult lesson, which depends on memorisation. Students would have difficulty achieving without these applications. The activities made the lesson simpler and more understandable. The application allowed us to learn better; it was more useful because we did research ourselves. It made it permanent.
2.2. Active participation	OAK2: The course became more effective through doing the applied activities. In this way, the lessons we participated in became more effective, and the lesson continued efficiently.
2.3. Research skills	OAK5: The new things we learned in the lessons taught me a lot about many topics. Even by looking at a word, I became curious and developed an investigative personality. The lessons were a bit tiring but fun. But it is nice to learn; we got a lot of information that will help us.
2.4. Teamwork	OAK4: The activities we did have affected me positively in many ways. Most importantly, I learned to work with the group; I learned to discuss a topic with [them] and find solutions.
2.5. Entertainment	OAK1: The technical part of the judicial correspondence course is based on memorising a lot. It sounds boring to me. I don't like it, but the applications and activities made the lesson fun.
2.6 EQP-based activity	OAK3: The activities are nice and fun. Thanks to these activities, we got a lot of information on many issues, especially [related to] society and people.

Table 6. Continues.

2.7. Diversity of resources and knowledge	OAK6: I developed my ability to accept the thoughts of different thinkers easily by thinking rationally and from multiple perspectives. It helped reinforce the issues and made me learn better. I got different information.
2.8. Facilitation	OAK1: Homework on topics allowed us to look at the events from a broader perspective. I think it is necessary for lessons to be learned in a fun and simpler way. It makes difficult issues easier. It allows us to learn better.
2.9. Classroom interaction	OAK4: Our activities have affected me positively in many ways. Most importantly, I learned to work with the group. I learned to discuss a topic with [them] and find solutions. The activities carried out in the lesson were fun in places. The activities have brought us a lot of things. I think they were very nice and fun.
2.10. Linking with life and the profession	OAK1: I learned many things I can use in daily life thanks to the activities and applications. Events enabled the information I learned.
2.11. Commenting	OAK6: I developed the ability to brainstorm and make a lot of comments in our lessons.

the end of the study. At the same time, the students found the activities in the judicial correspondence course efficient, pleasant, and fun. They stated that they actively use the behaviours they learned in some lessons and activities in their daily lives, that is, the outputs of the PBL model in the context of human values. Thus, these qualitative findings show that PBL has a positive effect on learning and human values in general.

As seen in Table 6, students described the activity-based process as fun and memorable, depending on the theme, also mentioning that it encouraged teamwork, facilitated learning, and had positive effects on connecting with life and the profession while developing their interpretation skills. It can be stated that the indicators expressed by the students depending on PBL in the interviews increased satisfactorily at the end of the study. At the same time, when their expressions were evaluated as a result of the interview, the students found the judiciary correspondence lessons to be effective, pleasant, entertaining and beautiful. They stated that they used the behaviors they learned in daily life depending on the lessons and activities, that is, the outputs of the problem-based learning model, by evaluating them in the context of human values. The qualitative findings of the study also show that PBL generally has a positive effect on learning and human values.

CONCLUSION

The study aimed to examine the development of human values of high school students taking a judicial correspondence course. The results obtained from the quantitative and qualitative data were analysed and interpreted together. The study's quantitative findings showed that the PBL model that was applied to the experimental group positively affected and increased the students' human values. There was a significant difference between the pre-test and post-test scores of the experimental group, except for one sub-dimension (tolerance). Similar results have been observed in previous studies; for example, Dochy et al. (2003) investigated the effects of PBL by using the meta-analysis method to review 43 experimental studies of PBL in higher education. Their findings revealed that PBL has a strong and positive effect on students' skills, and no negative effects were reported.

Further, Mansoori et al.'s (2017) quasi-experimental study showed that PBL models have an effect on students' academic performance through a comparison of pre-test and post-test results, showing that the students' academic performance in their experimental group increased significantly. Although there was no difference between the averages of the pre-test scores of both groups, the authors concluded that PBL had a significant effect on students' academic performance by examining the averages of the experimental group and the control group in the post-test. Meanwhile, Ninnig's (2017) quasi-experimental study took a quantitative approach to analyse and evaluate the differences in students' critical thinking skills after experiencing PBL and traditional models. Data analysis was performed with an independent t-test sample, and the post-test findings of the experimental group were significantly different. Ninnig proposed that teachers and researchers apply PBL models to develop students' critical thinking ability and concluded that the PBL model encourages students to solve the problems encountered in daily life, especially in social studies. Ferreira and Trudel (2012) used a mixed method to examine the effects of PBL on students'

attitudes toward science, problem-solving skills, and perceptions of the learning environment. Their results showed a significant increase in students' attitudes, and the authors also reported that the use of PBL facilitated the development of a sense of community in the classroom. In other experimental studies conducted, also using Dilmaç's (2007) Human Values Scale results similar to our study were observed. In Metli's (2017) study, secondary school students' cyberbullying-cyber victimisation and human values were examined according to their demographic characteristics. Anshori (2021) investigated the effect of problem-based learning integrated with Islamic values on students' social processes and learning outcomes. In the study, it was revealed that the effect of PBL on spiritual and social attitudes is quite high, but its effect on psychomotor skills is low. This result supports the conclusion that PBL has a positive effect on learning values in our study.

Monks (2010) studied apprentices in vocational and technical education to identify any beneficial changes that occurred in the general learning experience resulting from the use of PBL-style exercises. The apprentices found this method to be very positive and responded well, and the study's results showed that the PBL format, which has been developed and adapted significantly, is an appropriate application strategy option for apprenticeship training. Liu et al. (2010) evaluated PBL in a secondary school in Singapore and showed that there were significant differences in learning outcomes between experimental and control groups: in particular, students in the control group showed more memorisation skills, while students in the experimental group exhibited more analytical and evaluation skills. Consequently, similar to our study, it was found that PBL can result in high-level learning outcomes.

As a result of post-test measurement, it was concluded that there was a significant difference in the experimental group scale results of the effect of environmental education activity developed in accordance with the value education methods of Tahiroğlu et al. (2010) on the environmental attitudes of primary school 7th-grade students. Accordingly, the activities implemented had a positive effect on students' attitudes. Ramancharla et al.'s (2009) study encouraged students to discover what they deemed valuable and aimed to distinguish between real and absolute discrimination in real-life situations. Dilmaç et al. (2008) analysed the value perceptions of prospective teachers in terms of different variables and found gender differences in terms of universality, self-direction, and power values. A significant difference in the self-direction value dimension of prospective teachers between the ages of 17–20 and 21–24 was also observed. It was found that there was a significant difference only in the tradition value perception sub-dimension from the calculated values in order to reveal the difference between the average perceptions of the

prospective teachers at different grades. Tysinger et al. (1997) determined that PBL applied in small groups prompted medical students to think about ethics. Lin et al. (2010) found that PBL has positive effects on moral development. Khatiban et al. (2019) conducted an experimental study comparing teacher-centered teaching and PBL. At the end of the study, there was no significant difference between the moral development levels of the students in both groups. However, it was determined that the moral development of the students in the experimental group in which PBL was applied was at a higher level. In this direction, it has been emphasized that PBL is more effective in developing moral values. Based on these studies, it can be said that PBL has a high effect on developing affective behaviors. PBL is not only based on theoretical knowledge, it includes real-life problems and it is applied, etc. reasons may be more effective.

In the present study's qualitative results, students stated that they found the PBL method to be enjoyable and pleasant. Various extant studies support these expressions; for example, Papert (1996: 52–53) stated that the method is difficult but fun for both learners and teachers, with its certain degree of difficulty causing the method to be fun at the same time. Moreover, in his qualitative study on teachers who used the method, Barrett (2019) stated that using PBL as a concept to discover different types of learning that are difficult but fun, is a field that should be further investigated in higher education. According to him, it is a transformative feature about changing beliefs in how difficult it is to learn a particular dimension using PBL. In addition, some of the researchers conducted questionnaires asking students to evaluate the PBL departments of their classes. Such studies show that students generally think PBL is highly effective (Kaunert, 2009; Williamson and Gregory, 2010).

Another result of the study is that students are especially willing to participate in the problem-based learning method. The students, who have been used to teaching lessons in the form of transferring pure knowledge for years with traditional teaching methods, once again emphasized the effect of rote learning structure by stating that they are willing to participate in group discussions. Bate et al. (2014) stated that student participation in the PBL process can help develop the attitudes and qualities expected from a reflective practitioner. Although PBL is a time-consuming and labor-intensive method, it has a great advantage in helping schools and students become competent and thoughtful practitioners with high achievement. Sekti et al. (2023) found that PBL increased the motivation of students in their study and it was stated that learning could be carried out in a better way if students were encouraged to participate actively in the process.

In our study, interviewed students highlighted these expressions by emphasising the PBL qualities that helped them facilitate, tolerate, and interact in the

classroom. PBL has also been described as one of the most important developments of vocational education in universities (Boud and Feletti, 1977), which supports our findings that students believed the model made it easier to connect with real life and the profession. As a result, the ability to develop human values through PBL was supported by both our qualitative and quantitative findings. The students stated that they actively used the outcomes of the problem-based learning model in the context of human values, showing that PBL has a positive effect on learning and human values in general.

It has been concluded that PBL is more effective than teacher-centered practices in acquiring human values. At the same time, considering that students are active and working on problems they may encounter in their real lives, it can be said that it is beneficial to include PBL more in course applications. At this point, the competence of teachers also needs to be improved. This study was conducted in a school with only female students. This is the most important limitation of the research. Studies can be conducted to examine the effect of PBL on the teaching of values in different schools with mixed groups and at different levels.

In the PBL judicial correspondence course, a future mixed-pattern study is recommended to thoroughly examine its impact on high school students' ability to correctly assess human values. The effects experienced by high school students from PBL can be compared by examining different variables such as communication skills, critical thinking, creative thinking, etc. Training programs using different methods and techniques based on PBL practice can be prepared to improve high school students' human value skills.

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