The Effect of Lesson Plans Based on IB Education Philosophy and UbD Model on Student Achievement: A Study From Turkey

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Article History:
Received 02.04.2023
Received in revised form 30.06.2023
Accepted
Available online 10.07.2023

This study was made based on some discussions attempting to improve the quality of education by creating appropriate learning areas, differentiating education according to each student's interests, learning styles, and multiple intelligences. The aim of the study is the implementation and analysis of social studies lesson plans prepared in accordance with "UbD" and ''IB Planner'' for 3rd grade students. The study was conducted using a nested-mixed design within the framework of mixed method research. In the quantitative dimension of the study, pretest-posttest control group experimental model data were used. In the qualitative dimension, the data based on the feedbacks of teachers who are the implementers of the lesson plans were used. The study group of the quantitative dimension consisted of 320 students in the 3rd grade of a public primary school who voluntarily participated in the study. The study group of the qualitative dimension consists of 36 primary school teachers who are the implementers of the prepared lesson plan. The findings of the study show that the social studies lesson plans prepared based on the IB Planner and the UbD model made a significant difference in favor of the experimental group on both student accomplishment (posttest) and student achievement(pretest-posttest). The qualitative findings obtained from the teachers' feedback on the prepared and implemented plans indicated that the plans included enriched activities and were comprehensively prepared to appeal to all students, including students with special needs and gifted students in the same class. In addition, it was observed that the differentiated content in IB and UbD lesson plans was not limited to methods and techniques, but also included assessment and evaluation techniques. Both quantitative and qualitative findings revealed that the plans were designed in such a way that students could effectively acquire the prescribed behavior. Moreover, the implementation of the plans improved students' social skills, self-management skills, communication skills, research and thinking skills, increased their self-confidence and raised their achievement.

Keywords: IB, UBD, differentiation of instruction, IB-ubd lesson plans, UBD lesson plans

INTRODUCTION

At the most basic level, differentiation consists of teachers' efforts to respond to the variance among students in the classroom. Thanks to differentiation, individuals develop appropriate designs by linking their prior learning with what they learn later, taking responsibility for their learning, and using their different individual characteristics such as interests and learning styles. In differentiated instruction, each individual learns at his/her own pace. Differentiation can be achieved by using different classroom activities, methods and techniques and complementary assessment and evaluation tools. In differentiated instruction, students have different options for receiving and understanding information and expressing what they have learned. In this way, not only the content and process of the lessons but also the outcomes of the lessons are differentiated (Heacox, 2002; Tomlinson, 2000; Yabaş &Altun, 2009).

There are many educational practices in the world that aim to raise qualified individuals based on differentiated education. The most prominent of these is the International Baccalaureate Organization (IBO). IBO, aiming to create a more peaceful world by developing intercultural understanding and respect, as well as raising inquisitive, inquiring, knowledgeable and sensitive young people, is implemented in 148 countries. According to International Baccalaureate (2009) IB PYP consists of six transdisciplinary themes: "Who we are, the time and place we are in, the ways we express ourselves, how the world works, how we organize ourselves, and sharing the planet". The main ideas related to each transdisciplinary theme are addressed and in the context of units of inquiry, students explore, question and learn about these topics according to their learner profiles. Those are the mentioned learner profiles in order to make all humanity and the planet we live in more peaceful and better: according to the knowledgeable profile; students not only explore concepts, issues and ideas of local and global significance, but also gain deep knowledge of a broad and comprehensive range of

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disciplines through practice and exposure. According to the inquirer profile; they create an active learning environment thanks to their research and questioning skills. They are curious and independent learners. According to the thinker profile; they recognize and develop solutions for complex problems by using their critical and creative thinking skills. According to the principled profile; they respect the dignity of individuals and societies, take responsibility for their own behaviors. According to the communicator profile; they express their feelings, thoughts, and ideas in multiple languages, creatively. They are willing to work with other people and listening them. According to the open-minded profile; they respect not only the culture, perspectives, values, customs and traditions of other individuals, but also all different opinions. According to the caring profile; they have strong empathic abilities. They are sensitive about people's needs, feelings, thoughts and lives. They have a positive impact on people's lives and the environment. According to the risk-taker profile; these individuals are not afraid of making mistakes and always can think creatively. They can not only show caurage for extraordinary events and uncertainties, but also independently defend their beliefs . According to the balanced profile; they are aware of the importance of mental, physical and emotional balance for their own and others' health. According to the reflective profile; they can evaluate their strengths and limitations to support their learning and personal development.

According to Cowie de Arroyo (2011) thanks to the IB program, parents establish a closer bond with the school and become involved in the academic program with an overall perspective as it tries to meet the needs of students and parents by supporting them. In addition, the teachers trying to ensure the success of the program and making a difference are supported. Teachers are in constant communication with their students, while planning the curriculum that supports their students' learning experiences and needs. This helps students to perform well in school. It is, therefore, necessary to devise a variety of strategies to support the development and increase knowledge of teachers who are the leading ones for the change in curriculum and instructional issues. This is the educational purpose and mission of IB schools.

In the UbD design process, teachers starts by designing a three-step template. The first phase of this template includes the understanding, knowledge, basic questions, skills and the transfer steps that gathers around the big idea. Teachers can actively guide the learners in processing information and exploring complex problems through instructional strategies such as multimedia presentations, demonstration, modelling, guided practice, feedback and analogy. To ensure the transfer of the information needed in daily life, teachers contribute to the differentiation of content and environment by providing feedback, corrections in the context of graphic organizers, divergent inquiry and examination, simulations, problem-based learning, Socratic seminars, peer and self-assessment, authentic practices, and provide educational coaching to students (Wiggins &Mc Tighe, 2008; Yurtseven &Altun, 2017).

According to McTighe and Wiggins (2012) the UbD framework is based on seven key principles:

1. UbD is not a rigid program or a prescriptive recipe. Rather, it assists teachers in planning and implementing the curriculum.
2. Thanks to UbD, students deepen the knowledge by learning transfer. It helps students to use their content knowledge and skills effectively.
3. UbD enables students to understand and transfer what they have learned to the performance in an authentic way. There are six indicators of understanding. These are: the capacity to explain, apply, interpret, develop perspective, empathize and self-knowledge.
4. UbD follows a top-to-bottom sequence and has a three-stage design process. These are: desired outcomes, evidence and learning plan.
5. Teachers are not only content or event providers, but also learning coaches. They do not focus solely on the realization of learning and do not assume that every subject taught is understood by the students.
6. Constantly reviewing the units and curriculum in terms of design standards, increases the quality and effectiveness of the curriculum, by making it more interesting and professional.
7. The UbD framework tends to continiously improve student achievement. The results of the designs provide information about student performance, allowing teachers to make changes of the designs on a regular basis.

When the literature on the effects of lesson plans prepared with IB Planner and UbD model on student achievement is reviewed, it is observed that there are a limited number of studies (Çamlikaya, 2007; Hill, 2007; Mathews & Hill,2005; Hill & Saxton, 2014; Coca et al., (2012); Noble, 2011; Rubrica, 2018)) especially within the

scope of IB Planner. For example; Çamlikaya (2007) found sample studies from the IB curriculum that social studies and science disciplines will be structured under the IB PYP framework. Again, Hill and Saxton (2014) concluded that students raised with the IB curriculum have a good performance, exhibit a different approach to solving global problems with their critical and inquisitive thinking skills, and become leaders, open to personal development, entrepreneurial spirits and have multiple perspectives thanks to the social responsibility projects they develop. Although the positive effects of teaching practices using the IB Planner and UbD model have been emphasized in some studies, there is a need for a large number of scientific studies examining the effects of such design and teaching practice activities on the achievement of students with different levels, types and individual characteristics in order to be reflected in the education system, to be transformed into the qualified student behaviors desired by the society and to be disseminated.

Consequently, in this study, it was aimed to prepare lesson plans to be implemented in the social studies course for 3rd grade students based on the IB Planner and UbD model and to evaluate the effect of these plans in practice. Therefore, in the study;

"What is the effect of the lesson plans based on IB Planner and UbD model and prepared for 3rd grade social studies lesson on student achievement?" was taken as the main problem and answers to the following sub-problems were sought;

1. Is there a significant difference between the achievement (post-test) scores of the experimental and control groups?
2. Is there a significant difference between the (pretest-posttest) achievement scores of the experimental and control groups?
3. What are the feedbacks of the teachers, who are the implementers of the plans, about the program?

METHOD

Research Model

This study, which aims to implement and evaluate the social studies lesson plans (Annex 1.1 and 1.2) prepared for 3rd grade students based on IB Planner and UbD model, was conducted with a nested mixed design, one of the mixed research methods. According to Creswell and Sözbilir (2017) in mixed research, data are combined and integrated by using the strengths of qualitative and quantitative methods. Thus, the contribution of the methods to the research is greater than the contribution of each of the approaches alone. Accordingly, in the quantitative dimension of the study, an experimental model with pretest-posttest control group was used. In the qualitative dimension, the feedbacks of the teachers, who were the implementers of the lesson plans, on how the students learned the social studies "Safe Life" unit / "Recognizes traffic signs and signposts" were included. The qualitative data obtained based on the teachers' post-experiment implementation experiences were integrated into the experimental model and used to support the quantitative data.

Work Group

The quantitative data of the study were obtained from the experimental study in which social studies lesson plans prepared based on IB Planner and UbD model were implemented. Convenient sampling method was used to determine the school where the research was conducted. Accordingly, the implementations took place in a public primary school in Istanbul, where the researchers (three of them) were working. The experimental and control groups consisted of 320 3rd grade students who voluntarily participated in the experimental study. The experimental group consisted of the group in which the lesson plans prepared in accordance with the IB Planner and UbD model were applied, and the control group consisted of the group in which no intervention was made to the learning plans. In the formation of the experimental and control groups, the principle of impartiality was followed, and accordingly, both groups were randomly selected. The total number of students in the control group and the experimental group, which consisted of 18 different 3rd grade classes, was 320. Table 1 shows the comparison of the pretest scores of the experimental and control groups.

Table 1: the T-test results for the comparison of the groups' pre-test scores

Group	N	$\bar{x}$	SD	T	P
Control	160	53,37	22.30	-,37	,71
Experimental	160	54,28	21,38		

As can be understood from the analysis of Table 1, there is no statistically significant difference between the pretest scores of the experimental and control groups (t=-0.37; p>0.05). Therefore, it can be said that the readiness levels of the students in the experimental and control groups before the experimental process were similar, and the differences that may occur in the achievement of the students as a result of the applications can be attributed to the effect of the plans applied in the experimental group.

The qualitative data of the study were obtained from interviews with teachers who were the implementers of the lesson plans. Teachers took an active role in the implementation of the lesson plans for the "Safe Life" unit / "Recognizes traffic signs and signposts" outcome of the social studies course. Therefore, it was thought that the experiences of the teachers regarding the implementations would make an important contribution to the support of the experimental data and teachers were included as participants in the qualitative phase. For this reason, in person and face-to-face interviews were conducted with 36 teachers. Among the teachers, 28 were female and 8 were male; 2 had 1-5 years of service, 9 had 6-10 years of service, 19 had 11-15 years of service, 4 had 15-20 years of service and 2 had 20 years or more.

Data Collection Tools and Processes

Two different data collection tools were used to obtain the data of the study. In order to obtain quantitative data, an achievement test prepared to measure the achievements of the lesson plans prepared for the "Safe Life" unit / "Recognizes traffic signs and signposts" outcome of the social studies course on the basis of IB Planner and UbD model was used. In the process of preparing the achievement test, the course materials in the literature for the related achievements were scanned and the test items were created by making use of them, and seven different expert opinions were taken. Then, other validity and reliability studies were completed and the achievement test consisting of 20 multiple-choice questions was finalized. The achievement test was applied to both experimental and control group students before and after the experiment. During the implementation process of the experiment, the lesson plans were first explained in depth to the classroom teachers of the students in the experimental group, and no intervention was made to the lesson plans of the teachers in the control group. Before starting the implementation, the necessary permissions were obtained, the classroom environment was physically ready for the implementation, and the implementation was started after all preparations were completed. Information was obtained from the teachers at every stage of the implementation. The studies lasted for two weeks in total, i.e. six class hours. At the end of the second week, the post-test was administered immediately after the students in the experimental group completed the performance tasks expected of them.

A semi-structured interview form was used to obtain qualitative data. In the interview form, which consisted of five main questions and parallel follow-up questions; (1) The applicability and adaptability of the lesson plans created, (2) The suitability of the methods and techniques in the lesson plans to the outcome, (3) The suitability of the complementary measurement and evaluation techniques in the lesson plan to the outcome, (4) The structuring of the lesson plans at a level to include individuals with special needs and gifted individuals studying in a class, (5) The content differentiation in the plans was prepared in accordance with the purpose of the content. After the interview form was prepared, expert opinion was sought for the appropriateness of the questions, and the final form was reached by conducting a pilot study before the interviews with the teachers. Using the prepared interview form, firstly, the opinions of 18 primary school third grade teachers working in the same school about the implementation of the lesson plan prepared with the Understanding by Design design model were taken in May 2022. The following year in January 2023, the feedbacks of 18 different third grade primary school teachers working in the same school were taken regarding the implementation of the lesson plans prepared in accordance with the International Baccalaureate education philosophy. The teachers in both groups were provided detailed information about the lesson plans prepared before the implementation and were prepared for the implementation. The interviews were conducted in a

suitable environment at the school, taking into account ethical issues, and lasted at least 35 and at most 60 minutes.

Data Analysis

SPSS 26 (The Statistical Packet for Social Sciences) statistical package program was used to analyze the quantitative data of the study. Before the statistical analysis of the quantitative data, the normality test Kolmogorov-Smirnov was applied on the pretest and posttest scores. As a result of the analysis, it was seen that the pretest and posttest scores had a normal distribution. Therefore, Independent Sample t Test and Dependent Sample t Test techniques were used to analyze the quantitative data.

Content analysis was used to analyze qualitative data. For this purpose firstly, transcripts of the interviews were created, and themes, categories and codes were obtained from important expressions by reading the transcripts repeatedly. In the analysis process, the consistency of the participants' views, the frequency of repetition of the prominent views, and similar views expressed by the majority of the participants (Baş & Akturan, 2013) were taken into consideration. The coefficient of concordance was calculated to ensure the reliability of qualitative data analysis. For this, the researchers independently analyzed the interview texts and compared the themes and sub-themes they obtained. As a result of this comparison, the coefficient of concordance was calculated as 0.93. A coefficient of concordance above 80% indicates that the analysis is reliable (Miles & Huberman, 1994). Therefore, it was accepted that the data analysis was consistent and reliable. Accordingly, as a result of the qualitative data analysis, five themes were obtained: *applicability of the plans, teaching methods and techniques applied, assessment and evaluation techniques applied, level of coverage of the plans to all students, and level of differentiation of the content.*

Findings and Interpretation

The findings obtained according to the sub-problems addressed in the research are as follows.

1.Comparison of the achievement scores (post-test) of the experimental and control groups

In the first sub-problem addressed in the research, "the effect of the social studies lesson plans prepared on the basis of IB Planner and UbD model for 3rd grade primary school students on student achievement was examined. At the end of the applications, the achievements of the experimental and control group students were measured and compared. Table 2 shows the results of the independent t-test for the comparison of the achievement (posttest) of the experimental and control groups.

Table 2: the T-test results for the comparison of the post-test scores of the groups

Group	N	$\bar{x}$	SD	T	P
Control	160	56,62	22,30	-17,48	0,00
Experimental	160	89,25	7,73		

As seen in Table 2, there is a significant difference between the post-test scores of the experimental and control groups in favor of the experimental group ($t=-17.48$; $p<0.05$). It can be said that the experimental group students gained more behaviors predicted by the unit. The reason for this may be that the applications and activities in the experimental group included project-based activities, took into account the individual differences of the students, included rich methods, techniques, materials and measurement techniques, and this situation increased student success by increasing interest, motivation and participation rate. It was observed that some research findings on the effect of IB and UbD-based differentiated instruction on student achievement overlapped with the findings obtained from this study. For example; Rubrica (2018) found that project-based differentiated instruction prepared in accordance with UbD increased student achievement, Yurtseven and Altun (2015) found that it increased student motivation, Noble (2011) found that it increased student achievement in a correlation study on social studies discipline, Wiggins and Mc Tighe (1998) found that it led to the effective use of students' knowledge and skills because it increased the quality and effectiveness of teaching, Gürbüz, Koçak and Yurtseven (2022) increased student achievement in the mathematics course designed based on the UbD model, Yıldırım-Seheryeli and Gelbal (2020) differentiated from all other schools with assessment techniques based on individual differences, Young (2005) increased student achievement and performance and improved their perspective; Yurtseven, Doğan and Altun (2013)

found that students became academically equipped and their achievement increased within the scope of the science discipline designed in accordance with the UbD model.

2. Comparison of the achievement scores (pretest-posttest) of the experimental and control groups

In the second sub-problem addressed in the research, "the effect of the social studies lesson plans prepared on the basis of IB Planner and UbD model for 3rd grade students on student accomplishment /achievement was examined. Before and after the applications, achievement test was applied to the students in the experimental and control groups and their achievement (pretest-posttest) scores were compared. Table 3 shows the results of independent t-test for the comparison of the achievement scores of the experimental and control groups:

Table 3: The t-test results for pretest-posttest mean differences (accomplishment-achievement) of experimental and control groups

Group	N	$\bar{x}$	SD	T	P
Control	160	3,25	11,90	-17,18	0,00
Experimental	160	35,88	20,86		

As seen in Table 3, there is a significant difference between the achievement (pretest-posttest score difference) scores of the students in the experimental and control groups in favor of the experimental group ($t=-17.18$; $p<0.05$). While the starting score of the control group was 53.37 at the beginning of the test; the score at the end of the test at the end of the application was 56.62. On the other hand, while the baseline score of the experimental group was 54.28, the post-test score was 89.25. The difference between the achievements of the two groups, that is, between the pre-test and post-test scores, was 3.25 in one group and 35.88 in the other. This shows that the students in the experimental group learned the related outcome more. This means that the lesson designs achieved their purpose, the motivation of the students towards the lesson increased, and the students gained almost all of the desired behaviors. The reason for this may be that students' interest and motivation in the lesson increased, learning by doing-experiencing facilitated the transfer of knowledge to daily life, lesson plans adequately addressed all students in the class, including students with special needs and gifted students, increased interaction and cooperation among students, and the teacher was the guide and the student was active in the classroom. It can be said that these findings overlap with the studies of Young (2005), Yurtseven, Doğan & Altun (2013) and Çınar, Erişen & Çeliköz (2022). Especially in parallel with this study, in the study of Çınar, Erişen and Çeliköz (2022), it is stated that there is a significant difference between the pretest and posttest scores of the students thanks to the differentiation of content, environment, method and technique in the lesson plans prepared in accordance with the principle of differentiation of teaching envisaged by the constructivist approach, student motivation towards the lessons increased with interactive applications, they became more willing to participate in classroom activities, and the interaction and cooperation between them improved their behaviors positively.

3. Feedback of teachers, who are the implementers of the plans, on the program

While the effects of the program were tested experimentally in the first two objectives of the study, the third sub-problem aimed to evaluate the lesson plans prepared in line with the feedbacks of the teachers. Interviews were conducted with 36 teachers in the administration room of the school to evaluate the plans. Semi-structured questions were used in the interviews. Teachers were asked a total of five main questions and sub-questions parallel to these questions. After receiving feedback from the teachers, appropriate themes, codes and categories were created for each feedback. Table 4 shows the appropriate themes, codes and categories created in line with the answers given by 36 teachers:

Table 4: Ranking of the applied lesson plans according to the feedback of the teachers

Theme	Category	Code	Frequency	Percentage
Feasibility of plans	Usefulness	Student features	14	%38,8
		Media features	10	%27,7
		Content properties	12	%33,3
Teaching methods and techniques	Metacognition	Level of eligibility for acquisition	8	%22,2
		Contribution to students' learning	10	%27,7
		Helping students' active participation	18	%50
Measurement and evaluation techniques	Unusualness	Complementary measurement and evaluation techniques	8	%22,2
		Measuring student's learning process	28	%77,7
Level of coverage of plans for all students	Ability to address all students	Covering students with special needs	10	%27,7
		Covering gifted students	10	%27,7
		Addressing all students' interests and multiple intelligences	16	%44,4
Level of content differentiation of plans	The content is prepared for it's purpose	Status of covering the content of the outcome	12	%33,3
		Addressing different methods and techniques incorporating	14	%38,8
		Level of eligibility for acquisition	10	%27,7

As can be seen in table 4, teachers were asked to express their opinions considering the characteristics of the prepared lesson plans. As a result of the opinions received from the teachers, five themes, five categories and fourteen codes emerged. Here are the feedbacks provided by the teachers about the lesson plans created: the plans are useful enough to be applied in every province, district and village of the world, the methods and techniques and measurement and evaluation techniques in the lesson plans can easily reveal the metacognitive skills of the students and extraordinary, complete learning is realized in students, the plans cover all students in a class, including gifted and special needs students, students are active at every stage, teachers are guides, the plans differentiate the course content and meet the content of the acquisition. These findings obtained from the research also coincide with some research findings (Bodur & Yurtseven, 2021; Altun & Yücel Toy, 2020). Similarly, according to Heacox (2002), differentiation of instruction responds to students' interests, learning styles and learning needs. Differentiated instruction enables students to progress at their own individual pace. It helps students to make connections between what they have already learned and what they need to learn. Children who discover the way of learning in line with their own interests can easily transfer what they have learned to daily life. Students, who are given the opportunity to differentiate the curricular achievements with basic skills and performance evaluation criteria, develop appropriate designs by using their different individual characteristics. As a result of the research findings of a similar study conducted by Çeliköz (2004) it was seen that program applications developed in accordance with the constructivist approach had more effective results on student achievement. Again, according to Toe et al. (2015) there is a great tendency to provide personal development opportunities that aim to develop assessment literacies and include various practices that will provide information about future education and teaching, especially for teachers who want

to make reliable and valid assessment practices in their classrooms. This assessment literacy is used in IB PYP schools around the world. Therefore, teachers need to comprehensively review the content of the IB PYP to better understand assessment literacy. In this way, the assessment culture in IB PYP schools can be more deeply understood by teachers and provide them with insights into assessment literacy.

CONCLUSION

In this study, it was assumed that curricula should be dynamic and curriculum design models and plans should be continuously developed by focusing on students' learning needs. For this purpose, certain outcomes were selected within the scope of life science discipline and a differentiated content was prepared based on IB Planner and UbD model and applied to students. The main results obtained revealed that the social studies lesson plans prepared on the basis of IB Planner and UbD model were highly effective on both student accomplishment (posttest) and student achievement (pretest-posttest). In addition, the teachers, whose feedbacks about the plans prepared and implemented, confirmed this effect on student achievement. The teachers stated that the plans prepared based on IB and UbD can contribute to the success of students by enriching the content with designs in classroom practices and can be easily adapted to almost all disciplines. The teachers evaluated that plans are highly compatible with the constructivist approach, especially with the collection of the achievements related to the subjects in the curriculum under the title of big idea, the design of the achievements in accordance with Bloom's taxonomy, drawing attention to the lessons with basic questions, rich methods, techniques and assessment and evaluation types, informing about the target, feedback, activating the student, differentiating teaching and organizational steps.

As a result, it is thought that the fact that the plans include enriched activities, that they are prepared comprehensively to appeal to all students, including special needs and gifted individuals studying in the same class, and that the differentiated content in IB and UbD lesson plans is not only limited to methods and techniques, but also includes measurement and evaluation techniques, cause them to be effective in gaining the predicted behaviors. In general, it is believed that the plans prepared to improve students' social skills, self-management skills, communication skills, research and thinking skills, increase their self-confidence and increase their achievement. It is thought that teachers being in the position of a real guide in the classroom, addressing the interests and multiple intelligences of all students, emphasizing high-level thinking skills, active participation of students and taking part in the learning process by doing and living make the lesson hours enjoyable and lead to the realization of complete learning in all students.

RECOMMENDATIONS

In this study, in general, due to the effect of social studies lesson plans prepared based on IB Planner and UbD model on student achievement, it is recommended that similar plans and designs for different courses should be prepared and implemented and such plans should be more widely used by further testing their effectiveness with new scientific research. In addition, students' interests and dominant intelligences can be identified at an early age, then students can be directed to programs where they can progress at their own pace; the lesson designs can be made in accordance with the constructivist approach in the classrooms, and multiple intelligences can be made a part of these designs (Çeliköz &Çeliköz 2018; Yüksel &Çeliköz,2021). The scope of this study was limited to 320 3rd grade students studying in a primary school in Istanbul -Turkey, and 36 3rd grade teachers working in the same school, and the social studies lesson plans created and implemented in accordance with the UbD model and the IB planner by choosing the appropriate sampling design. During the research, all teachers were informed about the lesson design models and the researchers took the necessary precautions to avoid any problems during the implementation. The research was implemented on a voluntary basis.

Declarations

Conflict of Interest

No potential conflicts of interest were disclosed by the author(s) with respect to the research, authorship, or publication of this article.

Ethical Considerations

Before starting this study, the Directive on Scientific Research and Publication Ethics of Higher Education Institutions was reviewed several times. Scientific ethics and rules were carefully followed at all stages of the study. In the data analysis part, the researchers did not reflect their views and opinions in any way.

Contribution Rates of Authors to the Article

The authors provide equal contribution to this work.

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Appendix 1.1: Example of lesson plan for International Baccalaureate Philosophy (IB-PYP Planner)

THEME: HOW THE WORLD WORKS
GRADE 3
LEVEL: 8-9 Years Old.
TIME SCHEDULE: 40+40+40+40+40+40 minutes.
MAIN IDEA: ''Traffic rules are designed to facilitate human life.''
LEANER PROFILE:
(1) Knowledgeable (2) Thinkers (3) Communicators
LINES OF INQUIRY:
• Necessity of Traffic Signs • The Effect of Obeying Traffic Rules on Social Life
KEY CONCEPTS:
• Function • Perspective /Point of View • Reflective Thinker
TENDENCES:
• Collaboration • Creativity • Curiosity
SKILLS:
• Thinking Skills • Social Skills • Communication Skills • Self-management Skills
RELATED CONCEPT:
• Traffic Signs • Traffic Signboard • Traffic Rules • Social Life, Respect

TEACHER'S QUESTIONS:	**STUDENT'S QUESTIONS:**
• What kind of incidents could we encounter in traffic if there were no traffic signs? • What could be the functions of signboards in daily life? • What happens if we do not comply with traffic signs and lighted signal devices?	• What happens if we do not obey the traffic rules? • Why are there traffic rules? • Why are traffic signs important?

ACTION

PERFORMANCE TASK:

Purpose: To raise awareness about traffic signs and flashing lights.

Role: Pedestrian, driver, illuminated signal device, traffic sign, traffic police, health worker.

Audience: School administration, teachers and students

Situation: Dear student,

As you know, hundreds of people die every year in our country due to traffic accidents. One of the causes of traffic accidents may be that some drivers do not comply with traffic signs and illuminated signal devices. In this regard, you are asked to prepare effectively for the role assigned you, by investigating other causes of traffic accidents, accompanied by the necessary materials; It is expected to make an impromptu presentation for the school administration, your friends and me on the traffic track that we will be prepared by our class.

Performance Standards:

- You can benefit from TUIK data for the causes of traffic accidents.
- While preparing for your role, you can think about what kind of materials you can design.
- You can write down notes on the materials you have designed.
- You can make your designs in any size you want, but you should make sure that they are compatible with your role.
- You can get help from your peers, family and teachers when you need, by keeping in mind that you have to do most of the task on your own.
- Since you will be presenting to the school administration, teachers and students, you should perform your role with dedication in a creative way and make it uniqe.
- Keep in mind that you have to perform your role within a week.

QUERY CYCLE

ENGAGE	At the beginning of the lesson, the teacher briefly introduces the students to the topics related to the unit. Then, students are asked to express what these topics recall and the subjects arouse their curiosity related to the topics. After the brainstorming, she asks them to write down their curiosity about traffic signs and signboards on papers and hang them on the curiosity wall. The basic question "What kind of incidents would we encounter in traffic if there were no traffic signs?" is asked. The answers are reinforced by the basic question "What can be the functions of signposts in daily life?" Then, students were shown a video about traffic signs. The lesson ends after the answers given by the students to the basic question "How does the life of people who comply with the traffic rules become easier?"
EXPLORE	The teacher divides the students into groups of four with the help of the names chosen from the name wheel. He asks them to generate ideas among themselves about what will happen if we do not comply with the traffic signs and the lighted signal device, and to reflect them on paper as statements or by drawing. The results obtained after brainstorming are discussed in the large group discussion. The discussion continues until they reach a conclusion.
EXPLAIN	Additional explanations are made when necessary under the guidance of the teacher regarding the inferences reached. Examples in daily life regarding the importance of obeying traffic rules in human life are discussed. The information provided is rehearsed by the question-answer method.
	After the presentation of the subject to the students, the fist making technique, which is one of the self-assessment techniques, was explained, and the students who raised their hands were asked how well they learned the subject: • One finger for those who are still at the beginning of learning, • Two fingers for those who need more practice, • Three fingers for those who need a little help, • The four fingers of those who know enough to do it alone,

ELABORATE	• Those who know well enough to explain it to someone are asked to open their five fingers. After this question, those who say "I learned very well" are provided the highest activity, and those who say "I learned very little" are provided the lowest activity. The activity pages are printed out by the teacher instantly, and the students are divided into six different groups and each student is given a task card with their own group color. Groups are allowed to discuss their activities, decide what activities to do, how to start those activities, and who will do each task: **According to the Level of Readiness:** • **For Advanced:** To create a conceptual network regarding the importance of traffic signs and illuminated signs in human life. • **For Intermediate:** The students are asked to guess what these signs are by distributing hint cards that introduce traffic signs and signboards. • **For Entry Level:** To create an information board on the importance of traffic signs and illuminated signs in human life. **According to Learning Style:** • **For Visual Intelligence:** To have students with a high level of visual intelligence make a group painting about the importance of traffic signs and illuminated signs in human life. • **For Auditory Intelligence:** To enable students with high auditory intelligence to compose songs in groups regarding the importance of traffic signs and illuminated signs in human life. • **For Kinesthetic-Social Intelligence:** To group students with high kinesthetic intelligence about the importance of traffic signs and illuminated signs in human life and give them the opportunity to do drama or animation. • **For Verbal Linguistic Intelligence:** To create an environment for students with high verbal-linguistic intelligence to write and present a poem or text on the subject by grouping the importance of traffic signs and illuminated signs in human life. **By Interest:** Information about the subject is obtained from book sections, story sets, newspaper pages, the internet or coding without a computer, regarding the importance of traffic signs and illuminated signs in human life. • **Program Compression (For the Gifted and Talented)** The content is differentiated with the scamper technique for the high-level thinking skills of gifted individuals. Finally, students are asked to present their work in the equalizer technique. **ACTION- SOCIAL RESPONSIBILITY PROJECT** The teacher mentions at the previous lesson, a week ago, that hundreds of people in Turkey die every year due to traffic accidents. He mentions that some drivers do not comply with traffic signs and illuminated signal devices and this is one of the reasons for traffic accidents. In this regard, he gives students a performance task to present their friends and the school administration in this class, tells them to be prepared effectively for the given role, bring the necessary materials, and researches other reasons that cause traffic accidents. Students who are responsible for the performance task make presentations to the school administration, friends and the teacher using the materials they prepared on the traffic track during this

	lesson. At the end of the lesson, the teacher evaluates the students using an analytical rubric.
EVALUATE	Tableau (living picture) assessment technique is used to assess students' understanding of basic concepts and the subject matter. With this technique, students are expected to demonstrate the concepts they have learned in the lesson by using their bodies, gestures and mimics without speaking or moving. The teacher guides the students in this regard. Students are divided into groups of 2-3 students. The concepts are first drawn on a worksheet and they are asked to act out these pictures with their bodies. Other students try to guess the concepts shown. Then, the Y diagram template is distributed to the students and they are expected to reflect on what they have heard, seen and felt in that week's lesson.
	The teacher asks the students to write a reflective diary describing that day after this one-day observation. **(For Intrapersonal Intelligence)**

Appendix 1.2: A lesson plan example created based on the model of Understanding by Design

Teachers:		
Branch:	Primary School Teachers	
Grade:	3rd Graders	
Subject:	**A Safe Life**	
Duration:	40+40+40+40+40+40 Minutes	
PHASE ONE-DESIRED RESULTS		
BIG IDEA: ''I can recognize the traffic signs and obey the rules.''	**GENERAL OBJECTIVES**	
	• They can recognize traffic signs and signboards • They can give necessary examples of obeying the rules in traffic.	
	COMPREHENSION	**BASIC QUESTIONS**
	C1. They understand the importance of obeying traffic rules. **C2.** They understand the importance of traffic signs in daily life. **C3.** They understand the causes of traffic accidents and how to take precautions about it.	**BQ1.** What kind of incidents would we encounter in traffic if there were no traffic signs? **BQ2.** What can be the functions of signboards in daily life? **BQ3.** How can following the traffic rules, make life easier for people? **BQ4.** What happens if we fail to comply with traffic signs and flashing traffic lights?
	KNOWLEDGE	**SKILLS**
	K1. They explain the terms "sign and sign". **K2.** They know what traffic signs mean.	**S1.** They give examples from their surroundings about situations where traffic rules are followed or not.

	K3. They recognize traffic signs. **K4.** They know that obeying the traffic rules will make their daily life easier.	**S2.** They explain the importance of traffic signs and signs in daily life with examples. **S3.** They explain the causes of traffic accidents. **S4.** They compare the situations that will arise if the traffic rules are followed and not followed.
	TRANSFER	
	T1. They create a traffic track by using traffic signs. **T2.** They obey traffic rules. **T3.** They introduce traffic signs to their peers. **T4.** They evaluate/discuss the situations that may arise in case of obeying or not obeying traffic rules. **T5.** They visit the traffic education centers in their vicinity.	
THE SECOND PHASE- EVIDANCES		
RESULT EVAULATION	**THE PERFORMANCE TASK:** **Purpose:** To raise awareness about traffic signs and flashing lights. **Role:** Pedestrian, driver, illuminated signal device, traffic sign, traffic police, health worker. **Audience:** School administration, teachers and students **Situation:** Dear student, As you know, hundreds of people die every year in our country due to traffic accidents. One of the causes of traffic accidents may be that some drivers do not comply with traffic signs and illuminated signal devices. In this regard, you are asked to prepare effectively for the role assigned you, by investigating other causes of traffic accidents, accompanied by the necessary materials; It is expected to make an impromptu presentation for the school administration, your friends and me on the traffic track that we will be prepared by our class. **Expected Standards for Performance:** • You can benefit from TUIK data on the causes of traffic accidents. • While preparing for your role, you can think about what kind of materials you can design. • You can make your designs in any size you want, but you should make sure that they are compatible with your role. • You can get help from your peers, family and teachers when you need, by keeping in mind that you have to do most of the task on your own. • Since you will be presenting to the school administration, teachers and students, you should perform your role with dedication in a creative way and make it unique. Keep in mind that you have to perform your role within a week. **Your work will be evaluated according to the following criteria:** • **Conducting Research** (Complete investigation of other causes of traffic accidents)	

	• **Capturing Audience Attention** (The drama work created has a remarkable feature) • **Role Play** (Transferring the emotions in acting to the audience) • **Authenticity** (The designed drama work is original with a different perspective) • **The Time Management** (Completion of the task within given time or before the given time (as an exception).
EVALUATION PHASE	**OTHER EVIDENCE** • Portfolios • KWL • Learning logs • Y diagram • Analytical Rubric

THE THIRD PHASE – THE LEARNING PLAN

Where

After the students are informed about the topics related to the unit, the achievements and the methods and techniques to be applied in the introduction part, the students are expected to reach the following comprehension acquisitions:

- Understands the importance of obeying the traffic rules.
- Understands the importance of traffic signs in daily life.
- Understands the causes of traffic accidents and how to take precautions about it.

Hook

- Video created to teach traffic signs.

Equip

- Name Wheel
- Brainstorm
- 5 E Model
- KWL technique
- Large group discussion
- Punch making self-assessment technique
- Equalizer technique
- Hint Cards
- Compression Program (for gifted individuals)
- Scamper Technique
- Learning diary
- Tableau (Living Picture)
- Y diagram
- Analytical Rubric

Rethink & Revise

- KWL, observing the group work and providing feedback,
- Examining the studies done in the equalizer technique and providing feedback,
- Giving feedback on the performances through rubrics,
- Providing feedback on performances once again through peer evaluation.

Evaluate

- Peer evaluation form
- Punch making self-assessment technique
- Tableau (Living Picture)
- Rubric

Tailor to student needs

- Teaching using the equalizer technique was differentiated in six different ways through students' readiness levels, learning styles and interests.

- Each rung of the 5 E model was differentiated.
- The teaching of gifted individuals is differentiated via the program compression technique.
- With the scamper technique, the teaching of high-level thinking skills of gifted individuals is differentiated.
- Visual and kinesthetic differentiation was made using the Living Picture evaluation technique.

Organize

The instructional design was prepared in accordance with the UbD steps. In addition, the activities are planned in accordance with the order of acquisition and content. Lessons and activities to be implemented are listed below:

(1) Topic: Traffic Signs and Plates (3 Lesson Hours):

Activity 1 (Lesson 1) 5 E Engage Step:

At the beginning of the lesson, the teacher briefly introduces the students to the topics related to the unit. Then, students are asked to express what these topics recall and the subjects arouse their curiosity related to the topics. After the brainstorming, she asks them to write down their curiosity about traffic signs and signboards on papers and hang them on the curiosity wall. The basic question "What kind of incidents would we encounter in traffic if there were no traffic signs?" is asked. The answers are reinforced by the basic question "What can be the functions of signposts in daily life?" Then, students were shown a video about traffic signs. The lesson ends after the answers given by the students to the basic question "How does the life of people who comply with the traffic rules become easier?"

Activity 2 (Lesson 2) 5 E Explore Step:

The teacher divides the students into groups of four with the help of the names chosen from the name wheel. He asks them to generate ideas among themselves about what will happen if we do not comply with the traffic signs and the lighted signal device, and to reflect them on paper as statements or by drawing. The results obtained after brainstorming are discussed in the large group discussion. The discussion continues until they reach a conclusion.

Activity 3 (Lesson 3) 5E Explain Step:

Additional explanations are made when necessary under the guidance of the teacher regarding the inferences reached. Examples in daily life regarding the importance of obeying traffic rules in human life are discussed. The information provided is rehearsed by the question-answer method.

Activity 4 (4th and 5th Class Hours) 5 E Elaborate Step:

After the presentation of the subject to the students, the fist making technique, which is one of the self-assessment techniques, was explained, and the students who raised their hands were asked how well they learned the subject:

- One finger for those who are still at the beginning of learning,
- Two fingers for those who need more practice,
- Three fingers for those who need a little help,
- The four fingers of those who know enough to do it alone,
- Those who know well enough to explain it to someone are asked to open their five fingers.

After this question, those who say "I learned very well" are provided the highest activity, and those who say "I learned very little" are provided the lowest activity. The teacher prints out the activity pages instantly, and the students are divided into six different groups and each student is given a task card with their own group color. Groups are allowed to discuss their activities, decide what activities to do, how to start those activities, and who will do each task:

According to the Level of Readiness:

- **For Advanced:**

To create a conceptual network regarding the importance of traffic signs and illuminated signs in human life.

- **For Intermediate:**

The students are asked to guess what these signs are by distributing hint cards that introduce traffic signs and signboards.

- **For Entry Level:**

To create an information board on the importance of traffic signs and illuminated signs in human life.

According to Learning Style:

- **For Visual Intelligence:**

To have students with a high level of visual intelligence make a group painting about the importance of traffic signs and illuminated signs in human life.

- **For Auditory Intelligence:**

To enable students with high auditory intelligence to compose songs in groups regarding the importance of traffic signs and illuminated signs in human life.

- **For Kinesthetic-Social Intelligence:**

To group students with high kinesthetic intelligence about the importance of traffic signs and illuminated signs in human life and give them the opportunity to do drama or animation.

- **For Verbal Linguistic Intelligence:**

To create an environment for students with high verbal-linguistic intelligence to write and present a poem or text on the subject by grouping the importance of traffic signs and illuminated signs in human life.

By Interest:

Information about the subject is obtained from book sections, story sets, newspaper pages, the internet or coding without a computer, regarding the importance of traffic signs and illuminated signs in human life.

- **Program Compression (For the Gifted and Talented)**

The content is differentiated with the scamper technique for the high-level thinking skills of gifted individuals.

Finally, students are asked to present their work in the equalizer technique.

Activity 5 (6th Class Hour) Performance Task:

The teacher mentions at the previous lesson, a week ago, that hundreds of people in Turkey die every year due to traffic accidents. He mentions that some drivers do not comply with traffic signs and illuminated signal devices and this is one of the reasons for traffic accidents. In this regard, he gives students a performance task to present their friends and the school administration in this class, tells them to be prepared effectively for the given role, bring the necessary materials, and researches other reasons that cause traffic accidents. Students who are responsible for the performance task make presentations to the school administration, friends and the teacher using the materials they prepared on the traffic track during this lesson. At the end of the lesson, the teacher evaluates the students using an analytical rubric.

Activity 6 (7th Lesson Hour) 5 E Evaluate Level:

Tableau (living picture) assessment technique is used to evaluate whether students understand the basic concepts and the subject. With this technique, students are expected to demonstrate the concepts they learned in the lesson using their bodies, gestures and facial expressions without speaking or moving. The teacher guides the students in this regard. Students are divided into groups of 2-3. Concepts are first drawn on a worksheet and asked to animate these pictures by using their bodies. Other students try to guess the concepts shown. Then, the Y diagram template is distributed and the students are expected to reflect what they heard, saw and felt in that week's lesson.

The teacher asks the students to write a reflective diary describing that day after this one-day observation. **(For Intrapersonal Intelligence)**

Appendix 1.3: Scamper Technique

TRAFFIC SIGNS AND PLATES	SUBSTITUDE	COMBINE	ADAPT
	If there were no traffic signs and signs, what would people use instead?	Who else can we help with traffic rules?	How can traffic signs and warning signs be in the future with the advancement of technology?

MODIFY, MINIFY, MAGNIFY	PUT TO OTHER USES	ELIMINATE	REVERSE, REARRANGE
How can we make obeying traffic rules fun?	If you were a traffic cop, how would you teach people to obey traffic rules?	How can the lives of people who remove traffic rules from their lives be?	How can the lives of people who do not obey the traffic rules be?

Appendix 1.4: Analytical Rubric
Performance Task 1 Analytical Rubric
Student's name and surname:……..
Class:/Grade ……..

	Exemplary (4)	**Accomplished (3)**	**Developing (2)**	**Beginning (1)**	**Opinions and Suggestions**
Conducting Research	The research on the subject is quite extensive.	The research on the subject is comprehensive, but there are some deficiencies	The research on the subject is somewhat extensive, but there are many shortcomings.	Research on the subject is very superficial.	
Capturing Audience Attention	The drama performed aroused interest of the other students and they watched it carefully.	The drama performed aroused interest of the other students, but they did not watched it carefully.	The drama performed did not arouse the curiosity of the other students, but the students watched the play.	The drama performed did not arouse the curiosity of the other students and the students were bored while watching the play.	
Role Play	The drama was performed accurately conveyed to the audience. The audience understood the theme.	The drama was performed accurately but the audience had difficulties in understanding the message.	The drama was performed incompletely and incorrectly, but the audience did not have any difficulty in understanding the theme.	The drama was performed incompletely and incorrectly. The audience had difficulties in understanding the theme.	

Authenticity	The drama was presented in an original way, from a different perspective.	There are mostly authentic expressions in the presented drama. A few chapters are inspired by other works.	There is some authenticity in the presented drama task. Certain parts are inspired by other works.	The presented drama task is not authentic. All sections are inspired by various studies.	
The Time Management	The assignment was delivered on time or before the deadline.	The assignment was submitted 3-4 days after the due date.	The assignment was submitted 3-4 days after the due date.	The assignment was submitted a week after the due date.	

Appendix 1.5: Y Diagram