ASSESSMENT CONCEPTIONS OF TURKISH MATHEMATICS TEACHERS OF INTERNATIONAL MIDDLE YEARS PROGRAMME (MYP)

by

Merve Özcan

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APPROVED BY:

Assoc. Prof. Fatma Aslan Tutak ..... (Thesis Supervisor)

Assoc. Prof. Sevda Yerdelen-Damar .....

Assist. Prof. Gürsu Aşık .....

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to my beautiful niece Zeynep Doğa

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ABSTRACT

ASSESSMENT CONCEPTIONS OF TURKISH MATHEMATICS TEACHERS OF INTERNATIONAL MIDDLE YEARS PROGRAMME (MYP)

The primary purpose of this study was to investigate Middle Years Programme (MYP) Mathematics Teachers conceptions of assessment. It was also aimed at finding out the relationship between teachers' conceptions of assessment, curriculum orientation and mathematics related beliefs. Quantitative data were gathered through an online survey which contains Teacher Conceptions of Assessment Abridged Scale (TCoA-IIIA), Curriculum Orientation Scale (COS), Mathematics Related Beliefs Scale (MRBS) and some open ended questions from 30 MYP mathematics teachers. Qualitative data was collected by conducting interviews with 3 of these teachers. The descriptive results revealed that MYP mathematics teachers mostly think that assessment is for Improvement while moderately agreeing on accountability purposes. Correlation analysis indicated a strong positive correlation between Improvement and Student Accountability conceptions. Irrelevance had negative correlations with Improvement and School Accountability. Traditional beliefs had moderate negative correlations with Improvement and Student Accountability. On the other hand, there was a moderate positive correlation between Student Accountability and Constructivist Beliefs. The interviews were analyzed with two methods, (i) coding for teachers' conceptions of assessment and (ii) thematic analysis. Improvement (66 codes), Student Accountability (15 codes) and Irrelevance (2 codes) conceptions were appeared in the first analysis. In addition, thematic analysis revealed 6 themes about teachers' conceptions of assessment in relation with curriculum.

ÖZET

ULUSLARARASI ORTA YILLAR PROGRAMI (MYP) MATEMATİK ÖĞRETMENLERİNİN ÖLÇME VE DEĞERLENDİRME KAVRAYIŞLARI

Bu çalışmanın temel amacı Uluslararası Orta Yıllar Programı (MYP) kapsamında çalışan Türk matematik öğretmenlerinin ölçme ve değerlendirme sürecine ilişkin kavray- ışlarını incelemektir. Bunun yanında bu kavrayışlarının müfredat yönelimleri ve matematik ile ilgili inanışları arasındaki ilişkiyi incelenmiştir. Nicel veriler Öğretmenlerin Ölçme ve Değerlendirme Sürecine İlişkin Kavrayışları Ölçeğinin (TCoA-IIIA) kısaltılmış versiyonu, Müfredat Yönelim Ölçeği (COS), Matematik Hakkındaki İnanışlar Ölçeği (MRBS) ve açık uçlu sorular içeren çevrimiçi bir anket yolu ile 30 MYP Matematik Öğretmeninden toplanmıştır. Nitel veri toplama sürecinde ise bu öğretmenlerden 3 tanesi ile görüşmeler yapılmıştır. Sonuçlar, MYP matematik öğretmenlerinin çoğunlukla değerlendirmenin Gelişim için olduğunu düşündüklerini, bunun yanında okul ve öğrenci sorumluluğu amaçlarına da orta derecede katıldıklarını ortaya koymuştur. Korelasyon analizi, Gelişim ve Öğrenci Sorumluluğu amaçları arasında anlamlı bir ilişki olduğunu göstermiştir. Ancak, Önemsizlik ile Gelişim ve Okul Sorumluluğu amaçları arasında negatif yönde bir ilişki ortaya çıkmıştır. Geleneksel İnanışlar, Gelişim ve Öğrenci Sorumluluğu ile orta düzeyde negatif korelasyon göstermiştir. Öte yandan, Öğrenci Sorumluluğu ile Yapılandırmacı İnanışlar arasında orta düzeyde pozitif bir ilişki görülmüştür. Öğretmenlerle yapılan görüşmeler iki farklı yöntemle analiz edilmiştir: (i) öğretmenlerin ölçme değerlendirme kavrayışlarına yönelik kodlama ve (ii) tematik analiz. İlk analizde Gelişim (66 kod), Öğrenci Sorumluluğu (15 kod) ve Önemsizlik (2 kod) boyutları ortaya çıkmıştır. Ayrıca, tematik analiz öğretmenlerin müfredat kapsamındaki ölçme ve değerlendirme kavrayışları hakkında 6 tema ortaya koymuştur.

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LIST OF ACRONYMS/ABBREVIATIONS

Con-CO	Constructivist Curriculum Orientation
Con-MRB	Constructivist Beliefs
COS	Curriculum Orientation Scale
DP	Diploma Programme
IBO /IB	International Baccalaureate Organization
IMP	Improvement Conception
IRR	Irrelevance Conception
MoNE	Turkish Ministry of National Education
MRBS	Mathematics Related Beliefs Scale
MYP	Middle Years Programme
PYP	Primary Years Programme
SCA	School Accountability Conception
STA	Student Accountability Conception
TCoA-IIIA	Teachers' Conception of Assessment Abridged Scale
Tra-CO	Traditional Curriculum Orientation
Tra-MRB	Traditional Beliefs

1. INTRODUCTION

School is a place to prepare children for their life, give them opportunities to acquire the skills that are necessary for their future. The primary aim of the education is to raise young generations so that they know how to reach correct information, how to use and organize them. This aim of education has changed the classroom environments in a way to make students more active and responsible for their own learning. As a part of the changing trends in education, governments and educational policy makers have been working on educational reforms on their curriculum. The results of international assessments and surveys such as Trends in International Mathematics and Science Study (TIMSS) and Program for International Student Assessment (PISA) are analyzed in the process of curriculum development in Turkey (Ministry of Education, 2018).

The success of these reforms depends on the how they are understood, approached and applied by teachers and students. William and Black (1998) refer the classroom as a black box. Some input are placed in this black box and there are some expected outcomes. However, what is happening in the box is not given enough attention. Assessment is one of the key elements inside this black box. Assessment becomes very powerful when it is selected, implemented and evaluated carefully. It gives teachers opportunities to follow their students' improvements, to get more information about students' learning; and to make improvements in their lessons (Black, 2014; Dixson andWorrell, 2016; Gearhart and Saxe, 2004; William and Black, 1998). Assessment is also very important for students since they are expected to be responsible and active in their own learning process (William and Black, 1998). Thus, the changes in the curriculum have to be supported with corresponding changes in the assessment (Darling-Hammond *et al.*, 2013).

The important role of teachers in this new educational era is emphasized by Association of Teacher Educators (ATE) Commission on Classroom Assessment (2014) as; "Today's classroom teachers are expected to optimize the teaching, learning, and

schooling so the educational experience is learner centered, standards based, achievement oriented, data driven, and culturally competent" (p. 364). These expectations will become a part of teachers' implementations if they correspond to teachers' beliefs and conceptions. Teachers' beliefs about teaching, learning, curriculum, school and students affect their decisions, behaviors and practices (Pajares, 1992; Thompson 1984). Teachers have their own belief system that contains beliefs about learners, teaching, learning, resources, knowledge and curriculum (Gudmundsdottir and Shulman, 1987; Pajares, 1992). In addition to pedagogical knowledge and curriculum guidelines, these beliefs serve as a filter in teachers' decision making process (Ambrose, 2004; Clark and Peterson, 1986). Therefore, understanding teachers' beliefs is very important to see what is happening inside classrooms. According to Handal and Herrington (2003) curriculum changes related to teachers' practices are more likely to be successful when teachers' beliefs are taken into account. In other words, if the beliefs of teachers do not match with the underlying beliefs of the educational reform the success of the reform could be affected.

The primary purpose of the current study is to understand the assessment conceptions of MYP Mathematics teachers in Turkey. The assessment conceptions refers to the four purposes of assessment (Student Accountability, School Accountability, Irrelevance and Improvement) introduced by Brown (2002). These conceptions are important since they show what assessment means to practitioners rather than what is suggested (Vardar, 2010). Teachers do not just hold beliefs about assessment. They have a belief system containing beliefs about different aspects of education. Therefore, it is very important to understand teachers' beliefs as whole. In order to do so the relationship between different purposes of assessment, how assessment conceptions are related with teachers' curriculum orientation and mathematics related beliefs will be examined in this study.

2. REVIEW OF THE LITERATURE

Teachers are an important component of education. Therefore, understanding teachers' conceptions about different educational aspects such as assessment, curriculum, teaching and learning is very crucial. The number studies that focus on teachers' conceptions and beliefs have been increasing in recent years. The literature review of this study will start with brief descriptions assessment in education. Then, teachers' role in assessment will be discussed by introducing teachers' conception of assessment, curriculum and subject related beliefs. Assessment in Turkish education system will be briefly described. In the last part, International Baccalaureate Organization (IB) and IB programmes will be introduced focusing on the details of the Middle Years Programme (MYP).

2.1. Assessment in Education

Assessment can be defined as any of an assortment of procedures that provides information about the performance of the student (Miller *et al.*, 2009). Assessment is used for different purposes; administrative, grading, placement or improvement. An assessment instrument which is effective for one purpose might be meaningless for another purpose. Thus, it is important for teachers to be aware of their goals of using an instrument and design it accordingly (Dixson and Worrell, 2016; Miller *et al.*, 2009). Today's teachers are expected to be equipped with different assessment strategies and tools that encourage student engagement and provide meaningful data (ATE Commission on Classroom Assessment, 2014; International Baccalaureate Organization, 2017; Ministry of Education, 2018). Using different tools gives teachers the opportunity to have continuous data about student learning and thinking. Teachers can use these data to modify their instructions, to focus on misconceptions, add an activity, and give feedback to students.

2.1.1. Traditional and Alternative Assessments

Educational reforms have increased the use of assessment instruments which focus on the process rather than just the end product. This change in assessment and evaluation has increased the use of alternative assessment in addition to traditional assessment (Dikli, 2003; Karakuş, 2010; Nazlıçiçek and Akarsu, 2009). The main purpose of traditional assessment tools is to determine what and how much a student learned by assessing students at a certain time, generally at the end of instruction (Karakuş, 2010). Traditional methods are generally paper-pencil methods such as matching, multiple choice and fill in the blanks.

Alternative assessment aims at evaluating students' performance with multiple tools on a long term basis (Baki, 2008). Alternative assessment methods such as peer-assessment, portfolio and group work enable teachers to see student progress. Nazlıçiçek and Akarsu (2009) made a research about physics, mathematics and chemistry teachers' approaches to assessment tools and their assessment practices. The results of teachers' knowledge about assessment tools showed that they have higher averages on traditional methods. On the other hand, the lowest averages are on alternative methods which are concept maps, portfolios, journals and experiment reports.

2.1.2. Formative and Summative Assessment

The changing trends in education also support the use of formative assessment tools. William and Black (1998) define formative assessment as all activities done by teachers and students that provide information in the process of improving of teaching and learning practices. Summative assessment refers to the use of assessment to determine the quality of student learning and evaluating student performance (Dixson and Worrell, 2016).

Different studies show that formative assessment has a positive effect on students' learning (Gearhart and Saxe, 2004; William and Black, 1998). The students become an integral part of their own learning since they receive immediate and more personal

feedback. That is why teachers' knowledge about formative assessment techniques and their use brings many advantages to teaching and learning (Keeley and Tobey, 2011). Low-achievers or students who struggle with a subject start to believe that they are unable to be successful. These students eventually lose their self esteem, give up trying and sometimes become a "difficult kid" for teachers (William and Black, 1998). The use of formative assessments can change this in a positive way. The results of formative assessment are only used by teachers and the students themselves. This changes the students' focus from being successful to learning. When formative assessment is used properly, teachers can create a classroom environment in which every student believe in him/her to be successful (William and Black, 1998).

2.2. Teachers' Role in Assessment

The way teachers approach assessment is very important. The purpose of the same instrument can change according to how teachers approach it. An assessment would become formative assessment when the provided data is used to modify teaching in a way to address students' needs (William and Black, 1998). If teachers only use assessment results for evaluating performance of students, then they might underestimate the use of assessment results for improving their instruction. Students' attitudes are also affected by teachers' thinking about the purpose of the assessment (Brown, 2012). When students test scores, participation in class discussions, etc. are used for only summative purposes, their aim becomes getting the right answer. They try to get good grades, collect in-class points or give the "expected" answer. They don't want to be involved in cognitively demanding tasks. They are interested in how the results of any assessment will affect their grades (William and Black, 1998).

The studies on teachers' use of assessment show that there are many factors affecting teachers' assessment choices. These factors are both internal and external. Teachers' beliefs about teaching (ATE Commission on Classroom Assessment, 2014) and their self-esteem about the assessment type (Gelbal and Kelecioğlu, 2007) are examples internal factors. The pressure of high-stake exams/from parents-administers (ATE Commission on Classroom Assessment, 2014; Dixson and Worrell, 2016) and the

limitations of time (ATE Commission on Classroom Assessment, 2014; Black, 2014; Gelbal and Kelecioğlu, 2007) are some external factors.

2.3. Teachers' Beliefs and Conceptions

Beliefs were defined as 'mental constructions of experience-often condensed and integrated into schemata or concepts' by Sigel (1985) (cited in Pajares 1992, p. 313). Thompson (1992) used conception as a broader term which is "all that a teacher thinks about the nature and purpose of an educational process or practice". There has been an increase in the number of studies that examines teachers' beliefs and how these beliefs influence their practices. These studies revealed that teachers' beliefs about teaching, learning, curriculum, school and students affect their decisions, behaviors and practices (Pajares, 1992; Thompson 1984). Teachers have their own belief system that contains beliefs about learners, teaching, learning, resources, knowledge and curriculum (Gudmundsdottir and Shulman, 1987; Pajares, 1992). In addition to pedagogical knowledge and curriculum guidelines, these beliefs serve as a filter in teachers' decision making process (Ambrose, 2004; Clark and Peterson, 1986). Therefore, understanding teachers' beliefs is very important to see what is happening inside classrooms.

In education, the policy makers and the ones who implement the policy changes in schools are not the same people. This increases the importance of understanding teachers' conceptions and beliefs. The way teachers understand, approach and implement the educational policies depend highly on their conceptions (Brown, 2011b). Thompson (1992) states the importance of understanding teachers' conceptions as: *If teachers' characteristic patterns of behavior are indeed a function of their views, beliefs, and preferences about the subject matter and its teaching, then any attempt to improve the quality of mathematics teaching must begin with an understanding of the conceptions held by the teachers and how these are related to their instructional practice (p. 106).*

2.3.1. Beliefs Related to Teaching and Learning

Research on education has been emphasizing the fact that teachers' classroom behaviors and activities are shaped by various frameworks which stand for teachers' conceptions about teaching and learning (Chan and Elliot, 2004). For instance, mathematics teachers' practices are affected by their beliefs about mathematics and teaching and learning mathematics (Pajares, 1992; Thompson, 1992).

Chan and Elliot (2004) associate teachers' conceptions about teaching and learning to constructivist and traditional learning models. Constructivist learning model emphasize the creation of an active learning environment for students. On the contrary, the traditional model considers teachers as the source of information and students as passive learners. They conducted a study about teaching and learning conceptions of Hong Kong pre-service teachers, and the results showed that they do not exclusively believe in one of Constructivist or Traditional Model. The researchers explain this result with the intermingling of the conceptions. Hong Kong has a traditional teaching and learning approach (Brown *et al.*, 2011; Chan and Elliot, 2004). This might explain the tendency of Hong Kong pre-service teachers to have traditional conceptions. This explanation is also supported by the findings of Pajares (1992) as teachers' background affects their conceptions.

The results of a study that focused on the mathematics related beliefs of pre-service mathematics teachers in Turkey indicate that pre-service mathematics teachers have more constructivist beliefs than traditional. However, they have very traditional beliefs about solving questions. The reason behind this might be the testing system which requires a single correct answer (Haser *et al.*, 2013). A similar study was conducted by Çevirgen (2016) with the instrument developed for the previous study showed that pre-service mathematics teachers are in favor of constructivist beliefs and their beliefs become more constructivist as the grade level increases.

2.3.2. Curriculum Related Beliefs

Curriculum can be examined under two approaches as what is planned and what is experienced in the classroom. Intended curriculum is defined as "the educational systems' goals and means" (Schmidt *et al.*, 1996, p. 16), which contains the body of knowledge, ideas, and processes the policy makers want students to learn and experience in classrooms (Makowski, 2017; Özülkü, 2013). The curriculum is not always implemented in the classroom as it is intended by the curriculum developers. The enacted curriculum (Stein *et al.*, 2007), reflects what is actually experienced by the students in the classroom. Teachers are the main implementers of the curriculum. As it is revealed in the literature, their classroom practices are affected by their beliefs. Therefore, the enacted curriculum can be said to be a result of teachers' beliefs about curriculum, teaching and learning.

The applicability of an educational program will increase when teachers have positive opinions about the program. On the other hand, the negative opinions of teachers about the program make it difficult to apply it properly (Burkhardt, Fraser and Ridgway, 1990). Duru and Korkmaz (2010) conducted a study in order to investigate the opinions of mathematics teachers and homeroom teachers about mathematics curriculum. The results showed that these teachers have positive opinions about the mathematics curriculum. However, it was revealed that the program was not introduced to teachers properly. This might affect the implementation of the program. If the teachers do not receive professional support in the implementation of a new program they would implement it according to their own understanding. According to Handal and Herrington (2003) curriculum changes related to teachers' practices are more likely to be successful when teachers' beliefs are taken into account. Otherwise, teachers will continue to use their own practices in their classroom which will decrease the success of the educational reform.

If the mathematics teachers' beliefs are not congruent with the beliefs underpinning an educational reform, then the aftermath of such a mismatch can affect the degree of success of the innovation as well as the teachers' morale and willingness to implement

further innovation. (Handal and Herrington, 2003, p. 2).

Özülkü (2013) conducted another study to understand how the changes in physics curriculum are implemented by three teachers. The results of her study revealed that these three teachers only cover the topics according to the order stated in the curriculum. However, they rarely used the teaching methods of the intended curriculum and focused more on the possible questions that are asked in the university entrance exam. This results supports to importance of teachers' beliefs as shared by Handal and Herrington (2003).

Another study conducted by Ekici (2009) focused on pre-service science and technology teachers' curriculum orientation according to their grade level. He evaluated the curriculum orientation as constructivist or traditional. It can be interpreted that the pre-service science and technology teachers' conceptions about science curriculum gets closer to the constructivist view in the process of teacher training program.

2.3.3. Conceptions of Assessmentl

In the process of assessment, teachers' individual experiences and conceptions affect their students' learning and classroom performance (Vardar, 2010). The term "conception of assessment" aims to bring out the purposes of conducting assessment. Brown (2002) introduces four purposes of assessment as; school accountability, student accountability, improvement and irrelevance. Different studies used the four purposes framework to examine conceptions of assessment of teachers from different cultures (Brown, 2002; Brown *et al.*, 2011a; Brown *et al.*, 2011b; Brown, 2012). In addition, some studies were conducted in Turkey with sixth, seventh, eighth grade teachers (Vardar, 2010); pre-service English teachers (Yetkin, 2017; Yüce, 2015) and English preparatory class students and teachers of a university (Zaimoğlu, 2013). In the following part, the details of the four purposes will be explained with results of the mentioned studies.

2.3.3.1. Improvement Conception. The effect of assessment in improving teaching and learning has been topic of interest with the reforms on education. The educational reforms have started to change the primary aim of assessment into improvement of teaching and learning. Therefore, assessment is accepted as an integral part of teaching and learning. High quality assessment provides high quality information that shapes the classroom decisions of teachers about what to teach, how to teach (Nitko and Brookhart, 2011). Assessment is not just limited to testing and grading students; it is an important source of data for improving teaching and learning for both teachers and students (Brown, 2002; Nitkoand Brookhart, 2011).

Brown (2002) defines "improvement conceptions" as using assessment for the purpose of improving teaching and learning. There are different studies about teachers' conceptions of assessment in different countries (Brown, 2012; Vardar, 2010; Yetkin, 2017; Zaimoğlu, 2013; Yüce, 2015). The studies show that the teachers approve improvement purpose of assessment independent of their culture.

2.3.3.2. Student Accountability Conception. High stakes exams are used for evaluating student performance and the results of these exams used for placement purposes. The use of high stakes exams have created an educational atmosphere in which the focus is getting high scores for students, parents, teachers and schools. Student accountability conception refers to the use of assessment for evaluating students' performance and success.

The high stakes exams attract more attention than the assessment that takes place in schools under the control of teachers (Miller *et al.*, 2009). In some societies, the results of the national exams are very important. This situation affects the way teachers and, thus students approach the assessment. The studies on "conceptions of assessment" show that the way assessment is approached and the purposes attributed to assessment in a specific culture affect teachers' conceptions. The teachers of cultures in which assessment is high stake approve the accountability purpose more (Brown, 2011; Brown, 2012; Vardar, 2010).

2.3.3.3. School Accountability Conception. School accountability conception refers to the use of assessment data for evaluating the performance of schools and teachers (Brown, 2002). Teachers are accountable for their students' learning and they need to make it apparent to managers, supervisors and parents (Brown, 2012). This responsibility leads teachers to associate assessment with School accountability conception. Brown (2012) states that "teachers" thinking about assessment reflects the pressures and priorities of the system" (p.6). When students performance is seen as the most important indicator of a teacher' effectiveness, teachers start to feel under pressure. Different studies on the factors affecting teachers' assessment methods have revealed that the pressure coming from the high-stakes exams and accountability responsibilities to parents and administration affect teachers' decision (ATE Commission on Classroom Assessment, 2014; Dixson and Worrell, 2016).

Brown compares conceptions of teachers' from different cultures in his studies. For example; in New Zealand, the schools are independent in terms of administration. The selections of students, teachers are schools own responsibility. The government makes some inspections to check schools' performance. Thus, New Zealand teachers' give more attention to school accountability. However, in Chinese education system the success of students in high stake exams have a crucial importance. Thus, the teachers attribute student accountability purpose to assessment (Brown, 2011a; 2011b).

2.3.3.4. Irrelevance Conception. This conception refers to the idea that assessment is not useful in education process. The irrelevance conception might be a result of factors that have a negative effect on the quality of assessment. Teachers might be using various and powerful assessment tools. However, their lack of knowledge about how to apply the tools and how to use the results might cause the assessment to become meaningless (Vardar, 2010). According to Brown (2002), the idea of irrelevance of assessment is related with two claims: a) assessment means testing and testing is bad for education; b) assessment makes teachers, schools and students accountable.

Most of the studies conducted in Turkey showed that teachers agree less on irrelevance conception among the four purposes of assessment (Vardar, 2010; Yetkin, 2009; Zaimoğlu, 2013). However, the study of Yüce (2015) showed that pre-service English teachers also agreed on the Irrelevance of assessment.

2.4. Assessment in Turkey

There have been some major changes in the Turkish education system. The curriculums of each subject have been reviewed for all grade levels during the last decades. In addition, the national assessment systems have gone into an important change. The procedures and the question types of high-stake exams for university entrance and transition to high school have renewed for several times. The assessment approaches of the last Mathematics Curriculum states that assessment is an integral part of education and assessment results should be examined as a part of education process. In addition, multidimensional assessment is also emphasized concerning the differences of individuals and the limitations of using one type of assessment. Students and teachers must actively engage in assessment procedures (Ministry of Education, 2018a).

High stakes exams have an important role in Turkish Education. Students take a test in the last year of middle school and high school. The scores students get from these exams affect their further education. In the last decade, there have been drastic changes in the structure of the high stake exams for moving from middle school to high school and university entrance. In 2018, a new system has been introduced in the examination for transition from middle school to high school. The High School Transition Exam (Liselere Geçiş Sınavı- LGS) is implemented in two parts. The first part consists of a total of 50 multiple choice questions from Turkish (20), foreign language (10), religion and ethics (10), and Turkish Republic revolution history and Kemalism (10). The students are given 75 minutes for this test. The second part consists of 20 mathematics and 20 science questions, and takes 80 minutes. Scores of these tests are used for student placement into high schools that are labeled as prestigious by the MoNE and most of the private schools also use these scores to enroll students. Unlike the previous one,

the new system offers an option to parents and students as not taking the exam. In this case, students will apply the schools in their neighborhood and be placed in one. However, in 2018, 81.46% of the middle school graduates preferred to take the exam (Ministry of Education, 2018a). The percentage of 8thgrade students who took the exam increased to 85.08% in 2019 (Ministry of Education, 2019). The mathematics test of the previous exam mostly had direct questions which are solved using specific content knowledge. However, High School Transition Exam can be said to measure students' higher order thinking skills in non-routine problems. Students are expected to understand and analyze the question to decide which mathematical skills/knowledge they need.

2.5. The International Baccalaureate Organization - IBO

The mission of the IB is to raise inquiring, knowledgeable and caring individuals for creating a better and more peaceful world. IB students are encouraged to be active, compassionate and lifelong learners who accept and understand differences. The classroom environments, curriculum and assessment procedures of IB programmes provide an opportunity to raise global students who are skilled for the future. IB expects students to endeavor to become "inquirer, knowledgeable, thinker, communicator, principled, open-minded, caring, risk taker, balanced and reflective" learners. These 10 attributes which are named as IB learner profiles reflect the mission of IB (International Baccalaureate Organization, 2014).

Founded in 1968, the International Baccalaureate (IB) is a non-profit educational foundation offering four highly respected programmes of international education that develop the intellectual, personal, emotional and social skills needed to live, learn and work in a rapidly globalizing world (International Baccalaureate Organization, 2014).

IB offers 4 different programs for different ages;

- Primary Years Programme (PYP) is for ages 3 - 12
- Middle Years Programme (MYP) is for ages 11 - 16

- Diploma Programme (DP) is for ages 16 - 19
- Career- related Programme (CP) is for ages 16 - 19

IB programmes are taught in 149 countries in 5011 schools from Africa, Europe, Middle East, Asia- Pacific and North, Central and South America. In Turkey, 76 schools have been offering different IB programmes except the Career-related Programme (International Baccalaureate Organization, n.d). Only 3 of these schools are public high schools which are offering DP. The schools can offer different programmes at the same time. If a school offers all three programmes it is called a continuum school. There are 8 continuum schools in Turkey. 22 schools offer just PYP, 37 schools just offer DP and there is only 1 school offering just MYP.

The assessment approach of IB is the same for all programmes. It is stated in the IB standards that "learning, teaching and assessment effectively inform and influence one another." (International Baccalaureate Organization, 2018). In this study, the focus is the schools that are covering Turkish Mathematics curriculum within the context of an IB programme. MYP is purposively chosen to the IB programme as it has an improvement oriented assessment approach. The accountability purpose of assessment is minimized since there is no compulsory exam to finish the programme. During the scope of the programme students are not graded according to specific exams. They are provided with feedback to improve themselves. Students' improvement during the process is more important than the end products. On the other hand, Turkish MYP schools are expected to fulfill MoNE requirements. For example, students are graded according to their performances on specific exams and 8th graders of MYP still need to take an exam in order to apply prestigious high schools. In addition, most of the Turkish MYP mathematics teachers have a Turkish educational background in which assessment approach was different than MYP. All of these aspects might have different affects on Turkish MYP Mathematics teachers' conceptions of assessment. As the aim of this study is to investigate teachers' conceptions of assessment in relation with curriculum, MYP was chosen for its unique curriculum.

2.5.1. Diploma Programme (DP)

DP is the most offered programme in Turkey with 50 schools and it is also the most offered programmer among the 4 IB programmes all around the world. DP is first offered in 1968 and it is first offered in Turkey in 1994 (International Baccalaureate Organization, 2014). Students take internal and external assessments in DP. At the end of the second year of DP, students take external exams from different subjects in order to have their diploma. In addition, DP students prepare a very comprehensive final project named as extended essay. In line with philosophy of IB, the students choose the subject and topic according to their own interest. The reason of not focusing on DP for this study is the high stake nature of external assessments. The grades that students take from these exams reflected on their IB Diplomas which is used in application to universities. There is a similar pressure for non-DP students as they need to take the university entrance exam.

2.5.2. Primary Years Programme (PYP)

Primary Years Programme, which is introduced in 1997, is the first programme of the IB continuum. 36 schools in Turkey offer PYP. In this programme, transdisciplinary themes unite different subject areas and show students that the subjects connect beyond boundaries. There are six of transdisciplinary themes of global significance: "who we are, where we are in place and time, how we express ourselves, how the world works, how we organize ourselves, and sharing the planet" (International Baccalaureate Organization, 2018). The PYP includes ages from 3 to 12 which correspond to Grade 4 and before for MoNE. In Turkish education, the examinations start at Grade 4. Therefore, it is assumed that MoNE does not put any limitations for PYP teachers in terms of assessment and their conceptions would be similar to teachers of non-IB schools.

2.5.3. Middle Years Programme (MYP)

MYP programme is the least offered programme (excluding CP) in Turkey (14 schools) and also around the world. MYP is first offered in 1994. MYP is a student

centered program that emphasizes holistic learning and inter-cultural awareness and communication. These key elements are applied to whole MYP subjects which are language acquisition, language and literature, individuals and societies, mathematics, design, arts, sciences, physical and health education. Students are provided with the opportunity to show their strengths in different areas. Students are expected to be aware of their own learning process, MYP challenges students for being able to form connections between real life and their studies, and develop higher-order thinking skills (International Baccalaureate Organization, 2016). While doing so, the programme is compatible with any national, state or other curriculum standards.

MYP curriculum is concept- based. Every subject area both has its own concepts and shares common concepts with other areas. These concepts help students to make inter and intra disciplinary connections and enable a deeper understanding.MYP is not just aiming to build knowledge. It aims to develop skills which help students "learn to learn". These skills are defined as Approaches to Learning (ATL) skills and teachers plan their units in a way to address at least two ATL skills. The skill categories and clusters for each skill are given below.

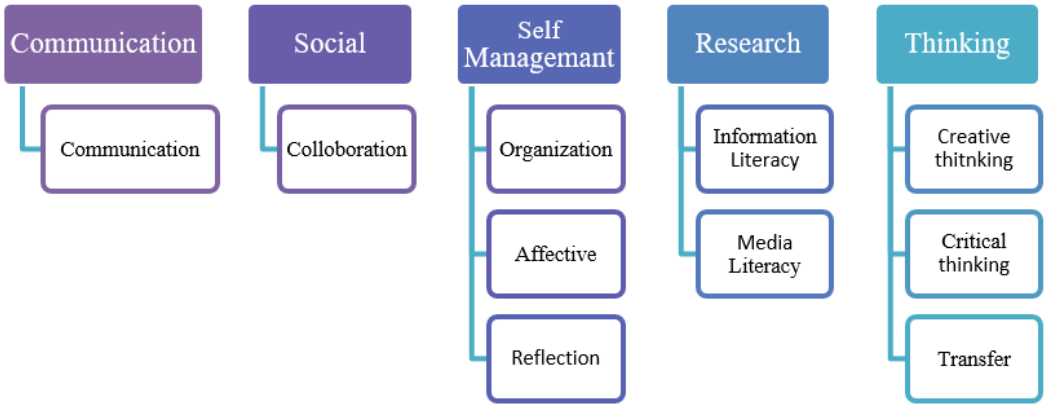

Figure 2.1. ATL Skill Categories and Clusters.

Every unit of each subject has a global context to help students to make connections with real life so as "to encourage international mindedness and global engagement within the programme" (International Baccalaureate Organization, 2014a, p. 18). A key concept and two related concepts are chosen for each unit. The concepts and global

context are used to construct a statement of inquiry which describes the relationship between these elements in the light of unit content (International Baccalaureate Organization, 2014a). ATL skills and IB learner profiles are also included in the plans. Having these different components of unit and lesson plans, MYP teachers also build their assessment to assess the Key and Related Concepts, Global Context, ATL skills and also IB learner profiles.

2.5.3.1. Mathematics Curriculum in MYP. The mathematics curriculum of MYP covers numbers, algebra, geometry, trigonometry, statistics and probability. In the MYP, mathematics encourages inquiry and application. This helps students to improve problem solving skills and to be able to transfer these skills to other disciplines and to their life outside the school (International Baccalaureate Organization, 2014b). The focus of MYP mathematics education is in line with the standards of National Council of Teachers of Mathematics (NCTM) and the properties stated in the Turkish Mathematics curriculum.

MYP mathematics teachers provide students with authentic examples for students to realize the importance of mathematics in their lives. Students are encouraged to apply their mathematical knowledge to new situations. Students of MYP are involved in activities where they represent the information, explore and model situations and solve familiar and unfamiliar problems. These are vital mathematical competencies not only for IB, but also for mathematics education all around the world. Especially, being able to use the mathematical knowledge for solving problems in unfamiliar context is becoming an important aspect of mathematics education.

2.6. Assessment in MYP

MYP does not require students to take a specific exam to finish the programme. There is an e-assessment process of MYP. The schools voluntarily take the e-assessment. The only compulsory assessment is in the last year of MYP; students prepare a personal project on a topic of their interests, to demonstrate their skills (ATL skills) and

IB learner profiles that they developed through the programme. These projects are internally assessed by the personal project advisors of that school and also IB chooses some projects randomly for moderation.

The most important assessment principle of IB community is highlighted as "..... and the most important principle is that assessments should support education, not distort it"(IBO, 2017, p. 21).

They outline the properties of good assessment as:

In particular, good assessment design is different for summative and formative assessment. Expanding on this principle, the IB's views on what makes good assessment can be summarized as:

- supporting Curriculum goals
- using a range of assessment tasks
- considering wider student competencies and higher-order thinking skills (International Baccalaureate Organization, 2017, p. 90- 91).

MYP has 4 assessment criteria for every subject. The 4 assessment criteria of MYP mathematics are:

(i) Knowing and Understanding: The students are expected to select and apply appropriate mathematical strategies to solve familiar and unfamiliar problems
(ii) Investigating Patterns: The students are expected to discover patterns, form general rules and verify/prove their rules
(iii) Communicating: Students are expected to use appropriate mathematical language and representations; make connections between forms of representations.
(iv) Applying Mathematics in real-life contexts: Students are expected to select and apply appropriate mathematical strategies to solve authentic real situations, justify the degree of accuracy of their solution (International Baccalaureate Organization, 2014a).

At the end of each unit, at least one criterion is used as summative assessment. The students must be assessed by each of the four criteria at least twice in a year. These criteria are graded from 0 to 8. The teachers decide the final grade of the students. Even though they are named as end of the unit summative assessment tasks, they don't serve only summative purposes. The rubrics are provided to the students with the tasks. Thus, students know what is expected from them and also they make self-evaluations. Students may be asked to write reflections at the end of an assessment task. They are expected to use their reflective thinking skills and judge their own work. Teachers are expected to use formative assessments before the summative assessment tasks and give feedback to students. In MYP, the assessment is not just interested in the end product; learning process is at least as much important. MYP teachers are expected to integrate different assessment strategies to their teaching. Classroom discussions on debatable questions, group works, differentiated tasks-activities and interdisciplinary tasks are the requirements of the MYP.

According to the report on MYP implementation in Turkey (Ateşkan *et al.*, 2016), MYP coordinators and teachers emphasized the positive impact of interdisciplinary units and formative assessment to monitor learning. Most of the MYP schools in Turkey implement the programme under the MoNE curriculum. This creates a challenge for schools to meet requirements of both IB and MoNE. MYP Coordinators of three different MYP schools view MYP as a framework to implement the MoNE curriculum in a more interdisciplinary and innovative way (Ateşkan *et al.*, 2016). Even though MYP is a learner-centered programme, the report showed that the teachers are in the center of educational activities. The pressure of the transition exam from primary school to high school results in more content-based lessons where memorization takes place (Ateşkan *et al.*, 2016).

3. SIGNIFICANCE OF THE STUDY

One of the main purposes of education is to improve student learning. There are various factors influencing student learning such as parents' education, socio economic status, curriculum, teacher related variables (knowledge, expectation, beliefs). Implementation of the curriculum is a factor which describes many elements of education. Indeed, implementation of curriculum also interplays with teacher variables (Handal andHerrington, 2003).Curriculum provides resources for instruction as well as describes different aspects of teaching; use of materials, use of technology, learning objectives and assessment practices (Cohen, Raudenbush, and Ball, 2003). Assessment is an integral part of instruction. If assessment is used productively, the results will inform not only teachers and students but also parents, administrators and policy makers (Black, 2014; Dixson andWorrell, 2016; Gearhart and Saxe, 2004; William and Black, 1998). There are some high stakes testing yet the classroom based assessments are more influencing on student learning. Classroom based assessments focus on process and tracking and documenting student learning. Thus, teachers' implementation of assessment provides rich information about classroom instruction. The way teachers approach assessment and analyze the results influence the effectiveness of assessment (Brown, 2002). Teachers' conceptions about assessment, curriculum, teaching and learning; their knowledge, and some external factors determine their educational decisions and use of assessment (Pajares, 1992; Thompson 1984).

There have been some studies on Turkish mathematics teachers' conceptions of assessment, or curriculum. In this study, the focus will be on examining Turkish teachers who teach with an international curriculum. The purpose of choosing these teachers' conceptions and beliefs is to investigate the relation between curriculum implementation and classroom based assessment implementations. A most commonly used international program in Turkey is International Baccalaureate programs. In order to examine curriculum and assessment relationship the middle school level is selected. Even though there is a required test to finish the program for high school, there is no such a test for middle school yet there is a high stake test at 8th grade

in Turkey for selecting students for high quality high schools. With lower pressures of the high stake exams the teachers have the chance to focus on concepts and skills. The studies on conceptions and beliefs of teachers' showed that cultural context and teachers' background (when they were students) affect their actions as teachers. In that sense, Turkish MYP teachers will be a very distinctive population for this study. MYP assessment is improvement oriented and accountability is not really a concern of the programme, where as Turkish teachers are mostly educated in a different way. Thus, MYP implementation in Turkey provides a unique context to study relationship between curriculum and teachers conceptions of assessment.

4. STATEMENT OF THE PROBLEM

4.1. Variables

The current study was conducted in two phases; quantitative and qualitative. The variables of the quantitative phase are years of experience as an MYP mathematics teacher, teachers' conception of assessment, teachers' curriculum orientation and teachers' mathematics related beliefs. Teachers' conception of assessment was also a variable for qualitative phase. The descriptions of the variables are given below:

- *Teachers'* MYP Experience represents the number of years that the teachers are teaching MYP Mathematics. The continues data for this variable were also converted into three categories; (i) 3 years or less, (ii) 4 to 6 years and (iii)7 years or more.
- *Teachers'* Conception of Assessment examines how teachers conceive assessment under four purposes as Student Accountability, School Accountability, Irrelevance and Improvement (Brown 2002, Vardar, 2010) as measured by Teachers Conceptions of Assessment Abridged Scale (TCOA-IIIA) for quantitative phase. In qualitative phase of the study, this variable was used to analyze teachers' individual interviews by using given four purposes.
- *Teachers'* Curriculum Orientation represents teachers' teaching orientation in the context of Curriculum as measured by Curriculum Orientation Scale (COS). Teachers' curriculum orientation is examined under the light of constructivist and traditional approaches. (Ekici, 2009) For this study, curriculum represents the mathematics curriculum of MoNE.
- *Teachers'* Mathematics Related Beliefs reflects teachers' beliefs related teaching, learning and the nature of mathematics which are developed in the process of teaching and learning mathematics with one's own experiences (Kayan, 2011). This variable is measured by Mathematics Related Beliefs Scale (MRBS).

4.2. Research Questions

This study aims to understand Turkish MYP Mathematics teachers' conception of assessment, curriculum orientation and mathematics related beliefs, and the relationship between them. Therefore, the study investigates the following questions:

Research Questions of Quantitative Phase

(i) Which assessment tools/strategies do Turkish MYP mathematics teachers prefer to use?
(ii) What are the Turkish MYP mathematics teachers' conceptions of assessment? a. What is the relationship among four different conceptions of assessment?
(iii) Is there a statistically significant relationship between Turkish MYP teachers' assessment conceptions and their mathematics related beliefs?
(iv) Is there a statistically significant relationship between Turkish MYP teachers' assessment conceptions and their curriculum orientation?
(v) Is there a relationship between MYP mathematics teachers' assessment conceptions and their experience as an MYP teacher?

Research Questions of Qualitative Phase

(i) What are participating three Turkish MYP teachers' assessment conceptions?
(ii) How participating three Turkish MYP teachers' assessment conceptions and MYP implementation are related to each other?

5. METHODOLOGY

The purpose of the current study is to explore MYP mathematics teachers' conception of assessment (measured by Teachers Conception of Assessment Abridged Survey, TCOA-IIIA) and its relationship with their curriculum orientation (measured by Curriculum Orientation Scale, COS) and mathematics related beliefs (measured by Mathematics Related Beliefs Scale, MRBS). The quantitative data collection was conducted during the last month of the 2018-2019 education year, by means of an online survey which includes the scales measuring each variable and three open ended questions. The participants were MYP mathematics teachers in Turkey. After quantitative data collection, individual interviews were conducted with three teachers who already participated in the quantitative part. Since this study is study includes both quantitative and qualitative data collection, mixed research design was used (Johnson and Christensen, 2008; Gay *et al.*, 2011).

5.1. Research Design

When qualitative and quantitative research methods are combined in a single study, it is called a mixed research design (Johnson and Christensen, 2008; Gay *et al.*, 2011). "The purpose of mixed methods research is to build on the synergy and strength that exists between quantitative and qualitative research methods to understand a phenomenon more fully than is possible using either quantitative or qualitative methods alone" (Gay, *et al.*, 2011. p. 481).

The purpose of this study is to understand MYP mathematics teachers' conception of assessment and to examine some factors in relation with it. Due to the restricted size of the population (N=30 Turkish MYP teachers), both quantitative and qualitative methods were used to increase the strength of the study. Therefore, the design of this study is sequential, explanatory mixed research.

5.2. Sampling

This study was comprised of quantitative and qualitative phases. The participant selection, sampling for each phase will be discussed in this section.

5.2.1. Participants of Quantitative Phase

The population of this study is purposively chosen to be IB-MYP Mathematics teachers in Turkey. All MYP mathematics teachers who know Turkish were asked to participate. There are 14 MYP schools in Turkey and all of them are private. The MYP schools of Turkey are generally located in three major cities (Istanbul, Ankara, and Izmir) and some other cities in the Marmara Region. The number of mathematics teachers in each school changes according to the size and also to the MYP levels taught at that school. Some of the schools apply MYP in only elementary grades while others complete the whole MYP continuum from grade 5 to 10. The approximate numbers of teachers according to cities are given below.

Table 5.1. Number of IB-MYP Schools in Turkey.

Cities	IB- MYP Schools	Number of Mathematics Teachers (Approximately)
Istanbul	8	40
Ankara	2	8
Izmir	1	5
Bursa	1	3
Edirne	1	3
Sakarya	1	5
Total	14	64

One of the MYP schools in Istanbul is not obliged to fulfill the requirements of MoNE Mathematics Curriculum since it is an international school. In addition, the mathematics teachers of this school have nationalities other than Turkish. Thus, the

teachers of this school could not be included in this study. Thirty MYP mathematics teachers had responded the survey (N= 30). The demographic information about the participants is given below.

Table 5.2. Demographic Information of Participants (N= 30).

	N	%
Gender		
Man	4	13.3
Woman	26	86.7
Faculty		
Faculty of Education	20	66.7
Faculty of Arts and Sciences	9	30
Engineering Faculty	1	3.30
Years of Experience		
5 years or less	13	43.3
6 to 10 years	5	16.7
More than 10 years	12	40.0
Years of MYP Experience		
3 years or less	16	53.3
4 to 6 years	8	26.7
7 or more years	6	20.0
Grade Levels		
Grade 5	21	70.0
Grade 6	20	66.7
Grade 7	14	46.7
Grade 8	12	40
Grade 9	8	26.7
Grade 10	5	16.7

There is a big difference in the number of female and male participants. This might be related with the number of female and male mathematics teachers in MYP

schools. In addition, the researcher could not make any intervention due to the voluntary nature of participation.

5.2.2. Participants for the Qualitative Phase

The participants of the qualitative part were three teachers who already took part in the quantitative phase. For confidentiality reasons the participants were given pseudonyms as Aslı, Burcu and Ceren (from three different schools). The demographic information for teachers will be explained in detail.

Aslı is a graduate of education faculty of a public university. She has been working as an MYP mathematics teacher for 4 years. Before MYP, she had teaching experiences both in Turkey and in another country as an internee teacher. She has taught grade five, six, seven and eight. In addition, she has teaching experience in PYP. Burcu is graduated from faculty of science and arts of a public university. She has 15 years of teaching experience which includes 10 years of teaching in an MYP school. She has taught grades six, seven, eight and nine under the MYP. Ceren is graduated from faculty of education of a public university and currently pursuing her master's degree. She has just finished her first year of teaching. She has taught grade five.

5.3. Instruments

This study aims to explore MYP mathematics teachers' conception of assessment and its relationship with their curriculum orientation and mathematics related beliefs. Under the light of this aim, Turkish Adaptation of Teacher Conceptions of Assessment Abridged Scale (TCOA-IIIA), Curriculum Orientation Scale (COS) and Mathematics Related Beliefs Scale (MRBS) were used (Appendix A, Appendix B, and Appendix C). Together with these three scales, demographic questions (Appendix D) and 3 open ended questions (Appendix E) formed the online survey. Later, some of the participants were interviewed according to the answers they provided to the open-ended questions.

5.3.1. Demographic Information

The first part contains questions related to the demographic information about the participants. MYP has a wide age range; from 5th grade to 10th grade. It will be important to have participants teaching different grade levels and having different levels of teaching experience. The demographic part will be detailed to reveal all of this information. The educational background and culture were highlighted in the literature as factors affecting teachers' conceptions of assessment. Participants' educational background was also addressed with questions asking educational background in another country as a student and/or as a teacher.

5.3.2. Turkish Adaptation of Teacher Conceptions of Assessment Abridged Scale (TCOA-IIIA Abridged Scale) (Vardar, 2010)

Turkish translation of Teachers' Conception of Assessment Abridged Survey (TCOA-IIIA) (Vardar, 2010) was used as one of the main instruments. The first part of this instrument was about measurement and evaluation methods that teachers use. Twenty six tools are provided and participants were asked to state the frequency they use these methods in their assessment and evaluation process. In the original survey and in the Turkish version of Teachers' Conception of Assessment (Brown, 2002; Vardar, 2010) participants were asked to select the assessment tools without providing data about frequency. For this study, this question has been changed into a question with scale instead of selecting from a list. The participants are asked to state the frequency they use each of the twenty six methods. The scale for frequency has 3 dimensions as never, occasionally, most of the time. The assessment methods stated in this question were taken from the Teacher Conceptions of Assessment Abridged Survey (Brown, 2008) and some other methods which are stated in the Turkish curriculum were added by Vardar (2010). Some MYP related methods which are stated in the "MYP: From Principals into Practices" (2014a) such as ATL Report and Process Journal were also included in the list. An expert of measurement and evaluation was consulted for final list of methods. In addition, the opinions of the MYP coordinator of one of the leading IB schools in Turkey were asked about the appropriateness of MYP related methods.

The second part of the instrument was a survey that examines teachers' conception of assessment. The original survey was developed by Brown (2002) as a part of his doctorial dissertation. This version of CoA was created to investigate teachers' conceptions of assessment and identify the structure of these conceptions and their relation between each other. It also investigates how conceptions of assessment are related to conceptions of curriculum, teaching, and teacher efficacy. The items in the scale are positive statements and the range of the scale is from "strongly disagree" to "strongly agree". The CoA-III had 50items. However, the number of questions was reduced to 27 in the abridged version (CoA - IIIA) (Brown, 2006).

The survey was adapted to Turkish by Vardar (2010). The survey was first translated into Turkish by 3 experts of English who have background in measurement and evaluation. Then back translation was done by two other experts who are specialized in measurement and evaluation in teaching English. In addition, opinions of three English teachers were asked. Finally, the translation process was ended with the revisions on the Turkish version that are suggested by the experts. After translation, pilot study was conducted with 265 teachers teaching different subjects in public schools in Ankara (Vardar, 2010). The reliability analysis showed that item-total correlations of two items were less than 0.3 and there was a significant increase in the Cronbach's alpha if item deleted values when these two items were excluded. Thus, these two items were excluded from the scale and the number of items becomes 25. The reliability coefficient for the 25-item scale was resulted in the value of 0.83.

The validation of the instrument was started with the examination of face validity by the experts and the necessary changes were made. Then, an Exploratory Factor Analysis (EFA) was conducted. In the original survey (Brown, 2002; 2008) there are four first order factors (Irrelevance, Improvement, Student Accountability, and School Accountability) and second order factors (for Improvement: Improve Teaching, Improve Learning, Valid, Describes Ability and for Irrelevance: Bad for Teaching, Used but Ignored, Inaccurate). However, EFA of the pilot study of the Turkish CoA-IIIA resulted in only first order factors. In order to check the reliability of the scale and its factors Cronbach's alpha reliability coefficients were calculated for this study. The

Cronbach's alpha value for the whole scale was .87. The list of items for each factor and their reliability coefficients are given below:

Table 5.3. Reliability Coefficients of Four Factors.

Factors	Items	Reliability
Student Accountability (STA)	2, 10, 18	0.74
School Accountability (SCA)	1,9, 17	0.75
Irrelevance (IRR)	7, 8, 15, 16, 23, 24, 25	0.78
Improvement (IMP)	3, 4, 5, 6, 11, 12, 13,14, 19, 20, 21,22	0.91

5.3.3. Curriculum Orientation Scale

The second survey is used for understanding the curriculum orientations of teachers. The scale is taken from the Learning, Teaching, Assessment and Curriculum Orientation Scale (LACO) developed by Ekici (2009) for the purposes of examining prospective teachers' learning-teaching concepts in the context of traditional and constructivist approaches. The researcher had prepared a collection of items in the light of the Teaching and Learning Conceptions Questionnaire (TLCQ) developed by Chan and Elliot (2004). 50 items were selected from this collection with contributions of two other researchers. The expert opinions were taken from 3 science teachers and 7 researchers.

The pilot study was conducted after the revisions on the items. The participants were 388 undergraduate students from Teaching Science departments of three universities. The factor analysis showed that 8 items can be under both factors and 4 items could not be included under none of the factors. These 12 items were excluded and the final version had 38 items. This instrument consists of 4 subsections; Curriculum, Teaching, Learning and Assessment which are graded separately. Only the curriculum subsection was used for this study. There are 8 questions in this part; 6 of them related to the constructivist factor and the remaining two are under the traditional factor. The items which are under traditional approach (3 and 5) were graded nega-

tively. For curriculum subsection, the highest grade is 40 and the lowest is 8. Higher grades mean that participants have a constructivist curriculum orientation. The reliability of the instrument was evaluated by checking the Cronbach's Alpha coefficient. The reliability coefficient of the whole scale was calculated as 0.53 for this study. The number of items in the scale and the number of participants might be reasons for the low reliability coefficients for Curriculum Orientation Scale.

Table 5.4. Reliability Coefficients for Curriculum Orientation Scale.

Factors	Items	Reliability
Constructivist Curriculum Orientation (Co-CO)	1, 2, 4, 6, 7, 8	0.59
Traditional Beliefs (Tra-CO)	3, 5	0.46
Curriculum Orientation Total		0.53

5.3.4. Mathematics Related Beliefs Scale (MRBS)

Mathematics Related Beliefs Scale (MRBS) was developed by Kayan (2011) for investigating pre-service elementary mathematics teachers' beliefs about the nature of, teaching, and learning mathematics caused by gender and year in the program. Belief frameworks of Thompson (1991), Lindgren (1996), and Ernest (1989) enlightened the development of MRBS.

The initial versions of MRBS with 39 items were reviewed by mathematics education researchers for content validity. The number of items has been decreased to 32 according to the suggestions. Then three researchers of mathematics education and one expert of Turkish Language reviewed the items. The items which are not clear were changed accordingly for the final version of the instrument. The final version was piloted with 242 pre-service elementary mathematics teachers and primary teachers from three universities. The factor analysis process revealed two factors: Traditional beliefs and constructivist beliefs. The Varimax rotational analysis showed that 6 items appeared under both factors, so these items are excluded. The final version of the

scale had 26 questions with a likert scale ranging from strongly disagree (1) to strongly agree (5). The total Mathematics Related Beliefs scores were calculated by grading the negatively worded items reversely. The highest score that could be taken from the instrument is 130 and the lowers is 26. Cronbach's Alpha values were calculated to check reliability of the instrument for the current study. The reliability coefficients and items of subscales are shown in Table 5.5.

Table 5.5. Reliability Coefficients of Mathematics Related Beliefs.

Factors	Items	Reliability
Constructivist Beliefs (Co-MRB)	1, 2, 5, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 21, 22, 23, 24, 25, 26	0.77
Traditional Beliefs (Tra-MRB)	3, 4, 6, 7, 16, 18	0.72
Mathematics Related Beliefs Total		0.79

5.3.5. Open Ended Questions

In addition to COA-III there will be some open ended questions. These questions are aimed to detect more information about teachers' assessment purposes and conceptions. Teachers are asked to give an example of an assessment method that they think is useful. The teachers who have experience as a non-MYP teacher are also asked to compare their assessment uses within and before MYP.

5.3.6. Semi-structured Interview

The researcher conducted semi-structured individual interviews with three of the participants in order to understand teachers' assessment practices and their conceptions about these practices in the context of MYP. Four questions formed the main structure of the interviews and the researcher added some other questions according to the answers of the participants. The semi-structured interview questions (Appendix F) are as follows:

(i) What kind of assessment tools did you use in your mathematics classroom this year?
   - How do you determine the assessment tools that you will use?
   - What impact does MYP content and applications have on this issue?
   - Do you use existing assessment tools or develop your own?

(ii) Did your teaching under MYP affect your opinions about assessment?

(iii) How would you introduce the assessment practices of MYP to a teacher who is new in MYP?

(iv) How do the assessment practices you use under MYP Mathematics lesson affect the process of teaching and learning?

5.4. Data Collection Procedure

Most of the schools finish their assessment and evaluation process by the end of May and the school year ends for teachers at the end of June. Thus, data collection had started at the end of May 2019 and continued until the end of June for teachers to have all their assessment done. Before data collection, the owners of COA-IIIA and MRBS were informed about the purpose of the study and asked for permission to use. The data collection procedure had started after the owners approved the use of their instruments in this study. The quantitative instruments and open ended questions were collected in an online survey to make it easily accessible for the MYP schools in different locations. The online survey also minimized the possibility of having missing data.

This study aimed at reaching as many participants as possible from the population of MYP mathematics teachers in Turkey. The researcher works in one of the MYP schools; the mathematics teachers of this school were asked to participate in the study. These teachers shared the survey with MYP teachers of other schools if possible. In addition, the online survey was sent to all MYP coordinators via e-mail with necessary explanations. Two more e-mails were sent as a reminder during the process of data collection. The purpose and details of the study are provided at the beginning of the survey and informed consents of the teachers were asked before they start to fill in the

survey (Appendix G). The duration of the survey was around 20 minutes.

After the quantitative data collection, the open ended questions were analyzed. The participants were grouped according to the answers they provided to the open ended question one. This question was asking for an assessment example which was effectively used in classroom. The assessment examples were categorized as MYP Related, Alternative and Traditional. An email was sent to all participants about the individual interviews. Among the thirty teachers who filled in the online survey, five of them agreed to participate in the semi-structured interviews. There were 2 teachers from MYP related category, one teacher from alternative category and 2 teachers from traditional category. In order to have a representative from each group, the teacher who provided an alternative assessment tool was directly included in the study. The teachers from the traditional group were from the same school. Therefore, the representative of this group was randomly selected between these two teachers. The third participant was again directly chosen so as to have participants from different schools.

5.5. Role of the Researcher

The semi-structure individual interviews created an opportunity for the researcher to ask additional questions when necessary. During the interviews, the researcher paid attention not to pose questions or comments which would be judgmental or leading. Especially, when the interview was conducted face to face, the researcher avoided facial expression that would create a negative environment.

5.6. Validity and Reliability for the Qualitative Phase

The quality of a study increases when the validity and reliability are taken into consideration. However, in qualitative studies the data do not allow researchers to make numerical analysis of validity and reliability. Guba and Lincoln (1985) used trustworthiness as an indicator of validity and reliability of qualitative studies. Trustworthiness explains how meaningful the findings of a qualitative study (Merriam, 2009). There are four criteria to increase the trustworthiness: (i) credibility, (ii) transferability, (iii)

dependability and (iv) conformability (Guba and LİIncoln, 1985). In this study, qualitative and quantitative data were collected and analyze to increase dependability and conformability. In addition, peer briefing was conducted with the advisor of the researcher by sharing ideas in every step of the study for credibility. The researcher conducted interviews for the qualitative data. The interviews were recorded and then transcribed carefully by the researcher to minimize the possibility of missing data. The transcriptions included exactly what is said by the participants. The data were analyzed with two different methods. Each analysis is described as detailed as possible by using quotes from the interviews in order to increase transferability.

5.7. Data Analysis

The qualitative and quantitative data were analyzed separately. The data analysis had started with the analysis of the open ended questions of the online survey to be able to determine the participants for qualitative phase. This analysis revealed the three categories of assessment type that teachers provided and the participants of individual interviews were determined by using these categories.

Since the quantitative data was gathered with an online survey, the researcher had the chance to make it compulsory to answer each item. Thus, there were no missing data for any of the questions. The second part of the data analysis was conducted to make descriptive analysis for each of instrument. Mean scores, median scores and standard deviations for COS, MRBS and each conception under the TCOA-IIIA were calculated. The frequencies of measurement and evaluation methods were also calculated to reveal which assessment methods were mostly used by the participant teachers. The mean scores were compared according to teachers' experience as an MYP teacher, their teaching experience in another country and the departments they graduated from.

Correlation analysis was conducted to check whether or not there was a significant relationship between the conceptions of assessment namely; student accountability, school accountability, irrelevance and improvement. In addition, the relationships between these conceptions and teachers' curriculum orientation (constructivist and tra-

ditional) and mathematics related beliefs (constructivist and traditional) and were also examined.

The interviews were analyzed with two methods, (i) coding for teachers' conceptions of assessment and (ii) thematic analysis. Before starting the analysis, the recordings of the interviews were transcribed by the researcher. The first analysis was conducted to better understand how these teachers conceive the purpose of assessment. Thus, the four purposes of assessment introduced by Brown (2002) were utilized as the codes for conceptions of assessment. The explanation of each code is described in Table 5.6.

Table 5.6. Explanations of Codes for Conception of Assessment.

Codes	Explanation	Example
Student Accountability	*Using assessment result to assign a grade to students, place into categories or to see if they acquire the determined objectives and behaviors*	*"We use quiz when we need to see if the student really learned it". "It shows the ranking of the students, where does s/he stands"*
School Accountability	*Relating assessment with evaluating schools' quality and success*	-
Irrelevance	*Describing assessment as being unfair, ineffective, unclear or unnecessary Not using assessment result*	*"I think, we sometimes compel students with exams."*
Improvement	*Using assessment for the purpose of improving instruction or student learning, and detecting deficiencies Assessing students' higher order thinking skills*	*"It is very important to give feedback to carry students to a higher level" "you get feedback from students and you improve your assessment tool "*

The second analysis is thematic analysis which is defined as "a method for identifying, analyzing and reporting patterns (themes) within data" (Braun and Clarke, 2006,p.79). Qualitative data can be organized and described in detail with thematic analysis (Braun and Clarke, 2006). For this study, thematic analysis was used to reveal how teachers conceive assessment in relation with curriculum. Firstly, the transcripts of the interviews of each teacher were open coded. Then, the codes were worked through to find themes.

6. RESULTS

In this section, the findings of the current study will be presented in two parts; (i) quantitative results and (ii) qualitative results. In the quantitative results, the descriptive statistics (frequency, mean, standard deviation) for each instrument will be presented separately. In addition, correlations between the variables will be introduced. Qualitative results will include the analysis of the open ended questions and analysis of the interviews by means of thematic analysis and coding for conceptions of assessment.

6.1. Quantitative Results

Firstly, the frequencies for assessment methods; mean scores and standard deviations for conceptions of assessment, curriculum orientation and mathematics related beliefs will be presented. In the last part, correlations coefficients between the variables and their factors or subscales will be introduced.

6.1.1. Teachers' Assessment Preferences

The first research question examines the assessment methods that were mostly preferred by MYP mathematics teachers. The teachers were asked to state the degree they use these methods in their assessment and evaluation process. The scale had three dimensions as never, occasionally and most of the time. The frequencies for all assessment methods were analyzed to answer this question.

In order to see the frequencies properly, the categorical data were converted into ordinal by assigning values to each category as 0 to never, 1 to occasionally and 2 to most of the time. Then the means for each assessment were calculated. The following table shows the frequencies and mean scores (out of 2) for each assessment method.

Table 6.1. Frequencies and Means of the Used Assessment Methods (N=30).

Assessment Methods	Median	Mean	Never (0)		Occasionally (1)		Most of the Time (2)	
			N	%	N	%	N	%
1. Open ended Questions	2	1.9	0	0	3	10	27	90
2. Written exams	2	1.83	0	0	5	16.7	25	83.3
3. Quiz	2	1.8	0	0	6	20	24	80
4. Rubric	2	1.7	0	0	10	33.3	20	66.7
5. Group Work	2	1.63	0	0	11	36.7	19	63.3
6. ATL Skills Report	2	1.6	1	3.3	10	33.3	19	63.3
7. Performance Assessment	2	1.57	2	6.7	9	30	19	63.3
8. Debate	2	1.57	2	6.7	9	30	19	63.3
9. Project	1.5	1.47	1	3.3	14	46.7	15	50
10. Matching	2	1.47	2	6.7	12	40	16	53.3
11. Self Evaluation	1	1.43	0	0	17	56.7	13	43.3
12. Individual interviews	2	1.43	3	10	11	36.7	16	53.3
13. Fill in the Blank	1	1.37	2	6.7	15	50	13	43.3
14. True False	1	1.37	3	10	13	43.3	14	46.7
15. Interdisciplinary Activities	1	1.37	1	3.3	17	56.7	12	40
16. Multiple Choice	1	1.23	3	10	17	56.7	10	33.3
17. Exit Card	1	1.2	3	10	18	60	9	30
18. Oral Presentation	1	1.1	3	10	21	70	6	20
19. Online Quiz Applications	1	1.1	6	20	15	50	9	30
20. Portfolio	1	1.03	8	26.7	13	43.3	9	30
21. Peer-Assessment	1	0.93	8	26.7	16	53.3	6	20
22. Process Journal	1	0.87	11	36.7	12	40	7	23.3
23. Observation Form	1	0.8	13	43.3	10	33.3	7	23.3
24. Constructed Grid	1	0.73	12	40	14	46.7	4	13.3
25. Oral Exam	0	0.43	19	63.3	9	30	2	6.7
26. Drama	0	0.43	20	66.7	7	23.3	3	10

As represented in Table 5.1, open ended questions *(M = 1.9)*, written exam *(M=1.83)*, quiz *(M=1.8)* and rubric *(M=1.7)* were the assessment tools that MYP Mathematics teachers use. More than half of the participants teachers reported using these methods most of the time *(Mdn= 2)*. On the other hand, oral exam *(M=0.43)* and drama *(M=0.43)* were the least preferred tools. The median values *(Mdn= 0)* of less preferred methods also showed that at least half of the teachers are not using these methods at all. These methods were followed by constructed grid *(M=0.73)*, observation form *(M=0.8)*, process journal *(M=0.87)* and peer-evaluation *(M=0.93)*. Process journal was the only MYP related method that appears to be used less by the MYP mathematics teachers.

In addition, an open ended question was included in the online survey in order to see teachers' assessment preferences from a different perspective. The question was asking the participants to provide an exemplary assessment tool that they used during the education year 2018-2019. One of the participants did not provide a proper example for this question. The analysis of the answers revealed three categories of assessment: MYP related, traditional and alternative. Examples and frequencies for each category are given in Table 6.2.

Table 6.2. Assessment Categories.

Category	**Example**	**Frequency**
MYP Related	*An MYP Summative Assessment in which I used real life components. The students were asked to design inclined ramps in accordance with international standards for elderly and disabled citizens.*	*11*
Alternative	*Drama can be a good example depending on the classroom dynamics and topic. It is suitable for evaluation.*	*11*
Traditional	*Pop-up quizzes that have one question related to a specific objective*	*7*

All of the traditional examples contained quizzes with different purposes. Five of the MYP related answers mentioned activities that improve students' Approaches to Learning (ATL) skills. Two answers included technology applications Desmos and Google Applications. In addition, there was an example in which students were using hands-on tools such as protractor and compass.

6.1.2. Conceptions of Assessment

In this part, the research question for understanding MYP mathematics teachers' agreement level for each purpose of assessment was investigated. The descriptive

statistics for the four components of Teacher Conceptions of Assessment Abridged Scale (CoA-IIIA) are represented in the Table 6.3. The minimum value for this scale was 1, while the maximum value was 6.

Table 6.3. Teachers' Agreement Level to Components of TCOA-IIIA (N=30).

Component	Median	Mean	Standard Deviation
Student Accountability (STA)	*4.67*	*4.40*	*1.16*
School Accountability (SCA)	*4.33*	*4.19*	*1.08*
Irrelevance (IRR)	*2.29*	*2.39*	*0.89*
Improvement (IMP)	*5.08*	*4.95*	*0.88*

As Shown in Table 6.3, Improvement *(Mdn=5.08, SD=.88)* and Student Accountability *(Mdn=4.67, SD=1.16)* had the highest agreement levels among the four components. These levels could be evaluated as "Moderate Agreement". The smallest mean score was for the Irrelevance Conception *(Mdn=2.29, SD=.89)* which could be evaluated as "Disagreement".

The mean values for each conception was compared according to MYP experience, experience in another country and faculty that participants graduated from. The participants were generally graduates of faculty of education and faculty of science and arts. Only one of the participants was graduated from engineering faculty. This teacher and the teachers who were graduated from faculty of science and art were included in one group as other. MYP experience of the teachers was categorized into three groups. The results are represented in Table 6.4.

Table 6.4. Comparison of the Means according to MYP Experience, Experience in another Country and Faculty.

	STA		SCA		IRR		IMP	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
MYP Experience								
3 years or less	*4.48*	*0.88*	*4.15*	*0.89*	*2.61*	*0.77*	*5.05*	*0.56*
4 to 6 years	*3.88*	*1.64*	*3.67*	*1.3*	*2.12*	*1.1*	*4.53*	*1.31*
more than 7 years	*4.89*	*1*	*5.05*	*0.88*	*2.02*	*0.92*	*5.25*	*0.86*
Experience in Another Country								
Yes	*4.17*	*1.37*	*3.75*	*1.02*	*2.3*	*0.6*	*4.63*	*1.25*
No	*4.48*	*1.1*	*4.2*	*1.08*	*2.42*	*1*	*5.07*	*0.71*
Faculty								
Education	*4.3*	*1.12*	*3.93*	*1.14*	*2.49*	*0.86*	*4.8*	*0.92*
Other	*4.6*	*1.27*	*4.73*	*0.77*	*2.17*	*0.97*	*5.27*	*0.75*

The participants who has 4 to 6 years of teaching experience agreed less on STA, SCA and IMP conceptions less than the other experience groups; especially compared to teachers with 7 or more years. The teachers with an experience in another country had a slightly less agreement level for each conception. Education faculty graduate participants agreed less in terms of SCA, STA and IMP conceptions.

6.1.3. Curriculum Orientation

In order to determine teachers' curriculum orientation, the total median score is examined. The total score of each individual was calculated by reversing the scores of the traditional items and adding the scores of constructivist ones. The curriculum orientation becomes more constructivist as the total score approached 40 which was the highest score for this scale. The median score was calculated as 34. Thus, the participant teachers were considered to have a constructivist curriculum orientation rather than traditional. The median scores for constructivist and traditional items were also analyzed to better understand the curriculum orientation.

Table 6.5. Median Scores for Curriculum Orientation (N=30).

	Median	Mean	Standard Deviation
Constructivist Items	*4.67*	*4.66*	*0.37*
Traditional Items	*3*	*3.03*	*1.17*
Curriculum Orientation	*4.25*	*4.24*	*0.36*

6.1.4. Mathematics Related Beliefs

MYP Mathematics teachers' mathematical related beliefs were determined by the descriptive analysis of the median scores of Mathematics Related Beliefs Scale. Before calculating the median, the traditional items were reversed and the general median score for teachers' mathematical related beliefs was calculated as 4.21 out of 5. This indicated that the participant MYP mathematics teachers moderately agreed on the belief statements. In addition, the median scores for Constructivist and Traditional beliefs were examined separately to better analyze. The mean score for constructivist and traditional beliefs were 4.60 and 2.93 respectively.

Table 6.6. Median Scores for Mathematics Related Beliefs (N=30).

	Median	Mean	Standard Deviation
Constructivist Beliefs	*4.6*	*4.54*	*0.26*
Traditional Beliefs	*2.93*	*2.94*	*0.75*
Mathematics Related Beliefs	*4.21*	*4.19*	*0.22*

6.1.5. Relationship between the Variables

"Correlation analysis is used to describe the strength and direction of the linear relationship between two variables" (Pallant, 2010, p.128). In order to investigate the relationship between the variables of Conception of Assessment, Mathematics Related Beliefs and Curriculum Orientation correlation analyses were conducted. Skewness and kurtosis values were used to check normality of the data. The data could be

accepted as normally distributed if the Skewness and Kurtosis vales are between -1.5 and +1.5. (Tabachnick *et al.*, 2013). For this study, the Skewness and Kurtosis values was calculated for each factor of each instrument. The results showed that the data was not normally distributed for Improvement Conception and for Constructivist Curriculum Orientation. This was an expected result due to the number of participants (N=30) Therefore, the Spearman's Rho non parametric correlation coefficient was used to describe the degree and direction of the relationship. The Skewness and Kurtosis values for each instrument are given in Table 6.7.

Table 6.7. Skewness and Kurtosis Values for Conceptions of Assessment.

	Skewness	Kurtosis
Conceptions of Assessment		
STA	-0.82	-0.20
SCA	-0.35	-0.43
IMP	-1.41	2.60
IRR	0.67	0.03
Curriculum Orientation (CO)		
Constructivist CO	-1.42	2.27
Traditional CO	0.46	-0.76
Mathematics Related Beliefs		
Constructivist Beliefs	-1.38	1.43
Traditional Beliefs	0.65	0.26

Firstly, the Spearman's Rho correlation coefficient was calculated to describe the relationship between the four conceptions of assessment which are *Student Accountability* (STA), *School Accountability* (SCA), *Irrelevance and Improvement* (IMP). Table 6.8 represents the results of this analysis.

Table 6.8. Correlation Coefficients for Conceptions of Assessment

	STA	SCA	IRR	IMP
Student Accountability (STA)	*1*	*0.346*	*0.032*	*0.457**
School Accountability (SCA)		*1*	*-0.064*	*0.613***
Irrelevance (IRR)			*1*	*-0.093*
Improvement (IMP)				*1*
**p < 0.01 level (2-tailed)				
*p < 0.05 level (2-tailed)				

There was a strong, positive relationship (r=.61, p<.01) between Improvement and School Accountability components. The correlation between Improvement and Student Accountability was moderate (r=.46, p<.05). The direction of the correlations between Irrelevance and Improvement, and Irrelevance and School Accountability was negative.

The fourth and fifth research questions were examining the relationship between the Conceptions of Assessment and the other variables. The correlations were analyzed for the traditional and constructivist subscales of Curriculum Orientation and Mathematics Related Beliefs.

Table 6.9. Correlation Coefficients between Conceptions of Assessment, Constructivist (Con-MRB) and Traditional Mathematics Related Beliefs (Tra-MRB), and Constructivist (Con-CO) and Traditional Curriculum Orientations (Tra-CO).

	Tra-CO	Con-CO	Con-MRB	Tra-MRB	STA	SCA	IRR	IMP
Tra-CO	*1*	*-0.266*	*-0.425**	*0.499***	*-0.35*	*-0.162*	*0.117*	*-0.23*
Con-CO		*1*	*0.536***	*-0.305*	*0.355*	*0.06*	*-0.02*	*0.275*
Con-MRB			*1*	*-0.358*	*0.362**	*0.06*	*0.108*	*0.2*
Tra-MRB				*1*	*-0.396**	*-0.249*	*-0.005*	*-0.414**
**p < 0.01 level (2-tailed)								
*p < 0.05 level (2-tailed)								

A strong positive relationship *(r=0.54, p<0.01)* was observed between Constructivist subscales of Curriculum Orientation and Mathematics Related Beliefs. In addition, Traditional subscales were also positively correlated at a significant level *(r=0.50, p<0.01)*. There was a small negative correlation between Improvement and Traditional Curriculum orientation. The negative correlation between Improvement and Traditional Beliefs was moderate *(r=-0.41, p<0.05)*. There was a moderate negative correlation *(r=0.40, p<0.05)* between Student Accountability and Traditional Beliefs, and a moderate positive correlation *(r=0.36, p<0.05)* between student Accountability and Constructivist Beliefs.

Finally, the relationship between conceptions of assessment and years of MYP experience was examined and no significant relationship was found. The direction of the relationship was positive for Accountability and Improvement conceptions, and negative for Irrelevance conception. The coefficients are presented in Table 6.10.

Table 6.10. Correlation Coefficients between Conceptions of Assessment and MYP Experience.

	STA	SCA	IRR	IMP
MYP Experience	*0.254*	*0.191*	*-0.054*	*0.244*
no significant correlation				

6.2. Qualitative Findings

Qualitative findings will include the analysis of the open ended question 2 of the online survey (comparison of MYP assessment to non-MYP assessment), the analysis of the interviews for conceptions of assessment and thematic analysis of the interviews. An e-mail was sent to all participants of the quantitative phase in order to ask if they would participate in the semi-structured individual interviews. Three participants were chosen from the ones who responded the email. These three participants were determined according to their assessment preferences measured by open ended question 1. Therefore, each teacher was a representative of a different assessment preference group (MYP Related, Alternative and Traditional).

6.2.1. Participating Teachers' Conceptions of Assessment

Participants' (Aslı, Burcu and Ceren) answers in the semi-structured individual interviews were coded to determine the conceptions of assessment that were hidden in their answers. First audio recorded interviews were transcribed and then analyzed by using Brown's (2002) assessment conception categorization; *Student Accountability, School Accountability, Improvement and Irrelevance*. The findings showed that these teachers relate assessment mostly with Improvement purpose. The Student Accountability purpose and Irrelevance of assessment also appeared in the answers. However, the teachers did not provide any answer related with School Accountability purpose. The details of the findings for each teacher are presented below with example quotes from their interviews.

Aslı provided an assessment example that categorized as *MYP related*. She has 4 years of MYP experience. Her mean scores on TCOA-IIIA were 5.83 for Improvement, 5.33 for Student Accountability, 4.00 for School Accountability and 2.86 for Irrelevance. The analysis of the interview with Aslı revealed 38 codes about conceptions of assessment. 32 codes were related to Improvement purpose while 6 codes referred *Student Accountability* purpose. *Irrelevance* and *School Accountability* did not appear in the analysis of this interview.

"It is very important to provide feedback in order to carry student to a higher level" (Improvement).

"We use quiz when we need to see if the student really learned it" (Student Accountability). Burcu provided an assessment example that categorized as a traditional method. Her mean scores for conceptions of assessment are 5.50 for Improvement, 5.67 for Student Accountability, 5.00 for School Accountability and 1.00 for Irrelevance. 21 codes of conceptions of assessment were found in the analysis of the interview with Burcu. 15 codes were uses of assessment for Improvement while 6 codes were related with Student Accountability. She might be using assessment for improvement purposes and yet agreeing on the accountability of students.

"It provides feedback for me to see in which skills of the students need to improve" (Improvement).

"It shows the ranking of the student" (Student Accountability).

Ceren provided an assessment example that categorized as an alternative method. Her mean scores for conceptions of assessment are 5.08 for Improvement, 2.67 for Student Accountability, 3.67 for School Accountability and 2.00 for Irrelevance. Ceren was the only teacher who mentioned Irrelevance (2 codes) of assessment during the interview. There were 24 codes in total which were mostly related with Improvement purpose of assessment (19 codes) and barely mentioned Student Accountability uses (3 codes). These findings are in line with her mean scores on TCOA-IIIA as Improvement was highest among all conceptions.

"MYP provides an opportunity to shape instruction according to formative assessment" (Improvement).

"I think, we sometimes compel students with exams" (Irrelevance).

6.2.2. Conceptions of Assessment in Relation with Curriculum

The second open ended question was asking teachers to compare their MYP assessment with their non-MYP assessment experiences, if they had. 6 teachers stated that they have no experience other than MYP. 22 teachers shared their experiences in favor of MYP, 1 teacher stated that s/he was doing similar assessment while working in a non-MYP school in another country. There was a teacher who thinks that there are no differences due to the structure of her/his school. Among the 22 teachers who were in favor of MYP, there were two common opinions to explain the difference. The first opinion was about being process or product oriented. The teachers stated that MYP assessment provides opportunities to focus on the learning process. Secondly, participant teachers believe that MYP assessment tasks require higher order mathematical skills rather than memorizing.

Another data source of Teachers' Conceptions of Assessment in Relation with Curriculum was semi-structured individual interviews. Thematic analysis of the interviews revealed 6 main themes and some sub-themes. The themes are as follows:

Assessment Tools: Teachers are expected to use different assessment tools in order to promote student learning (ATE Commission on Classroom Assessment, 2014; International Baccalaureate Organization, 2017; Ministry of Education, 2018b). Thus, the participants were asked the assessment tools that they used during this education year. This theme refers to all assessment tools used by teachers. The assessment tools were categorized as paper-pencil and technology based. These two assessment types were analyzed as two sub-themes. All three teachers provided examples for paper-pencil assessment tools.

Burcu: We did written exams, short-small quizzes. We also practice tests (deneme sınavları) and end of the topic tests (Konu Tarama Testi-KTT).

In addition, the teachers refer to technology based assessment tools by naming different technological applications. Therefore, technology based assessment tools was

not defined as the second sub theme. Aslı and Ceren mentioned technology based assessment more than once, Burcu did not mention any technology based assessment tool.

Aslı:We use technology applications, especially Kahoot and Quizizz. These are good for instant assessment and at the end of the units to see the unit as whole.

Ceren: I also teach Mathematics Terminology in 5th and 6th grades. I used Mentimeter application in this lesson for matching words.

Preparation of assessment tasks: The preparation of the assessment tools is also highlighted in the literature as the teachers must be aware of the purpose of the tool and design accordingly (Dixson and Worrell, 2016; Miller *et al.*, 2009). The teachers were asked two questions as "How do you prepare your assessment tools?" and "How do you determine the assessment tools that you use?". Considering teachers' answers for preparing assessment tasks, there are two types of preparation emerged from their answers; preparing assessment with MYP connection, preparing tasks without deliberate connection to MYP.

Aslı: We develop ourselves. There are some existing ones; we look at them, too. We attend a lot of in-service training and we learn different applications there.

All three of participants discussed assessment tasks in relation with MYP. Due to IB regulations, MYP assessment tools needs to have connections with the Global context and statement inquiry of the units while also to use encouraging students to use their ATL skills.

Ceren: I have a 1 year of experience in MYP. I didn't used the already existing ones much, I used according to my own practices.

Burcu: We develop ourselves. IB has a website, we can search from there.

The use of assessment results: Assessment becomes meaningful for students and teachers when the results are used properly. The teachers reported different uses of assessment results such as providing feedback to students, improving assessment tools, assigning grades, specify students' weaknesses and provide extra work.

Aslı: By means of assessment we can provide personal feedback by detecting where a student stands.

Burcu: We see the weaknesses of the students; at which topic, at which unit, what s/he cannot do. We provide extra work according to weaknesses of the kid to complete the missing parts.

MYP Implementation: This theme consists of 3 sub-themes as (i) Turkish mathematics curriculum expectations, (ii) real life connection, (iii) concept and skill based assessment. MYP is just providing a framework for teachers. The teachers in this study are responsible to fulfill the requirements of Turkish Mathematics Curriculum and MYP at the same time. All of the teachers were asked how they combine these two curriculums. Aslı and Burcu reported that Turkish Mathematics Curriculum objectives can be connected within the MYP unit plans. However, Ceren stated that it is difficult to adopt the spiral structure of curriculum to MYP.

Burcu: The MoNE curriculum is in line with MYP. It was difficult before, but now MoNE includes task and questions similar to MYP. Therefore, they are more related now.

Ceren: In 6th grade, the topics proceed intermittently. There is beginning of a topic, and then it passes to another topic. If we think in this sense, applying MYP is a bit difficult.

In MYP, the unit plans and assessment tasks of the units are built upon Global Contexts that explains the real life connection of the content. Therefore, Aslı and Ceren referred to real life connection and/or global context when they were asked about the effects of MYP on teaching and learning. Aslı also mentioned real life connection while answering other question. Burcu did not mention real life connection. Therefore, she was asked to explain how she was using global context.

Aslı: The main purpose of doing MYP is to bring students in a different perspective and to enable students to perceive the place of mathematics in daily life.

Burcu: We choose the global context according to what we want to give importance to in that unit. In other words, we determine according to the activity we will do at the end of the unit and what we want to teach the child with that activity.

A probing question was asked to better understand Burcu's implementation of global context. The questions was "What do the global contexts and concepts provide you¿'. She reported that before global context there was another system for real life connection. She believes that this change made it difficult to find connections.

Burcu:I just said "I learned it". Then global contexts were introduced and I can't say that I have no difficulties to find connections. I do connect, but the previous one was easier.

Concepts and ATL skills are other important aspects of MYP unit plans. All of the participant teachers also mentioned conceptual learning and/or skills based learning. Ceren reported differentiation for her students with special needs. These students' skills were taken into account in planning instruction and assessment. Therefore, differentiation was also included in this sub-theme as it focuses on individual skills of students.

Ceren: My student with special needs had a serious problem in mathematics. I developed many different materials for him. He had a different curriculum.

Burcu: In MYP, we assess students' skills.

Aslı... It allows student to learn conceptually and improves the ability to analyze and interpret.

Factors related assessment: It was discussed in the literature that teachers' assessment decisions and practices are affected by some external factors. The participant teachers shared some factors that related to their use of assessment and its results. These factors reduce the impact of assessment. The participants reported MoNE Mathematics Curriculum, students and parents and archiving as factors. MYP coordinators are expected to check if the assessments are properly applied and evaluated according to the unit plans and rubrics. Therefore, in some schools, teachers to provide evidence from student work and store these evidences in a specific database. Only one of the teachers mentioned archiving as a factor

Ceren: We keep some examples form student work in our school system. Archiving takes a lot of time and I think that we sometimes loose the content while archiving. ... archiving is a big issue and as a result I can't give feedback to students on time.

All of the teachers reported that the MoNE curriculum affect their assessment preferences. The number of objectives to be covered creates limitations for these teachers.

Aslı: We try to cover all the objectives in MoNE curriculum, and sometimes we even introduce some extra objectives. As a result, we may face time related issues in assessment.

Burcu: The MoNE curriculum is too intense. In some levels, I can finish the curriculum at the end of May by just talking. I don't have time to conduct activities.

Students and parents were also reported by two teachers as they affect especially the use of assessment results.

Burcu: … But in the end, it really works for students who are interested in it, no matter how much I do. It is not only about the teacher, but also the child. But I think every student working in coordination with his/her teacher would be successful.

Ceren: I think that the success of the student decreases when it comes to the MEB exam. The students might be stresses. Because the grade is reported to parents or if the parents care a little bit more about exam grades the student feel more stressful.

Teacher Improvement: Two of the participant teachers reported their improvement as a teacher while preparing and conducting assessment under MYP. Aslı mentioned teacher improvement in her answers to different questions. Ceren mentioned the contributions of MYP when she was asked how MYP affected her opinions about assessment.

Aslı: 'Preparing the assessment tasks contributes a lot to teachers. Why I am teaching this topic, where does it come from, how this is related to real life' We learn these while working'.

Ceren: Before starting MYP, I wasn't approving only test oriented assessment. … MYP actually has enriched the content. With MYP philosophy, I have realized that it is possible.

7. DISCUSSION AND CONCLUSION

In this chapter, the results of quantitative phase and findings from the qualitative phase will be discussed in the light of the literature and the structure of the MYP programme.

7.1. Turkish MYP Mathematics Teachers' Assessment Preferences

The descriptive analysis of the MYP mathematics teachers' use of different assessment methods revealed that the mostly preferred methods are traditional which are *open ended questions (M = 1.9), written exam (M=1.83)* and *quiz (M=1.8).* These results are in line with the results of different studies conducted in Turkey (Acar-Erdol and Yıldızlı, 2018; Birgin and Baki, 2012, Gelbal and Kelecioğlu, 2007, Nazlıçiçek and Akarsu, 2008) as teachers have a tendency to use traditional methods even though the MoNE curriculum encourages alternative methods. The teachers in this study might be relating open ended questions to the questions they ask during their instruction to foster students' higher order thinking. Written exams and quizzes can be evaluated as a part of MYP assessment since they are used to assess Criterion A: Knowing and Understanding (International Baccalaureate Organization, 2017). On the other hand, accountability purpose might be the underlying reason for these preferences of MYP mathematics teachers.

Rubric (M=1.7) follows the most preferred three methods. The high use of rubric might be due to the structure of MYP summative and formative assessment tasks in which a rubric is shared. *Group work (M=1.63), ATL skills report (M=1.6) and performance assessment (M=1.57)* are also highly used by MYP mathematics teachers. Group work is compatible with MYP assessment as it requires students to use Collaboration and Communication skills. MYP students are provided with ATL skills report twice a year. Teachers might be referring ATL report as all the assessment about ATL they did through the year. Finally, teachers might be relating MYP summative with performance assessment since they require students to acquire similar skills.

While planning the units MYP teachers prepare some inquiry questions which are categorized as factual, conceptual and debatable questions. These questions scaffold students in the process of approaching the statement of inquiry and, both students and teachers develop their own questions to explore (International Baccalaureate Organization, 2014a). As a result of this, *debate* was also used a lot by MYP mathematics teachers *(M=1.57, 93.3%)*. In order students to think about global context and realize the relationship, teachers start a debate by asking open ended questions. This also explains the high use of open ended questions. Another traditional method with high percent of usage is multiple choice *(M= 1.23, 90%)*. Multiple choice assessments are still very important in Turkish education because of the high stake exams. Teachers might be using multiple choice tests to prepare their students for these exams. In addition, multiple choice assessment tools are easy to evaluate and MoNE provides teachers with a collection of multiple choice test for each topic of each subject.

Drama (M=.43) and *oral exam (M=.43)* were the least preferred methods. Teachers have been using oral exams to assign oral grades to their students. However, in recent years teachers take a lot different constraints into account while deciding oral grades. They use different methods such as performance assessment, oral presentations that will encourage students to share their ideas and use different skills. Thus, they might see oral exam as a very old method that is assessing student at a specific time, for a specific topic rather than looking at the whole learning process. Mathematics teachers might hesitate to use drama in their lessons. Some unexpected results were detected in the number of teachers who stated that they never use *portfolio (N=8, 26.7%), peer assessment (N=8, 26.7%) and observation form (N=13, 43.3%)*. When the high use of group work is taken into account, the use of peer assessment and observation form were expected to be higher as they might be supportive assessment tools to evaluate group work. Student portfolio could be an important data source for MYP mathematics teachers as to see student improvement. However, the changes in technology provided teachers with tools to collect student work. The teachers in this study may be using these technological methods, but may not refer it as portfolio because they consider it to be a collection of papers.

According to the previous studies, There might be two reasons for teachers to use some assessment methods less than others; (i) teachers prefer the methods that they feel competent at (Gelbal and Kelecioğlu,2007) and (ii) teacher's preferences are affected by their experiences as a student (Pajares,1992). For instance, drama could be a less popular method when these teachers were students. Another aspect of teachers' assessment selection may be practices required by the curriculum. For example, group work is not common in Turkish national curriculum (also assuming teachers to have limited experience with it while they were students) but teachers reported using them frequently. Their preference can be explained by MYP curriculum requirements. The least preferred assessment tools are not practices that are required by MYP.

Turkish MYP Mathematics Teachers' assessment preferences were also examined with an open ended question in the online survey. Quiz and open ended questions were the only traditional methods shared by the teachers. Quiz also reported in the semi-structured individual interviews by two teachers who were representatives of traditional and MYP related assessment groups. Teachers mainly reported using MYP formative and MYP summative assessments which shows that their preferences of assessment tools were influenced by MYP curriculum requirements.

7.2. Teachers' Conceptions and Beliefs

The descriptive results of Curriculum Orientation Scale (COS) and Mathematics Related Beliefs Scale (MRBS) revealed that MYP mathematics teachers have *constructivist beliefs and a constructivist curriculum orientation.* These results are in line with the results of the studies of Ekici (2009) for curriculum, and Kayan (2011) and Çevirgen (2016) for mathematics related beliefs. A moderate positive relationship was found between these two variables *($r=0.43$, $p<0.05$).* A deeper analysis of the relationship between the constructivist and traditional items of the scales created a better picture. There were significant positive correlations between the two traditional subscales *($r=0.50$, $p<0.01$)* and between the two constructivist subscales *($r=0.54$, $p<0.01$).*This result is consistent with the descriptive results of both variables. Therefore, it can be concluded that the participants expect curriculum to enable a classroom environment

where students are encouraged to be responsible for their own learning, be curious and learn how to learn. MYP mathematics teachers in this study are responsible to meet the standards of MYP and MoNE. The Turkish Mathematics Curriculum has been developed with a constructivist approach (Ministry of Education, 2018b) and MYP is a student-centered programme (International Baccalaureate Organization, 2014a). Under the lights of these constructivist approaches, it is an expected result for MYP Mathematics teachers to hold constructivist beliefs and curriculum orientation.

The correlation analysis of the conceptions of assessment of MYP mathematics teachers revealed that Improvement conception had positive correlations with both School accountability *($r=0.613$, $p<0.01$)* and student accountability *($r=0.457$, $p<0.05$)* conceptions. These results are in line with the results of the studies of Brown (2002, 2008), Yetkin (2017) and Yüce (2015). These teachers might be endorsing assessment as it is improving learning and quality of instruction while providing information about student achievement and school quality. This can be explained with the fact that different conceptions might be in interaction (Brown, 2002).

Correlation analysis was conducted to see how traditional and constructivist subscales are related to conceptions of assessment. Improvement conception had a moderate negative correlation with *traditional Mathematics Related Beliefs ($r=-0.41$, $p<0.05$)* and negative but small correlation with Traditional Curriculum Orientation *($r=-0.23$, $p<0.05$)*. According to these results, it can be concluded that the participating teachers might think using assessment for improvement purposes not being possible with traditional approach. In addition, *Student accountability* conception had a moderate positive relationship with constructivist beliefs *($r=0.36$, $p<0.05$)* and moderate negative relationship with traditional beliefs *($r=-0.40$, $p<0.05$)*. The directions of the non-significant relationships were the same for traditional and constructivist curriculum orientations. Therefore, MYP mathematics teachers might believe that assessment results can be used for evaluating student performance in a constructivist learning environment. Students might benefit from the assessment results as they become the center of their own learning. In order to examine the relationship between participating teachers' conception of curriculum and their conception of assessment, individual

interviews were conducted in addition to surveys, and the findings about it will be discussed in the next section.

7.3. Assessment Conceptions in Relation with Curriculum

According to the descriptive results for each conception on TCOA-IIA, *Improvement* had the highest mean *(Mdn=5.08, SD=.88)* while Irrelevance had the lowest mean *(Mdn=2.29, SD=.89)* for MYP mathematics teachers. This might be related with the improvement-oriented nature of MYP which requires teachers to use formative assessment and give feedback to students as much as possible. These feedbacks are not only about correctness of students' answers but also about how they can improve their ATL skills, and how they can relate their answers to the global context and statement of inquiry of the unit. In addition, MYP teachers are also expected to improve their instruction with the use of unit plans. Every unit plan of each subject has a reflection section which contains prior to teaching the unit, during teaching and after teaching the unit parts (International Baccalaureate Organization, 2014a). This section requires teachers to think about their unit plan and ways to improve it. Brown (2002) stated that improvement requires formative uses of assessment. The answers of teachers to the open ended question 2 support this idea. Most of the participants stated that they focus more on the process rather than the product with MYP and so they also approved Improvement purpose. The interview findings also revealed the highest number of codes about Improvement purpose to the assessment. The results are in line with their high mean scores on Improvement conception of TCOA-IIIC.

Assessment is an integral part of MYP programme (International Baccalaureate Organization, 2014a). This might be the reason for the lowest score on Irrelevance conception. MYP assessment tasks should be prepared in a way to provide meaningful data about students, so MYP Mathematics teachers did not conceive assessment as irrelevant. This was also consistent with the findings of the interviews as there were only 2 codes referring Irrelevance conception. This conception was present in one of the interviews. However, the summative uses of assessment were related with Irrelevance in this interview.

The relatively high mean scores of *Student Accountability (Mdn= 4.67, SD=1.16)* and *School Accountability (M=4.33, SD=1.08)* conceptions might be a result of the competitive nature of the private schools and expectations of parents. Majority of the private school parents care a lot about the final grades of their children and they also take mathematics as one of most important subjects. Therefore, teachers might feel under pressure when a student gets a low grade from exams. The high stake exams of Turkish education system also increase the importance attributed to accountability conceptions. Even though students are in MYP years and they do not have to take exams to finish programme, most of the eight graders of the MYP schools in Turkey take the High School Transition Exam so they also expect to be prepared for High School Transition Exam. Private schools are using the success of their students for advertisement since the success in the High School Transition Exam is a reason for parents to choose these schools. There are some other studies that show that pressure of high stake exams plays an important role in teachers' assessment practices (Birgin and Baki, 2012; Karakuş, 2010).

Even though these teachers moderately agreed on School Accountability Conception on TCOA-IIIA, this purpose did not appear in the interviews because the interviews focused on the assessment in classroom. Therefore, School accountability did not come into prominence in day to day basis. External factors might be the reason for these teachers to agree on School Accountability Conception. They might not be attaching such a purpose to assessment, but the fact that schools are hold accountable from other parties of education might be affecting their conceptions. It was also pointed in the literature that teachers' conceptions are affected by the expectations of society and the culture (Brown, 2002).Similarly, for student accountability, there was a high mean score on Student Accountability of TCOA-IIIA which did not emphasized much in the interviews. Again, this might be interpreted as participating teachers have accountability in their minds, but this is not their primary purpose of classroom assessment.

The MYP schools included in this study are expected to share two reports at the end of a school year; one for MoNE and one for MYP grades. The students get some

scores form the compulsory exams and these scores directly affect their final grade on MoNE report. Even though a lot of different assessment tools are used in the process, these reports are evaluated as the indicator of students' performance. For example, Ceren noted that *"Even though we try to decrease the number of exams, in the end we conduct MoNE exams and we use that data. The process is important, but we give students a message that says you get this grade and it will appear in your MoNE report".*

8. LIMITATIONS AND SUGGESTIONS

This study aimed at understanding the conceptions of assessment of MYP mathematics teachers in Turkey. The number of MYP schools and MYP mathematics teachers caused some limitations for the study. The number of Turkish MYP mathematics teachers is estimated to be around 65. The number of teachers who agreed to participate in this study is 30 corresponding 46% of the population. The quantitative data collection was conducted with an online survey and teachers were reached via e-mail.

This study may be extended to collect data from all Turkish MYP mathematics teachers (by visiting schools and administering the survey by hand) or MYP mathematics teachers at other countries. For such a large study, the data sources may also diversified by including classroom observations or instructional material analysis. In addition to a cross cultural comparison of MYP mathematics teachers' conceptions of assessment, a similar study can be conducted with Turkish non-MYP private schools or public schools to compare the differences in teachers' conceptions.

The results showed that the curriculum requirements might have an effect on teachers' use of assessment methods. Therefore, the Turkish Mathematics Curriculum could be designed in a way to require teachers to use specific assessment methods, preferably alternative methods. The MYP emphasizes the use of assessment for formative purposes and encourages teachers to give feedback to students. In assessment standards of Turkish Mathematics curriculum, the importance of formative assessment is also mentioned (Ministry of Education, 2018b). However, teachers might need more guidelines to be able to use formative assessment as a part of their classroom practices. The curriculum could include guidelines for teachers in terms of formative uses of assessment. In addition, more in-service trainings related to assessment could be provided for teachers. This might increase the use of assessment for improvement purposes rather than accountability.

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APPENDIX A: TEACHERS' CONCEPTIONS OF ASSESSMENT ABRIDGED

A.1. Ölçme ve Değerlendirme Yöntemleri

Açıklama: Aşağıda bazı ölçme ve değerlendirme yöntemleri verilmiştir. Bu yöntemleri değerlendirme amacı ile ne derecede kullanıyorsunuz? Her bir yöntem için size en çok uyan kullanım düzeyini hiç kullanmıyorum, nadiren kullanıyorum, orta sıklıkta kullanıyorum, sıklıkla kullanıyorum, çoğunlukla kullanıyorum olarak belirtiniz.

Table A.1. Ölçme ve Değerlendirme Yöntemleri.

	Hiç Kullanmıyorum	Ara sıra kullanıyorum	Çoğunlukla kullanıyorum
Yazılı Sınav			
Çoktan Seçmeli Test			
Küçük Sınav (Quiz)			
Açık Uçlu Sorular			
Boşluk Doldurma			
Tartışma			
Eşleştirme			
Doğru-Yanlış			
Portfolyo (Öğrenci Ürün Seçki Dosyası)			
Öğrenci Öz-Değerlendirmesi			
Yüz Yüze Görüşme			
Proje			
Sözlü Sunum			
Sözlü Sınav			
Drama			
Akran Değerlendirme			
Grup Çalışması			
Performans Değerlendirme			
Gözlem Formu			
Online Quiz Uygulamaları			
Dereceli Puanlama Anahtarı (Rubric)			
Disiplinler Arası Çalışma			
ATL Skills (Öğrenmeye Yaklaşım Becerileri) Raporu			
Süreç Günlüğü			
Yapılandırılmış Grid			
Çıkış Kartı			
Diğer (Lütfen Yazınız):			

A.2. Eğitimde Ölçme Ve Değerlendirme Süreci Hakkındaki Görüşleriniz

Açıklama: Aşağıda ölçme ve değerlendirme sürecine ait ifadeler bulunmaktadır. Her bir ifadeye görüşlerinizi en iyi açıkladığını düşündüğünüz 1: hiç katılmıyorum ve 6: kesinlikle katılıyorum arasındaki değerlerden birini seçerek belirtiniz.

Table A.2. Eğitimde Ölçme Ve Değerlendirme Süreci Hakkındaki Görüşleriniz.

	Hiç katılmıyorum		**Kesinlikle katılıyorum**
1. Ölçme ve değerlendirme sonuçları, okulların sorumluluklarını yerine getirme düzeyleri konusunda ilgili kurum ve kuruluşlara bilgi sağlar.			
2. Ölçme ve değerlendirme, öğrencilerin seviyelerine göre gruplara ayrılmasına yardımcı olur.			
3. Ölçme ve değerlendirme, öğrencilerin öğretilenden ne kadarını öğrendiği hakkında bilgi veren bir süreçtir.			
4. Ölçme ve değerlendirme sonuçları, öğrencilere performansları hakkında geri bildirim verilmesine yardımcı olur.			
5. Ölçme ve değerlendirme, öğrenme ve öğretme sürecinin vazgeçilmez bir parçasıdır.			
6. Ölçme ve değerlendirme süreci, öğretmenlerin sınıf içinde kullanacakları öğretim yöntem ve tekniklerinde değişiklikler yapmasına imkân sağlar.			
7. Ölçme ve değerlendirme, öğretmenleri inandıklarına aykırı bir biçimde öğretmeye zorlayan bir süreçtir.			
8. Öğretmenler ölçme ve değerlendirme yapsalar bile sonrasında ortaya çıkan bulgulardan çok az yararlanırlar.			
9. Ölçme ve değerlendirme sonuçları, bir okulun kalitesi hakkında bilgi veren geçerli bir göstergedir.			
10. Ölçme ve değerlendirme, öğrencilerin yaptığı çalışmaların not bazında değerlendirilmesini sağlar.			
11. Ölçme ve değerlendirme, öğrencilerin ne öğrendiği hakkında bilgi veren bir süreçtir.			
12. Ölçme ve değerlendirme, öğrenme sürecindeki gereksinimleri hakkında öğrencilere geribildirim verilmesine olanak sağlar.			
13. Ölçme ve değerlendirme sonuçları, öğretim sürecinin şekillenmesine yardımcı olur. Ölçme ve değerlendirme sonuçları tutarlı olmalıdır.			
14. Ölçme ve değerlendirme öğrenciler için adil olmayan bir süreçtir.			
15. Ölçme ve değerlendirme sonuçları dosyalanır ancak bunlar ne yazık ki daha sonar tekrar kullanılmayarak dosyalarda öylece kalır.			
16. Ölçme ve değerlendirme sonuçları, okulların yaptığı çalışmaları değerlendirmede kullanılır.			
17. Ölçme ve değerlendirme, öğrencilerin belirlenen hedef ve davranışları kazanıp kazanmadığı hakkında bilgi verir.			
18. Ölçme ve değerlendirme süreci, öğrencilerin üst düzey düşünme becerilerinin ölçülmesine olanak sağlar.			
19. Ölçme ve değerlendirme, öğrencilere öğrenme sürecini nasıl verimli geçirmeleri konusunda yardımcı olur.			
20. Ölçme ve değerlendirme süreci, öğrencilerin ihtiyaçları doğrultusunda seçilecek yollarla öğretim yapılmasına olanak sağlar.			
21. Ölçme ve değerlendirme sonuçlarına itimat edilebilmelidir.			
22. Ölçme ve değerlendirme, eğitim ve öğretim			
23.sürecinin etkili bir şekilde yürütülmesini engeller.			
23. Ölçme ve değerlendirmenin, öğretim süreci üzerinde etkisi yoktur.			
24. Ölçme ve değerlendirme belirsiz bir süreçtir.			

APPENDIX B: CURRICULUM ORIENTATION SURVEY

Aşağıda müfredat ile ilgili ifadeler yer almaktadır. Her bir ifadeye katılma düzeyinizi en iyi açıkladığını düşündüğünüz kesinlikle katılmıyorum, katılmıyorum, kararsızım, katılıyorum, tamamen katılıyorum değerlerinden birini seçerek belirtiniz.

Table B.1. Curriculum Orientation Survey.

	Kesinlikle Katılmıyorum	Katıl-mıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
1. Müfredat, öğretmenin öğrenme ortamında iyi bir rehber olmasını ister.					
2. Müfredat, öğrencilere "öğrenmeyi öğretme" becerisi kazandıracak biçimde planlanmalıdır.					
3. Müfredat, öğretmenlere, öğrencilere mümkün olduğu kadar fazla ve kapsamlı alan bilgisi verilmesini önermelidir.					
4. Müfredat ve ders içeriği, öğrencilere bilim ve teknolojiyle ilgili merak duygusu geliştirebilecekleri biçimde hazırlanmalıdır.					
5. Müfredat, içerik (alan bilgisi) olarak öğrencilere sorgulamaya gerek duymadan anlayabilecekleri kadar doğru, güvenilir ve kapsamlı bilgilerin verilmesini sağlamalıdır.					
6. Müfredat, öğrenciler arasındaki bireysel farklılıklara uygun olacak kadar esnek olmalıdır.					
7. Öğretim programı ve ders planları, öğrencinin öğrenimin merkezinde olduğu etkinliklere (grup çalışması, tartışma, vb.) imkân sağlayacak esneklikte olmalıdır.					
8. Dersin içeriği daha çok öğrencilerin yaparak öğrenebileceği aktivitelerden oluşmalıdır.					

APPENDIX C: MATHEMATICS RELATED BELIEFS SCALE (MRBS)

Matematik Öğretimi ve Öğrenimine İlişkin İnanışlar Ölçeği Aşağıda matematik hakkında inanışlar içeren birtakım ifadeler verilmiştir. Bu ifadelere katılıp katılmadığınızı Kesinlikle Katılmıyorum (1), Katılmıyorum (2), Kararsızım (3), Katılıyorum (4), Kesinlikle Katılıyorum (5) cevaplarından bir tanesini işaretleyerek belirtiniz.

Table C.1. Mathematics Related Beliefs Scale (MRBS)

	Kesinlikle Katılmıyorum	Katıl-mıyorum	Karar-sızım	Katılıyorum	Kesinlikle Katılıyorum
1. Öğrencilerin matematiksel kavramları anlamaları için bu kavramların oluşum sürecine katılmaları gerekir.					
2. Öğretmenin öğrencinin aktif olduğu sınıf tartışmasını oluşturması matematik eğitiminde önemlidir.					
3. Matematik, temelde aritmetik becerilerin günlük hayatta kullanımıdır.					
4. Matematik bilgisi olgular, kurallar ve işlemlerden oluşur.					
5. Matematik öğretiminin amacı öğrencilerin matematiksel kavramları araştırarak akıl yürütmelerini geliştirmektir.					
6. Matematik öğretmeni işlemleri matematiksel bilgi olarak göstermelidir. 7. Matematiği öğrenmek için öğrenciler çok soru çözmelidir.					
8. Matematik dersinde matematiksel düşünmenin önemi vurgulanmalıdır.					
9. Matematik öğretiminde öğretmenler matematiksel oyunlardan da yararlanmalıdır.					
10. Matematik dersinde bir kavram problem durumları da yaratılarak öğretilebilir.					
11. Matematikte hâlâ üretilecek bilgiler vardır.					
12. Öğrenciler matematiksel problemleri kendileri oluşturma ve çözme fırsatına sahip olmalıdır.					
13. Matematik öğretiminde görsel ve somut gösterimler, materyaller mümkün oldukça sık kullanılmalıdır.					
14. Öğrenciler aynı sonuca farklı yollardan ulaşabilme fırsatına sahip olmalıdır.					
15. İspat ve genelleme matematik öğretimi sürecinin önemli bir parçasıdır					
16. Matematik öğretiminde, konu sonunda problem çözerken öğretmenin öğrettiği basamaklar sırasıyla izlenmelidir.					
17. Öğrenciler matematik dersinde kullanılan işlemlerin sebeplerini anlamak için çaba harcamalıdır.					
18. Matematik öğretiminin amacı soru çözerken derste gösterilen yolları kullanarak doğru cevaba ulaşmaktır.					
19. Matematik öğretiminde öğrenciler tarafından					
20. geliştirilen fikirler de dikkate alınmalıdır.					
21. Matematik öğretimi sürecinde öğrenciler birbirleri ile çalışmaya teşvik edilmelidir.					
22. Matematik öğretiminde teknolojinin olası kullanımına da önem verilmelidir.					
23. Matematik öğretiminde işlemlerin yanı sıra, öğrencilerin bilgilerini uygulayabilecekleri problemlere de yer verilmelidir.					
24. Öğrencilerin matematiği sevmeleri için matematik öğretmenini sevmeleri gerekir.					
25. Matematik diğer derslerle ilişkili olduğu için önemlidir.					
26. Matematik öğretiminin amacı öğrencileri hayata hazırlamaktır.					
27. Matematik eğitiminde materyaller ve somut gösterimler matematiksel kavramların gelişmesinde etkili değildir.					

APPENDIX D: DEMOGRAPHIC INFORMATION

1. Cinsiyetiniz
    i. Kadın
    ii. Erkek
2. Hangi üniversite ve bölümden mezun oldunuz?
3. Türkiye dışında bir ülkede eğitim gördünüz mü? Cevabınız evet ise hangi seviyede, kaç yıl ve hangi ülke olduğunu belirtiniz.
    i. Evet
    ii. Hayır
4. Ne kadar süredir öğretmenlik yapıyorsunuz?
5. Hangi IB programlarında öğretmenlik yapıyorsunuz?
    i. PYP
    ii. MYP
    iii. DP
6. Kaç yıldır MYP programı kapsamında öğretmenlik yapıyorsunuz?
7. Şimdiye kadar hangi seviyelerde MYP kapsamında öğretmenlik yaptınız?
    i. 5. Sınıf
    ii. 6. Sınıf
    iii. 7. sınıf
    iv. 8. Sınıf
    v. Lise Hazırlık Sınıfı
    vi. 9. sınıf
    vii. 10. Sınıf
8. Türkiye dışında bir ülkede öğretmenlik yaptınız mı? Cevabınız evet ise hangi seviyede, kaç yıl ve hangi ülke olduğunu belirtiniz
    i. Evet
    ii. Hayır

Figure D.1. Demographic Information.

APPENDIX E: OPEN-ENDED QUESTIONS

Lütfen, aşağıdaki soruları birkaç cümle ile cevaplayınız.

- Yakın zamanda kullandığınız ve etkili olduğunu düşündüğünüz bir ölçme değerlendirme aracını kısaca anlatınız.
    - Kullandığınız yöntem nedir? Neden bu yöntemi tercih ettiniz?
    - Hangi amaçla kullandınız?
    - Kullandığımız uygulamanın MYP ölçme-değerlendirme anlayışına uygunluğunu kısaca değerlendiriniz.
- MYP öncesi (varsa) ve MYP sonrası ölçme değerlendirme uygulamalarınızı içerik, kullanım amacı ve etkisi açısından kısaca karşılaştırınız.
- Ölçme değerlendirme ile ilgili herhangi bir eğitim aldınız mı? Cevabınız evetse bu eğitimleri bir iki cümle ile açıklar mısınız?
    - Evet .....
    - Hayır

Figure E.1. Open-Ended Questions.

APPENDIX F: SEMI-STRUCTURED INTERVIEW QUESTIONS

Çalışma kapsamında bireysel görüşmeye gönüllü olduğunuz için teşekkür ederim. Görüşmede MYP öğretimindeki ölçme-değerlendirme (assessment) uygulamalarınız hakkında birkaç soru yöneltmek istiyorum.

1. Bu yıl matematik sınıfınızda ne tür ölçme-değerlendirme araçları kullandınız?
    d. Kullanacağınız ölçme değerlendirme araçlarını nasıl belirliyorsunuz?
    e. MYP program içerik ve uygulamalarının bu konuda nasıl bir etkisi var?
    f. Hazır değerlendirme araçları mı kullanıyorsunuz kendiniz mi geliştiriyorsunuz?

2. MYP programında öğretim yapmanız ölçme değerlendirme hakkındaki düşüncenizi etkiledi mi?

3. MYP'ye yeni başlayacak bir öğretmene programın ölçme değerlendirme uygulamalarını nasıl tanıtırdınız?

4. MYP matematik dersi kapsamında kullandığınız ölçme değerlendirme uygulamaları öğrenme ve öğretme sürecini nasıl etkiliyor?

Figure F.1. Semı-Structured Interview Questions.

APPENDIX G: INFORMED CONSENT

Değerli katılımcı,

Boğaziçi Universitesi, Matematik ve Fen Bilimleri Eğitimi bölümünde yüksek lisans öğrencisiyim. Uluslararası Bakalorya (IB) Orta Yıllar Programı (MYP) öğretmenlerinin eğitimde ölçme ve değerlendirme sürecine yönelik kavrayışlarını incelemeyi amaçlayan tez çalışmamı Doç. Dr. Fatma Aslan Tutak danışmanlığında yürütmekteyim.

Anket içerisinde demografik bilgilerinize, kullandığınız ölçme ve değerlendirme yöntemlerine; ölçme-değerlendirme süreci, matematik müfredatı ve matematik öğretimi and öğrenimi ile ilgili görüşlerinize yönelik sorular bulunmaktadır. Anket sorularını yanıtlarken kendi ``Olçme ve değerlendirme`` tanımınızı göz önünde bulundurmanız beklenmektedir. Araştırmanın amacı Türkiye'deki genel durumu ortaya çıkarmak olup okul veya öğretmen karşılaştırması yapılmayacaktır. |

Katılımcıların isimleri sorulmayacaktır. Araştırmanın amacına ulaşmasında büyük önem taşıyan yanıtlarınız sadece bu çalışma için kullanılacak olup araştırmanın sonuçları yüksek lisans tezinde, bilimsel sözlü-yazılı ortamlarda bireyleri ve okul bilgisini açığa çıkarmayacak şekilde paylaşılacaktır.

Çalışmaya verdiğiniz destek için şimdiden teşekkür ederim.

Sorularınız olması durumunda bana (Merve Ozcan, merveozcan28@gmail.com) veya tez danışmanıma (Doç. Dr. Fatma Aslan Tutak, fatma.tutak@boun.edu.tr) ulaşabilirsiniz. Desteğiniz için teşekkür ederim.

Merve Ozcan

Matematik Öğretmeni

Figure G.1. Informed Consent.