This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Teacher Trainer Handbook

of the project

Promoting Formative Assessment: From Theory to Policy and Practice (FORMAS)

under the

Erasmus+ Programme Key Action 3, Support for Policy Reform Forward looking cooperation projects

Leonidas Kyriakides, *Department of Education, University of Cyprus, Cyprus*

Margarita Christoforidou, *Department of Education, University of Cyprus, Cyprus*

Evi Charalambous, *Department of Education, University of Cyprus, Cyprus*

Andria Dimosthenous, *Department of Education, University of Cyprus, Cyprus*

Elena Kokkinou, *Department of Education, University of Cyprus, Cyprus*

Anastasia Panayiotou, *Department of Education, University of Cyprus, Cyprus*

Bert Creemers, *Faculty of Behavioural and Social Sciences, University of Groningen, the Netherlands*

Theodossios Zachariades, *Department of Mathematics, National and Kapodistrian University of Athens, Greece*

Giorgos Psycharis, *Department of Mathematics, National and Kapodistrian University of Athens, Greece*

Despina Potari, *Department of Mathematics, National and Kapodistrian University of Athens, Greece*

Chrissavgi Triantafillou, *Department of Mathematics, National and Kapodistrian University of Athens, Greece*

Adrie Visscher, *Faculty of Behavioural and Social Sciences, University of Twente, the Netherlands*

Jitske de Vries, *Faculty of Behavioural and Social Sciences, University of Twente, the Netherlands*

Peter Van Petegem, *Department of Training and Education Sciences, University of Antwerp, Belgium*

Tine Mombaers, *Department of Training and Education Sciences, University of Antwerp, Belgium*

Roos Van Gasse, *Department of Training and Education Sciences, University of Antwerp, Belgium*

Ioannis Ioannou, *Ministry of Education and Culture, Cyprus*

Liselotte Van de Perre, *Flemish Agency for Higher Education, Adult Education, Qualifications and Study Loans, Belgium*

Christos Milionis, *Ministry of Education, Research and Religious Affairs, Greece*

Dionysios Lamprinidis, *Ministry of Education, Research and Religious Affairs, Greece*

Gijske Mels, *Ministry of Education, Culture and Science, the Netherlands*

University of Cyprus

ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ, ΠΟΛΙΤΙΣΜΟΥ, ΑΘΛΗΤΙΣΜΟΥ ΚΑΙ ΝΕΟΛΑΙΑΣ

HELLENIC REPUBLIC
National and Kapodistrian University of Athens

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Παιδείας, Έρευνας και Θρησκευμάτων

UNIVERSITY OF TWENTE.

Ministry of Education, Culture and Science of the Netherlands

University of Antwerp

Vlaanderen
is onderwijs & vorming

Contents

AIMS AND OUTLINE OF THE HANDBOOK 4

PART A 6

Introduction 6

The framework for measuring teacher assessment skills 7

a. Phases of the assessment process 8

b. Assessment techniques 11

c. Measurement dimensions 14

Why the dynamic approach to teacher professional development? 17

Implementing a teacher professional development course based on the dynamic approach: The main steps to be followed 19

The rationale of the teacher professional development course 20

Measuring teachers' assessment skills to identify professional needs 24

The structure of the teacher professional development course 26

Your role as educators 28

PART B 30

Introduction 30

Presentation of training materials 34

1. Introductory session 1 (common for all groups) 34
2. Sessions 2-5 for Group A 45
3. Sessions 2-5 for Group B 79
4. Sessions 2-5 for Group C 120

CONCLUDING REMARKS 158

Appendix A: Application Activities 159

Application Activities for Group A (sessions 2-5) 160

Application Activities for Group B (sessions 2-5) 187

Application Activities for Group C (sessions 2-5) 204

Appendix B: Action Plans 226

Action Plan for Improvement – Group A 227

Action Plan for Improvement – Group B 230

Action Plan for Improvement – Group C 233

References 236

AIMS AND OUTLINE OF THE HANDBOOK

Student assessment has been recognized as one of the factors that can have an important impact on the quality of student learning (e.g. Antoniou & Kyriakides, 2011; Hattie & Timperley, 2007). Particularly, formative oriented assessment practices have long been argued to have a positive effect on student learning outcomes (Creemers & Kyriakides, 2015; Hattie & Temperley, 2007; Herman, Osmundson, Ayala, Schneider, & Timms, 2006; Wiliam, Lee, Harrison, & Black, 2004). Examining current practice, it is acknowledged that, despite the positive views of teachers in favour of formative assessment, a great percentage of everyday assessment practice is still summative oriented. One of the main aims of the Erasmus+KA3 project entitled *"Promoting Formative Assessment: From Theory to Policy and Practice (FORMAS)"* is to contribute in improving professional standards of secondary teachers by supporting them to conduct assessment for formative reasons and become more effective in terms of promoting student learning outcomes (cognitive and meta-cognitive). This handbook is addressed to teacher educators interested in supporting teachers to improve their skills in student assessment. Specifically, it aims to support teacher trainers in the delivery of a Teacher Professional Development (TPD) program in student assessment. The TPD course presented here is based on a training course designed under the FORMAS project. The course was implemented in four countries (i.e. Cyprus, Greece, The Netherlands, and Belgium). Our aim was to achieve a positive impact on both assessment skills of secondary teachers and student learning outcomes in mathematics. Unfortunately, the COVID-19 pandemic caused problems to the implementation of the main activities of the project. Specifically, based on the new laws and regulations that the governments of the four participating countries have taken to face COVID-19 virus, all public and private schools of all levels of education closed in March 2020. Consequently, the last (i.e., 5th) training session of the teacher professional development (TPD) course and the final measurement from teachers and students were rescheduled at a later point. It is acknowledged that this change might have affected our ability to detect positive effects. However, despite the difficulties that all country teams have faced, it was possible to identify statistically significant effects of the TPD course

not only on improving the assessment skills of participating teachers, but also on promoting their students' learning outcomes in mathematics (cognitive and meta-cognitive).

We believe that this TPD can also be helpful to other educators working with teachers of different subjects to support them in improving their assessment skills and promoting the learning outcomes of their students. The handbook includes two parts. Part A presents the theoretical background and main assumptions of the approach used to design the program. The rationale of the training, a description of the general structure of the training and the role of the teacher educators are also discussed in this part. Part B presents a detailed guide outlining the training material and the necessary information for the implementation of each training session for all groups of teachers.

PART A

The first part of the handbook presents the theoretical background based on which the TPD program was developed. It aims to support teacher trainers interested in implementing the TPD program, by providing a detailed presentation of the theory and main assumptions that underlying it. Understanding the theory behind the training is considered crucial as it helps teacher trainers make appropriate decisions during implementation. First, the framework for the evaluation of teacher assessment skills in relation to their impact on student learning outcomes is presented. This framework was also used to make decisions in relation to the content and design of the TPD. Then, the Dynamic Approach (DA) employed in this TPD, its main assumptions and steps for implementation are presented. Following, the rationale behind the content and design of the TPD are outlined. Specific issues in relation to student assessment are discussed to provide clarifications and avoid possible misconceptions. Next, the measuring of teacher assessment skills and how teachers are expected to be grouped during the TPD program are presented. Finally, the role of teacher trainers is explained, outlining basic responsibilities and necessary actions before, during, and after the implementation of the program.

1. Introduction

The growing accountability framework, the need for higher learning outcomes and the recognition of assessment as a key factor for teacher effectiveness have resulted in an increased need for teacher competency in assessment practices that aid student learning. When looking at the purpose student assessment aims to serve, *two purposes* are mainly discussed: the *summative* and the *formative* purpose of assessment. Summative assessment is used for the recording of the overall achievement of a pupil in a systematic way (DES/WO, 1988). It aims at describing attainment achieved at certain time for comparisons to be made according to students' level of performance. On the other hand, formative assessment is used in order to identify the strengths and weaknesses of each student (diagnostic aspect), as well as, to help teachers plan appropriate next steps in order for improvement to be achieved (intervention aspect). Formative assessment

is learning oriented and aims at providing information concerning students' performance that could be used for the improvement of both the teaching and learning process (Mok, 2010). Research suggests that teachers who use assessment for formative rather than summative purposes are more effective in promoting student learning outcomes (Creemers & Kyriakides, 2008; Hattie & Timperley, 2007; Herman, Osmundson, Ayala, Schneider, & Timms, 2006; Wiliam, Lee, Harrison, & Black, 2004). This is the reason why the FORMAS project focuses on formative assessment emphasising the need for the promotion of teacher practices that can have a positive impact on student learning. At the same time, it is acknowledged that although teachers hold positive views towards formative assessment (Brown, 2004; Sach, 2012) they also report insufficient training in its use (DeLuca & Klinger, 2010) and appear to use assessment practices for summative rather than for formative purposes (Christoforidou, Kyriakides, Antoniou, &, Creemers, 2014; James & Pedder, 2006). Based on the above, one of the aims of the FORMAS project is to design and deliver a TPD program that can have a positive impact on teacher assessment skills and student learning outcomes (i.e. cognitive and metacognitive). To do so, a framework to examine teacher assessment behaviour and identify specific skills involved when assessing students' learning was developed. This framework allows the evaluation of assessment skills in relation to their impact on student learning outcomes and was used to make decisions in relation to the content and design of the TPD to be implemented. A description of the framework is presented next.

2. The framework for measuring teacher assessment skills

The framework developed and used in the FORMAS project (shown in Figure 1) examines assessment looking at the following three main aspects of this teacher factor: a) the phases of assessment, b) the various assessment techniques and c) the five dimensions that can be used to measure the functioning of this teacher factor. Each of these three aspects are presented below.

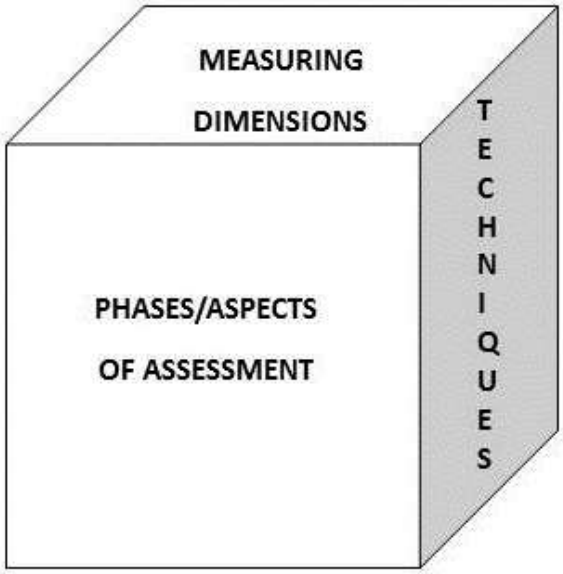


Figure 1. A framework for measuring teacher assessment skills

a) Phases of the assessment process

Student assessment is considered an integral part of teaching and is defined as the systematic process of gathering information about students' learning (Shepard, 2000). Each phase of the assessment process can be characterized by the decisions made and actions taken by the teachers within that phase. The proposed framework identifies five main phases that describe in a comprehensive way the skills involved in the process of assessment design and practice (see Figure 2).

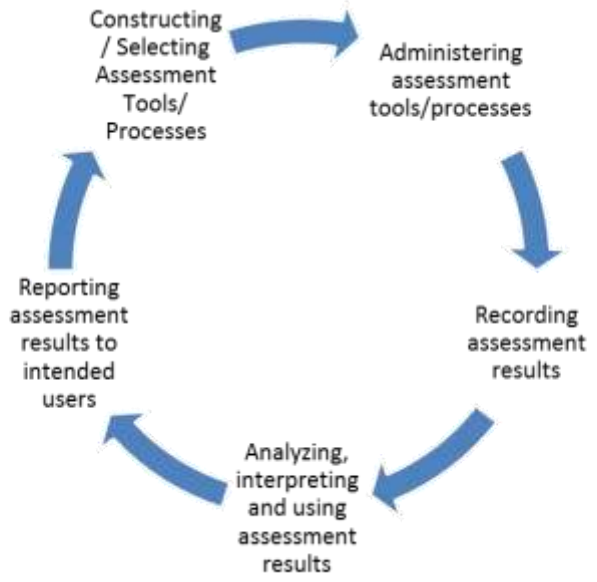


Figure 2. The main phases of the assessment process

The first two phases highlight the need for good quality assessment data that enable the identification of students' learning needs for specific and learning-oriented feedback to be provided. In the third phase teachers make sure that important assessment information is not lost and is available to be used to support further learning. The analysis and interpretation of data in the fourth phase is necessary to identify students' specific learning needs and thus be able in the fifth phase to give constructive feedback to all involved in the assessment process. These phases are based on the assumption that effective teachers should make sure that: (i) appropriate assessment instruments are used to collect valid data; (ii) appropriate procedures in administering these instruments are followed to collect reliable data; (iii) data emerging from assessment are recorded in an efficient way and without losing important information; (iv) assessment results are analysed, interpreted and used in ways that can promote student learning; and (v) assessment results are reported to all intended users, including parents and students, in order to help them take decisions on how to improve student learning outcomes. Without neglecting the sequential character of the five phases involved in the process of the design and implementation of assessment, this framework considers all phases as interrelated and interchangeable and not a step-by-step model. The division of the assessment process into phases is done to

make sure that each aspect of assessment practice is taken into account when measuring assessment skills. A short description of each phase is presented below.

i. Constructing/ Selecting Assessment Tools/ Processes

This phase includes skills that refer to the planning and designing of an assessment, as well as, to the selection and/or construction of the assessment tools and processes. The skills required in this phase cover the decisions concerning the purpose that each assessment mechanism aims to serve (Brookhart, 2003; Gipps, 1994; Pellegrino, Chudowsky, & Glaser, 2001; Torrance & Pryor, 1998) and the definition and sharing with students of the learning goals and success criteria against which a student will be assessed (Herman et al., 2006; Sadler, 1989). Moreover, teachers are expected to involve students in the process of the construction and selection of tools as this might contribute to the development of student metacognitive skills. Finally, it includes teacher skills related to the selection and/or development of quality assessment tools by means of which the purpose and goals of the assessment will be achieved (Green & Mantz, 2002; Shepard, 2000).

ii. Administering assessment tools/processes

The second phase includes skills associated with the implementation of assessment. Skills included in this phase refer to decisions concerning the timing of an assessment, the assessment's link to the learning goals and the instruction, the variety of techniques used, as well as, the teachers' role during assessment administration (Anderson, 2003; Black & Wiliam, 1998; Shepard, 2007). It is expected that assessment tools will be administered in an appropriate way to help teachers collect both valid and reliable data about the learning needs of each student.

iii. Recording assessment results

The third phase refers to skills associated with the recording of assessment results derived from the assessment process. Effective documentation requires keeping regularly updated records of students'

progress, record results in ways that can be used to identify students' needs and involving students in record keeping (Harlen, Gipps, Broadfoot, & Nutall, 1992; Stiggins & Chappuis, 2005).

iv. Analyzing, interpreting and using assessment results

The fourth phase refers to skills associated with the analysis, interpretation and use of assessment results. Optimally, teachers use the assessment results to make responsive changes to instruction and learning (Popham, 2006). These changes must be early enough in the decision-making process, in order to actually influence student learning (Stiggins & Chappuis, 2008).

v. Reporting results to intended users

The fifth and last phase refers to skills related to the reporting of assessment results to intended users. Skills included in this phase refer to decisions concerning the purpose of reporting, the audience of reporting, the instruments used to report, as well as, the quality of teacher communication with intended users. In order to promote the formative purpose of assessment reporting should be closely related to the learning objectives. In this way constructive feedback to students can be provided.

b) Assessment techniques

The term "assessment techniques" refers to the evaluation methods employed to assess students' learning. Whereas the term "assessment tools" refers to instruments, strategies and processes that can be used to assess student learning (e.g. a written test); "assessment techniques" is a wider concept and refers to the type of assessment method that can be employed (e.g. written assessment). It is expected that teachers first decide the most appropriate method to be used (e.g. oral assessment) and then decide on the specific tool to be administered (e.g. oral presentation, oral question etc.). Current thinking in assessment recognizes that a variety of assessment techniques needs to be employed, as learning is multidimensional and cannot be adequately measured by a single technique. In addition, the use of multiple sources can help teachers to explore possible reasons for students' mistakes (Bennett, 2011). For example, mistakes made in a written

assessment task can be explored further by using oral assessment through which the reasons for making these mistakes might be identified. It is important to note that all types of assessment techniques are considered valuable. Teachers are expected to choose and effectively implement a combination of techniques to assess student learning based on the appropriateness for a given situation.

Specifically, the framework looks at assessment techniques by taking into account two important decisions affecting assessment technique selection: ***a) the mode of response,*** meaning how the students respond to an assessment task and ***b) who perform(s) the assessment*** (see Figure 3). This allows us to look at assessment techniques that require different modes of student response (i.e. written, oral, performance), but at the same time we take into account that these techniques can be used not only by the teacher, but also by the students themselves in the forms of self, peer- and co-assessment. When assessment techniques are categorized based on how the student responses; three basic types are recognized: *i) written assessment, ii) oral assessment*, and *iii) performance assessment*.

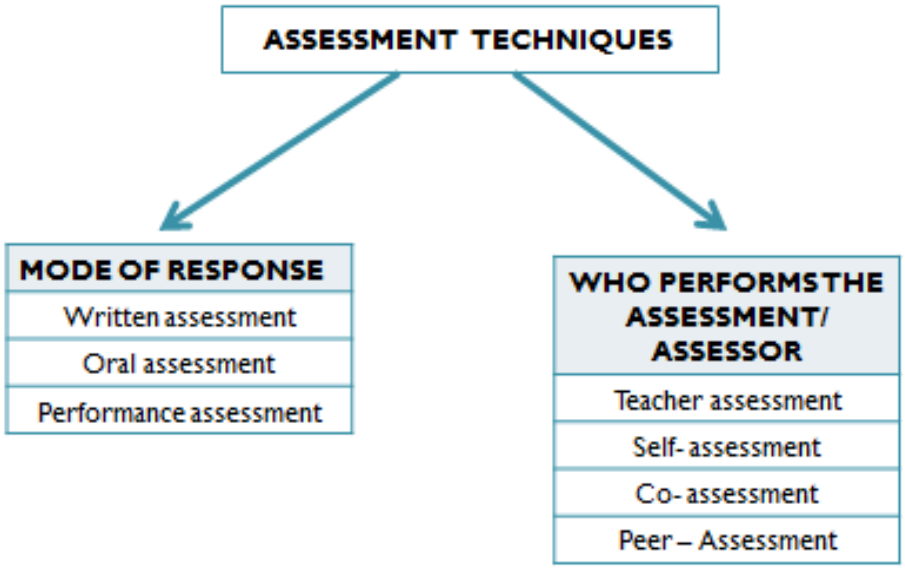


Figure 3. Assessment techniques

Written assessment refers to any assessment task that requires students to respond in writing. This type of assessment usually refers to the use of written tests. However, it also refers to quizzes, written assignments, written exercises, reports and projects. ***Oral assessment*** refers to any assessment task that requires an oral response. For example, the use of questioning by the teacher or presentations by students. ***Performance assessment*** refers to tasks that require students to create a product or response, or to perform a specific set of tasks in order to demonstrate their knowledge and skills. Performance assessment tasks yield a tangible product and/or performance that serves as evidence of learning (i.e. creating a 3D figure of a specific volume, using the ruler to measure distance, building a model). Performance assessment is directly linked to observation, as the assessor is expected to observe the performance process or product in order to assess student learning (Stiggins et al., 2006).

Assessment techniques are also categorized by considering who holds the role of the evaluator in the assessment process. Specifically, four categories are recognized: ***i) teacher assessment, ii) self-assessment, iii) peer-assessment,*** and ***iv) co-assessment***. ***Teacher assessment*** is the most commonly used type of assessment in this category and refers to the cases when the teacher is the one responsible to assesses students' learning. The second type of assessment, ***self-assessment*** shifts the role of the assessor to the student itself. ***Peer-assessment*** refers to assessment that is done from one peer to another. Finally, ***co-assessment*** is also included as many times a combination of teacher-, self- and peer assessment occurs in a classroom. ***Co-assessment*** refers to a collaborative method of assessment and can be any combination of self-assessment, peer assessment and assessment by the teacher.

Each type of technique based on the mode of response can be performed by different or a combination of assessors. For example, we can have a performance assessment that is assessed by the teacher or a performance assessment that is self-assessed, peer-assessed or co-assessed. The emphasis in all combinations remains on the skills of teachers to design, administer, record, analyse and report these different types of assessment techniques. Once again it is emphasized that the framework does not discriminate techniques based on their importance and considers all techniques as equally valuable in assessing student learning. However, teachers are expected to be able to choose and combine techniques to be used based on their

appropriateness for a given situation and make sure that they do not rely on the use of a single technique to assess student learning.

c) Measurement dimensions

The dimensions used to measure teacher skills in assessment draw on methodological and theoretical developments in the field of Educational Effectiveness Research (EER). Specifically, the following five dimensions proposed by the dynamic model of educational effectiveness (Creemers & Kyriakides, 2008) are considered: ***(a) frequency, (b) focus, (c) stage, (d) quality*** and ***(e) differentiation***. These dimensions help us describe in a better way the functioning of each characteristic of effective teachers. Frequency is a quantitative way to measure the functioning of each effectiveness characteristic, whereas the other four dimensions examine qualitative aspects of the characteristics.

Specifically, ***frequency*** is measured by considering the number of assessment tasks that teachers administer to their students, as well as how often assessment takes place. For each one of the assessment techniques included in the framework (i.e. written assessment, oral assessment, performance assessment, self and peer-assessment) we look at how often the technique is used, as well as, the frequency across the different techniques. This helps us identify the emphasis given by a teacher to assessment. We can also examine the balance between the use of different assessment techniques. However, it is not assumed that having frequent assessments is enough. For example, a teacher may use assessment frequently but rest only on the use of written tests. In this case, the learning of students who underperform in written tests due to various reasons (i.e. language proficiency learning difficulties, test anxiety) will not be assessed in a valid way. Thus, the ***focus of an assessment*** is also taken into account. Focus is measured by looking at the ability of a teacher to use different ways of measuring student skills rather than using only one technique. This helps us examine the internal validity of the assessment used. Learning is multidimensional and cannot be adequately measured by a single technique since relying on only one technique will only reflect a part of students' achievement and learning. A teacher using a combination of written, oral and performance assessment to evaluate students' learning is more possible to acquire valid information on students' learning. Focus also refers to whether the

teacher uses the information that she/he collects for more than one purpose (e.g., identifying needs of students, conducting self-evaluation, adopting his/her long-term planning, using evaluation tasks as a starting point for teaching). In formative assessment, teachers are expected to use assessment results not only to identify students' needs but also to give feedback, create opportunities to address these needs and make adaptations to his/her teaching. For example, a teacher might use a combination of techniques to assess student learning but use all of them to assign grades. This suggests that appropriate focus is achieved in relation to the use of a combinations of techniques, but not in relation to why and how these techniques are used.

Next, the ***stage*** dimension is measured by investigating the time at which the assessment tasks take place (e.g., at the beginning, during and at the end of a lesson/unit of lessons) and the time lapse between collecting information, recording results, interpreting and using assessment information and reporting results to students and parents. This dimension is especially important when looking at formative assessment given that timely intervention to address students' needs is essential. For example, a teacher that only assesses students' learning at the end of a lesson or a unit, will not be able to provide feedback while learning is taking place and address possible obstacles. At the same time, a teacher that administers a written test and provides feedback on the results after a month has lost valuable time to address needs identified though the assessment. The quality of assessment is also taken into account. The dimension of ***quality*** can be determined in two different ways. The first one refers to the properties of the assessment, as these are discussed in the literature (i.e. the properties of the evaluation instruments used by the teacher, the type of feedback given). Formative assessment requires the use of sound assessment practices to have an impact on student learning. For example, a teacher might give frequent feedback to students about their performance, but the feedback given may not refer to specific strengths and/or weakness identified in relation to the learning objectives assessed. In such case, the feedback provided cannot be used by students to improve their learning and thus cannot be considered constructive. In another case, a teacher might use oral assessment to evaluate students' learning but fail to use good quality questions when doing so which creates concerns about the reliability and validity of the information collected. Second, the impact of an assessment on student achievement is considered. As

mentioned earlier, formative assessment has been empirically related to improved student outcomes. Thus, whether teachers are using assessment for formative purposes is examined. For example, a teacher might use good quality assessment tools to evaluate student learning but only to acquire information for summative purposes. In this case, the quality in terms of the properties of the assessment is high but in terms of its impact on student learning is considered problematic. In another case, a teacher might incorporate self and/or peer assessment in the classroom routines but never use these assessment techniques/data in order to support student learning assuming that the use of alternative assessment techniques inherently satisfies the formative purpose of assessment. Finally, ***differentiation*** is examined in relation to the extent to which teachers use different techniques for measuring student needs and/or different ways to provide feedback to different groups of students considering their background and personal characteristics. Students of any age and in any culture will differ from one another in various intellectual and psychomotor skills, in both generalized and specialized prior knowledge, in interests and motives, in their socio-economical background, and in personal styles of thought and work during learning. These differences have been related to differences in student learning progress. Only when teachers consider that students differ from one another in various ways and make appropriate adaptations to address these differentiated needs, will they be able to implement assessment that has a positive impact on learning. For example, a teacher might be using good quality assessment tools but use them without any adaptations for all students, failing to address his/her students' differentiated needs. In another case, a teacher might choose to use different criteria for success and/or assessment tools for different students to better address students' learning needs.

Considering assessment as a multidimensional construct not only provides a better picture of what makes teachers more effective when assessing students but also helps to develop more specific strategies for improving assessment practice. Applying the five dimensions presented above to examine teachers' assessment skills allows us to develop comprehensive strategies for improving assessment practice since the feedback given to teachers could refer not only to quantitative, but also to qualitative characteristics of their assessment practice. In addition, it allows us to design targeted interventions that can have a positive impact both on teachers' skills and on student learning outcomes.

The framework presented above was used to make decisions in relation to the design of the TPD that was implemented under the FORMAS project. First it was used to design a research instrument (i.e., a teacher self- report) to measure teachers' skills in assessment. The instrument enabled the identification of specific developmental stages of assessment behaviour (see Section 6). The instrument was validated in all four participating countries (i.e. Cyprus, Greece, The Netherlands and Belgium) and was used both as a pre measure to identify teachers' skills in assessment and as a post measure to examine the impact of the TPD course on improving teachers' skills. By identifying teachers' specific needs in assessment though the administration of the questionnaire at the beginning of the intervention, it was possible for appropriate corrective actions to take place. Specifically, the content of the TPD course was designed to address the needs of groups of teachers as these were identified by the initial measurement. In this way, a customized training approach was achieved. The *Teacher Assessment Skills Questionnaire* is available on the project's website (see www.ucy.ac.cy/formas). Teacher Trainers interested in using the questionnaire should contact the project coordinator to acquire permission. The FORMAS research team is happy to provide any necessary support (e.g. administration procedures, data analysis and interpretation). Please note that the questionnaire needs to be completed with name/identification details to enable the identification of individual needs of each teacher since the analysis of data will help us classify teachers into different stages and we need to know at which stage each teacher is situated.

3. Why the dynamic approach to teacher professional development?

Recognizing the role of TPD in improving teachers' teaching and assessment practices (Borko, 2004; Kennedy, 2016) the FORMAS project used the DA to TPD (Creemers, Kyriakides, & Antoniou, 2013) for the design and delivery of the TPD course. The DA was considered as the most appropriate approach since previous studies provide support for the effectiveness of DA on the development of teaching and assessment skills and student achievement (e.g. Antoniou & Kyriakides, 2011, 2013; Creemers, Kyriakides, & Antoniou, 2013). In addition, the DA is aligned with the project's basic principles and assumptions.

First, the DA aims to establish stronger links between EER and improvement of practice. In line with FORMAS, the DA emphasizes the need for improvement efforts to concentrate on teacher practices that have been empirically associated with positive impact on student learning (i.e. formative assessment).

Second, it acknowledged that the duration of a TPD affects the impact that the program can have on teacher knowledge and skills. Duration, both in terms of span of time over which the TPD is spread and the number of hours spent in the TPD (Desimone, 2009), needs to be considered when designing professional development interventions. Therefore, the TPD presented in this handbook is not just an on–off professional development workshop but a series of five (5) sessions, ideally spread over the period of the school year (i.e. September to May). This allows teachers to use the time-lapse in-between sessions to implement actions for improvement, get feedback on their efforts and adjust their actions accordingly. It also enables the evaluation of the program (i.e. pre and post measurements) in order to identify its impact on the development of teachers' skills and its indirect effect on student learning, thus allowing subsequent decisions to be made on how to further improve it.

Third, the DA suggests that for TPD to be effective it needs to focus both on the development of competence but also on the engagement of participants in critical reflection. This TPD was designed in such a way that both competence development and guided critical reflection are highlighted. Teachers were provided support in order to develop specific assessment knowledge and skills that are necessary to effectively implement student assessment; while at the same time taking ownership over and critically reflecting on their learning through the development and revision of their action plans.

Fourth, the DA acknowledges that teachers have differentiated professional needs and that some may be more competent in specific skills than others. This is the reason that an initial evaluation of teachers' assessment skills took place before the TPD. Based on the results, the training offered was adjusted to accommodate these differentiated needs. In addition, the DA acknowledges that assessment skills vary in difficulty level and can be grouped starting from relatively easier skills towards more advanced types of teacher assessment behaviour. Taking this into account the training material of this TPD was differentiated to address groupings of assessment skills that vary in difficulty. For example, teachers that had not yet

developed the necessary skills for constructing good quality assessment tasks received training related to these skills and not on skills related to differentiating assessment which are situated at a higher level of difficulty. At the same time, teachers who were already competent in constructing good quality assessment received training in skills related to the recording of assessment information in ways that enables its use for formative purposes. The main steps for implementing a TPD based on the DA are presented below.

4. Implementing a teacher professional development course based on the dynamic approach: The main steps to be followed

The DA refers to four main steps that need to be considered when designing a TPD course. These steps were used to design and guide the implementation of the TPD program under the FORMAS project. The ***first step*** is concerned with the identification of the professional development needs of each teacher using a teacher questionnaire for measuring assessment skills. In the FORMAS project, this initial measurement took place during the introductory session (i.e. session 1) and helped us identify priorities for improvement for participating teachers and group teachers based on their needs. Specifically, three stages of teacher assessment behavior were identified (see section 6). Similar stages are expected to be identified when the questionnaire is administered in other contexts. The ***second step*** is concerned with the support that the advisory team (i.e. educators) provides to teachers to help them establish their own action plans. Specifically, teacher educators are expected to provide teachers of each group with training material, opportunities for application of new knowledge and supporting literature related to the assessment skills of their group, and with clear instructions about the area on which each group should concentrate for improvement (see Part B for the material that can be used). As a result, each teacher will be able to develop his/her own action plan. The ***third step*** of the DA comprises the establishment of formative evaluation procedures throughout the sessions. This means that teacher educators are expected to work closely with participating teachers to help them identify their learning goals and choose actions that can aid their achievement. Most importantly, they are expected to provide constructive feedback during and through the sessions to support teachers' improvement efforts. The ***fourth and final step*** of the DA aims to identify the impact of the program on the

development of teachers' assessment skills and its indirect effect on student learning. In the FORMAS project, this summative evaluation was the responsibility of the research team and took place after the end of the TPD through the administration of the teacher questionnaire and students' posts-tests (cognitive and metacognitive) in mathematics. The results allowed us to identify the positive impact that the TPD course had both on teacher assessment skills and on student learning outcomes and guided subsequent decisions on how to further improve the program for future use (see the respective report on the project's webpage, www.ucy.ac.cy/formas).

5. The rationale of the teacher professional development course

Emphasis on assessment skills

As mentioned earlier, teachers hold positive views towards assessment practices that can aid student learning and recognize the importance of implementing formative assessment practices in their classrooms. This could be because formative assessment is low-stake, can be part of their everyday teaching practice without major changes in their routines, gives them more freedom on when and how it will be implemented and is better aligned with their role as teacher in the promotion of learning. In the FORMAS project, teachers participated in the professional development program on a volunteer basis; therefore, it can be assumed that they did recognize the importance of promoting the formative assessment in their everyday practice. However, acknowledging formative assessment as a significant element of teaching is not enough for changes in practice to take place. If a teacher has not developed the necessary knowledge and skills involved in the implementation of formative assessment, he/she will most probably fail to effectively implement it in everyday practice. The TPD presented in this handbook acknowledges that for changes in practice to occur teachers need support in developing the knowledge and skills required for implementing effective formative assessment practice.

Focus on the development of assessment skills rather than the use of specific strategies

The distinction between formative and summative assessment has to do with the purpose that each one of them is designed for and used to serve. Summative assessment is about describing the overall achievement of a student usually for purposes of selection or comparison. On the other hand, formative assessment is about identifying a student's learning needs for appropriate action to take place to support his/her learning. Research argues that achieving both purposes with the same mechanism is not feasible (Harlen & James, 1997; Black & Wiliam, 1998; Kyriakides & Campbell, 2003; Kyriakides, Demetriou, & Charalambous, 2006). Therefore, an assessment practice can be identified as summative or formative when we examine the purpose it serves. Even if a practice appears as formative oriented, if the information elicited is not used to make adjustments and provide support to help students improve their learning, then the formative purpose is not met. For example, some teachers use supposedly "formative strategies" in classrooms (e.g., exit slips, traffic lights) without informing or accomplishing any next steps in learning. At the same time, contemporary assessment practices (e.g. portfolios, self-assessment rubrics) are perceived as inherently formative neglecting the fact that depending on their use, they can serve both formative and/or summative purposes. For example, a teacher might involve students in self-assessment believing that they use formative assessment but then use the results of this assessment as part of students' grading, which is in fact summative. Therefore, our aim is not just to train teachers in using specific formative oriented strategies. Our focus is on developing the knowledge and skills teachers need to perform the assessment-related aspects of their work in a competent and professional manner (Brookhart, 2011) to achieve the formative purpose of assessment. This will be achieved by helping teachers become able to distinguish when and how to use each assessment skill to serve the formative purpose of assessment.

Skills involved in the use of basic techniques when these are used in formal and/or informal situations

It is a common misconception that formal assessments are always summative, whereas informal or on the fly assessments serve the formative purpose. However, once again the purpose served depends on how the information elicited will be used. You could have informal assessments that are never used to inform students

about their learning and how it can be improved (e.g., an impromptu oral question that identifies a misconception, but the teacher ignores it). At the same time, you could have formal assessments that are used to identify students' needs and guide future actions (e.g. provide constructive feedback on the results of a formal written test). This also stands for the use of the basic assessment techniques (i.e. written assessment, oral assessment, and observation/performance assessment). Assessment techniques are not categorized as being formative or summative. All techniques can be used to achieve either purpose. For example, written assessment in the form of written tests is usually perceived as an inherently summative assessment. However, a teacher can design, administer, and use the data of a written test to identify and address students' learning needs in order to help them improve. At the same time, it is acknowledged that the purpose an assessment aims to serves defines how an assessment tool will be constructed and administered and how data elicited will be interpreted and used. Thus, it not assumed that the same assessment tool (i.e. a specific written test) can be used to serve both purposes at the same time. The TPD focuses on developing teachers' skills in planning, delivering and using results for all types of techniques used in both formal and informal situations, based on the formative purpose of assessment and the learning objectives to be examined.

Timing of an assessment is important but does not define purpose

Another common misconception is that formative assessment is synonymous to continuous or frequent assessment. Indeed, when an assessment takes place (i.e. at the beginning, during or at the end of a school year, a semester, a unit, or a lesson) is important in order for the formative purpose to be achieved. Formative assessment is expected to take place more frequently as this ensures that learning needs will be identified early enough for corrective actions to take place. Therefore, in the literature, the continuous character of formative assessment has been highlighted (Black & Wiliam, 1998; Clark, 2012). However, this does not mean that when an assessment is continuous or frequent that at the same time the formative purpose is achieved. For example, a teacher may assess students in each lesson or even more than once in a lesson but never use assessment information elicited to inform future practice or give feedback to students. At the same time, an assessment at the end of a unit can be used to give students constructive feedback on whether they

have achieved the learning objectives of the unit and which steps to take to improve their learning in relation to these objectives. This is important since mathematical constructs that are presented in one unit are closely related with those that are taught during the next unit (or even the next year). For this reason, constructive feedback given at the end of a unit is useful for promoting the learning outcomes of the next unit. Thus, it is important to remember that identifying an assessment practice as formative has to do with whether it helps students improve their learning rather than when it takes place.

The principles of sound assessment refer to both formative and summative assessment

Student assessment is a process of professional judgment based on separate but related principles of measurement evidence and evaluation (McMillan, 2000). Both summative and formative assessments are expected to satisfy the basic principles of educational assessment. Therefore, teachers are expected to design and use assessments that are amongst others reliable, valid, representative, unbiased, ethical, efficient, and feasible. For example, aligning learning objectives with assessment tasks (e.g., creating a specification table) is necessary in order to make sure that an assessment is representative of the teaching offered and that the tasks address the learning objectives in a valid way. This is necessary, regardless of whether the assessment is done for summative or formative purposes. At the same time, it is acknowledged that the purpose of an assessment might shift the emphasis to one or more of these aspects; however, this does not mean that teachers are free to ignore all others. For example, when using summative assessment teachers are expected to put more emphasis on the reliability of the assessment since these results are to be used to make judgments and take decisions about a student that have usually a more high-stake character (i.e. grades, class repetition, academic awards etc.). On the other hand, when using formative assessment, teachers are expected to put more emphasis on the validity of their assessment in order to make sure that results elicited are meaningful and can help to identify students' learning needs in order for appropriate actions to take place. Regardless of the assessment purpose, teachers are expected to have the skills to design and use quality assessments that satisfy the basic principles of assessments. In this TPD, the emphasis is on developing teachers' skills in using quality formative assessment based on the available knowledge-base of educational assessment.

6. Measuring teachers' assessment skills to identify professional needs

As mentioned earlier, the DA employed in this TPD course, acknowledges that teachers have differentiated professional needs and that some may be more competent in specific skills than others. This is the reason, an initial evaluation of teachers' assessment skills using a teacher questionnaire took place before the TPD. The questionnaire was developed during the first phase of the FORMAS project based on the theoretical framework presented in section 2 and support for its validity has been provided. The analysis of the data elicited during the first phase of the project provided support to the scaling and developmental structure of teachers' abilities in assessment. Specifically, it was found that assessment skills can be grouped into *three types/stages of assessment behaviour*, which are discerned in a distinctive way and move gradually from easier to more advanced skills. In addition, the four phases of assessment process which were used to measure teachers' skills (see section 2) do not stand independently but, on the contrary, they are found to coexist in all three types/stages. This implies that teachers in all three types/stages are involved in the dynamic cycle of assessment, with their skills differentiated in terms of their complexity in each phase. It is important to note that when analysing the results our aim was to identify stages that were comparable across the four countries participating in the project. Based on the data in each country more than three stages could be identified. A larger number of stages would have provided more specific information on teachers' needs; however, it would not have allowed comparisons across countries. A more parsimonious solution of three stages was therefore chosen. It is acknowledged, that using the suggested questionnaire to measure assessment skills in another context (i.e. country, subject, grade etc.) may yield different results both in terms of the numbers of stages identified and of the specific skills included in each stage. Therefore, in delivering TPD courses in a single country and on other subjects requires adaptation of the design of the course materials to the specific classification of assessment skills that may emerge. A description of the three stages used in the FORMAS project is presented below.

Stage 1: Using mainly written assessment to measure achievement in mathematics for summative purposes. The assessment skills included in this stage reveal that teachers demonstrating this type of

behaviour usually use assessment for summative purposes. Even though it is possible that they acknowledge the importance of formative assessment, they have not yet managed to establish a classroom culture that can successfully foster formative assessment practices. They usually use ready-made assessment tasks. However, the quality of their assessment practice needs improvement in term of its representativeness and of its internal and content validity. For example, they do not use a specification table to align intended learning outcomes with assessment tasks or take actions to ensure that the assessments used are representative of their teaching in terms of time spend spent and emphasis given. Oral and performance assessment are not systematically used to assess students' learning and assessment tasks used are mainly written. In regard to the written assessment tasks these are usually of the same type which raises questions about their concurrent validity. Homework is provided but it is not used for formative purposes (i.e. to identify students' learning needs to inform their teaching practice).

Stage 2: Using different techniques of assessment to measure achievement in mathematics but without defining appropriate success criteria and providing constructive feedback. The assessment skills included in this stage reveal that, teachers demonstrating this type of behaviour give feedback to students about their learning and attempt to use assessment for formative purposes. However, the feedback provided is usually evaluative instead of constructive. In addition, teachers at this stage use different assessment techniques to assess students in mathematics but this is not done in a way that enables them to compare the results which emerge from the use of different types of assessment and in this way to test the internal validity of their assessment. In addition, they usually keep records of information elicited from only the written assessment and do not systematically utilize records instruments such as checklists and rubrics. There is also space for improving their skills in formulating appropriate learning goals and criteria for success. Subsequently, it is difficult for both teachers and students (when self/peer-assessment is used) to identify students' learning needs, as well as, how these needs can be addressed.

Stage 3: Using assessment techniques to measure specific and more complex educational objectives to provide constructive feedback but without involving students in the assessment process and differentiating their assessment practice. Teachers demonstrating this type of behaviour can use a variety of assessment techniques to measure students' learning and usually keep records of information elicited not only from written assessment but from other techniques as well. However, recording is usually not done in ways that facilitate the formative use of the information available. For example, teachers may only keep records of the final overall performance of students (e.g. grades) during each unit which cannot be easily used for formative purposes. In addition, teachers at this stage assess group work but not in a systematic way and their assessment is primarily concerned with the team's overall performance rather than with each student's contribution to the teamwork. Teachers situated at this stage have already established a culture that encourages students' involvement in the process of assessment. However, both peer and self-assessment for formative purposes are not yet systematically and efficiently introduced. Finally, teachers at this stage have not yet managed to introduce differentiated assessment practices in their teaching.

The three stages identified confirm the initial assumption of the FORMAS project that teachers have differentiated professional needs when it comes to student assessment. This implies that *a common training to all participating teachers, as is usually the case, is not an appropriate solution.* The TPD offered under the FORMAS project was organized in a way that could accommodate these *differentiated needs*, by *providing differentiated training to each group of teachers based on their initial evaluation results*. A detailed description of the content and the material of the training for each of the three groups, as well as information on the implementation of the training, is presented in Part B of this handbook.

7. The structure of the teacher professional development course

The TPD course presented in this handbook suggests **five (5)** face to face training sessions with participating teachers. The suggested duration for each session is around three (3) hours. The rationale of the structure suggested is to provide teachers with adequate training time while at the same time allowing time in between

sessions for them to practice/test new knowledge presented in each session. It is also considered better to start the TPD intervention at the beginning of a school year. In this way, it is easier for teachers to establish both a positive assessment culture in the classroom, as well as, introduce new assessment practices. Using the suggested timeframe also allows for pre and post measurements of student learning outcomes to be carried out. Of course, the TPD course can also be implemented following a different time frame than the one suggested. However, it is crucial to ensure the distance between sessions to allow time for teachers to implement the actions they included in their own action plans to improve their practice. Distance between sessions is also important to allow teachers the necessary time for reflection to identify possible shortcomings in their attempts to improve their practice, as well as, ways to overcome them. Table 1 below presents a suggested timeframe for the implementation of the TPD.

Table 1. Suggested timeframe for the TPD intervention

Training Sessions	**Timeline**
1st meeting – Introductory session & Initial measurement (teacher questionnaire)	Mid of September
Initial measurement (student mathematics tests)	During the first 3 weeks of October
2nd meeting- Formation of groups – Presentation of new material- Personal Action Plan-first draft	2nd week of November
Feedback on action plan implementation (i.e. visits, emails)	
3rd meeting - Presentation of new material- Personal Action Plan revision	2nd week of January
Feedback on action plan implementation (i.e. visits, emails)	
4th meeting - Presentation of new material- Personal Action Plan revision	Last week of February
Feedback on action plan implementation (i.e. visits, emails)	
5th meeting - Presentation of new material- Personal Action Plan revision	End of April or during the 1st week of May (depending on the Easter Holidays of each country)
Feedback on action plan implementation (i.e. visits, emails)	
Final measurement (student mathematics tests and teacher questionnaire)	June
Feedback on results	September- October of next year

The first session of the TPD is common for all teachers. For sessions 2 to 5, teachers are grouped based on their professional needs as these are identified by the initial measurement of their assessment skills. Since teachers will be grouped based on the analysis of the initial measurement, it is important that the measurement is done at the beginning of the TPD. This will allow sufficient time for the analysis of data and grouping of teachers before the second session. As the table above shows, the initial measurement of teacher assessment skills can take place during the first session. It is expected that teachers are informed about their group allocation before the second session. For sessions 2 to 5, training can take place simultaneously in different rooms with different trainers or on different days depending on the number of trainers available. In the case that different trainers are used, it is best if trainers are rotated between the groups, to avoid possible trainer effect.

Finally, it is important to note that the TPD course can be implemented for more than one year. Development of teaching skills, including student assessment, is a rather long-term process demanding acquisition of both simple and more complex in-class teaching behaviours (Garet et al., 2001; Villegas-Reimers, 2003). The final measurement of teacher assessment skills conducted at the end of the intervention can provide valuable information on how the training can continue. For example, the final measurement can indicate that some teachers remain situated at the same developmental stage and thus need further training, whereas others might have managed to move to the next more demanding stage suggesting that training on new skills is required.

8. Your role as educators

As an educator you are expected to expertise and knowledge with practitioners and help them develop strategies and action plans that are in line with the relevant knowledge base of EER. Specifically, as the educator of this TPD you are expected to deliver the content of each session and share your expertise and knowledge with participating teachers to help them improve their assessment skills and practice. You are expected to create an environment where everyone is encouraged to participate, understand one another's point of view, share experiences and exchange constructive feedback. In-between the five sessions, there will

be an estimated time lapse of approximately six weeks. During this time, teachers will be asked to implement the actions they included in their own action plans in order to improve their practice. Even though we cannot hold teachers accountable for their effort, it is important to stress to participants that this time is valuable and needs to be used effectively. Your role during this time is to be available and to provide support and feedback (i.e. through emails, school visits etc.). If you realize that a participant may not be as engaged, you could initiate communication and offer your support. Below, an outline of the basic responsibilities throughout the sessions and in each session separately is provided. Of course, responsibilities are expected to vary in different contexts.

Main responsibilities in-between sessions:

- Provide administrative support (i.e. arrange meetings, print material, book rooms).
- Communicate with participants regarding administrative issues (i.e. meetings timetable, meetings place, contact information, send material after each meeting).
- Provide constructive feedback in between sessions (i.e. school visits, skype meetings, emails).

Main responsibilities in each session:

- Facilitate participants' critical reflection on their own action plans.
- Present the theory using the material prepared by the research team.
- Explain application activities.
- Provide constructive feedback during application activities.
- Support participants in their attempt to adjust their actions plans based on their reflection and the new aspects of relevant theory presented during each session.

PART B

The second part of the Teacher Trainer Handbook aims to support teacher trainers by providing a detailed guide for the practical implementation of the TPD course. First, some important issues regarding the administration and delivery of the training program are discussed. Then, a detailed presentation of the training material and suggestions for the implementation of each training session for all groups of teachers are provided. Of course, any teacher trainer wishing to implement the TPD course is expected to make all necessary adjustments depending on the context and the needs of participating teachers.

1. Introduction

As discussed in the first part of this handbook, the FORMAS project uses the DA to TPD to help teachers improve their assessment skills and support them in conducting assessment in ways that promote student learning. This TPD program aims both at the development of teachers' competence in assessment but also on teachers' engagement in critical reflection. The focus of both (i.e. competence development and critical and guided reflection) is on assessment skills which have been empirically related to positive student outcomes. In addition, it is recognized that teachers have differentiated professional needs and that some may be more competent in specific skills than others. Therefore, an initial evaluation of teachers' assessment skills took place during the first session of the TPD. The training offered for sessions 2 to 5 were then adjusted to accommodate these differentiated needs.

Formation of groups based on the completion of the questionnaire during session 1

Based on the study carried out during the first phase of the FORMAS project, teachers were grouped into three groups based on their assessment skills (i.e. Group A, Group B and Group C). Each group had differentiated professional needs and thus received different training according to these needs. Dividing teachers into groups was not done for summative but for formative purposes. As a trainer you are expected to refer to different groups of teachers based on their improvement priorities and any comparisons regarding

their competence or effectiveness must be avoided. It is also important to stress that each teacher has his/her own improvement areas and that the classification into these three groups is an attempt to create relatively homogenous groups in terms of their improvement priorities. This means that within a group, teachers might have similar but not necessarily the same improvement priorities.

Development of action plans

We expect each teacher to develop his/her own action plan by considering his/her own needs and context in which he/she is expected to teach mathematics to secondary school students. Although a sample action plan per group is provided, each teacher is expected to adapt it to match his/her own situation. The sample action plans provided include a list of suggested activities/actions per objective. Teachers are expected to choose or adapt some of these activities to their context or create/develop their own. You should encourage teachers to include a feasible number of tasks. Teachers are free to create their action plan following a different format if the necessary aspects are addressed. Bear in mind that by the end of session 2 teachers are expected to develop their action plans and revise them in each session by considering the new material covered during the sessions and their experiences in implementing their actions. For this reason, each session (3-5) begins with an activity that encourages teachers to reflect and share experiences about the implementation of their action plan. It is especially important to stress that the emphasis here is on teachers taking action to improve their practice and not on how well and precisely the action plan is developed. Your role is to remind and encourage teachers to work on their action plan from one session to the next.

Delivery of material

The material and application activities for the training are presented in detail below. The rationale of each slide/combination of slides and application activities is provided. However, it is expected that each trainer will use his/her own teaching approach and classroom organization strategies (including time allocation) in delivering the material and make any adjustments necessary to better address teachers' needs. We are confident that given your expertise you will be able to organize each session appropriately. If different trainers

are used to implement the TPD, frequent meetings to exchange experiences and improve training material are encouraged. For example, when the TPD was implemented in Cyprus three different trainers were used. For the first common session, all three trainers were present and for the next four sessions, trainers rotated among the three groups. After each session, the trainers met to discuss the session, exchange feedback, suggest improvements and address possible organizational issues.

During each session teachers are expected to work individually or in their groups on the application tasks given. The purpose of these application activities is to provide teachers with opportunities to practice the skills under focus. It is expected that during these activities, teachers might raise questions or express concerns about what they are asked to do. For this reason, in the detailed description of the material (see next section) the rationale and purpose of each application activity are presented. When necessary, sample answers, common misconceptions or points for discussion are also included. It is particularly important to note that application activities hold a particularly important role in the training and thus trainers must make sure that the appropriate time is devoted. All application activities/sample solutions are available in Appendix A.

Content per session for each group

As mentioned above, session 1 will be common for all three groups. Table 2 below shows the content to be covered in sessions 2-5 for each group. The analysis of each session is presented in the next section.

Table 2. The content of sessions 2-5 for each group.

	Session 2	***Session 3***	***Session 4***	***Session 5***
GROUP A	Creating a culture that can foster formative assessment	Designing representative and valid assessments	Developing different types of assessment items to achieve quality in assessment	Assessing homework for formative purposes
GROUP B	Providing constructive feedback to students	Using different types of assessment techniques in an efficient and systematic way	Formulating assessment success criteria and involving students in the process of assessment	Using rubrics/checklists to record results from different assessment techniques
GROUP C	Recording results in ways that enable us to identify the needs of each student	Using assessment to assess individual/group work	Differentiation in assessment: facing the challenges	Differentiation in assessment: implications for using self-assessment and recording/reporting results

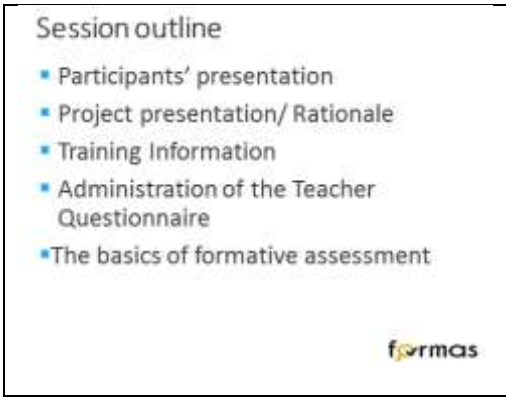
2. Presentation of training materials

2.1. Introductory session 1 (common for all groups)

Introductory session 1-For all groups	
General Aims	1) Presenting the TPD rationale and basic administrative information 2) Administering the teacher questionnaire (1st measurement) 3) Familiarizing participants with action plan development 4) Setting a common ground for discussing formative assessment
Session Outline	▪ Participants' presentation ▪ Project presentation/ Rationale ▪ Training Information ▪ Administration of the Teacher Questionnaire ▪ The basics of formative assessment
Important Information	✓ If the participants have not yet completed the initial measurement questionnaire, it is important to make sure that there is NO discussion/sharing of information regarding formative assessment that may impact the questionnaire completion. Teachers need to complete the questionnaire based on their current practices. ✓ Participants need to write down their names on the front page of the questionnaire. This is important since this information is needed to group teachers for next sessions. PLEASE MAKE SURE that teachers have completed their names before submitting their questionnaire.
Material/handouts	▪ Session 1- Introductory session PowerPoint handouts ▪ Teacher Questionnaire ▪ Flipchart (for slide 27, if you decide to write down responses) ▪ 3-2-1- Exit ticket

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that not alterations (besides adding the trainer/s details) are made.



Slide 3

Participants are informed about the topics/content to be covered during the session.

Slide 4

Ice-break activity. The purpose is to "warm up" the group by helping members to get to know each other but also to manage expectations of what this training will or will not offer them. You are free to add/adjust questions. However, please remember that no discussion/sharing of information regarding formative assessment that may impact the questionnaire completion should occur. Your role is to hear participants' views/opinions and not to make clarifications/corrections.

Slides 5-7

Basic information about the FORMAS project (i.e. funding, partner countries, project aim).

It is good to mention that the same TPD took place simultaneously in all four countries. Possibility of networking opportunities with participants from other countries implementing this TPD can also be discussed.

Slides 8-9

Presentation of the project's rationale. It is especially important for participants to comprehend the basic principles based on which this program was developed. This will help manage participants' expectations and help them accept more easily the 'different groups' approach to be employed for sessions 2-5. Some points to take into consideration:

- *This training is not only about them becoming more skillful in assessment but also on how this can impact their students' learning. The goal is to help students learn better. That is why we measure student achievement before and after the intervention.*
- *Professional development in assessment can be designed to cover a variety of areas. This program was designed with a focus on specific skills that have been empirically related to improve learning outcomes.*
- *As students, teachers also have differentiated improvement priorities. Therefore, a first measurement (i.e. questionnaire) is done to identify these priorities. The questionnaire asks teachers themselves to provide information about their current practices as they are considered as the most appropriate sources of data to provide this information. The questionnaire should therefore be considered as a form of self-assessment about teachers' assessment skills.*
- *Given these differentiated needs, the TPD will not be in the typical form of all teachers having the same training. Groups of teachers with similar priorities will be created and a more 'customized' approach will be employed.*
- *This training will include both new knowledge, as well as, the opportunities to apply it through application activities. These activities hold an important role for the development of the skills addressed.*
- *Reflection is also important as it will help them identify possible shortcomings in their attempts to improve their practice, as well as, ways to overcome them.*

Slides 10-11

Basic information about how the TPD will be implemented. The timeframe will be adjusted by each trainer to show the scheduled meetings arranged in each case.

Slides 12-13

At this point the teacher questionnaire for measuring assessment skills will be administered. Please have in mind that you should not answer any questions during assessment administration. Encourage participants to answer based on their practice and not on what it is best in theory. Remind them of the purpose of this questionnaire (i.e. identify improvement priorities) and why being honest is important for the training to be as useful to them as possible.

NOTE: *Teachers <u>MUST</u> write their <u>NAME</u> on the front page of the questionnaire. Please make sure that all questionnaires include a name when collecting them.*

Questionnaire administration cannot be moved at the end of the session. It is important that teachers complete the questionnaire before training begins to ensure the quality of the results.

Slides 14-16

Presentation of how participants will be grouped for sessions 2-5. It is important that teachers understand that for the following 4 sessions they will be organized in different groups. It is also necessary to stress that each teacher has his/her own improvement areas (as they will help us identify through the questionnaire) and that the classification into these groups is an attempt to create relatively homogenous groups in terms of their improvement priorities. That means that within a group, teachers might have similar but not necessarily the same improvement priorities.

The role of reflection throughout the training sessions is also highlighted. It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. Distance between sessions is provided to allow them the necessary time for reflection. Through reflection they can identify possible shortcomings in their attempts to improve their practice, as well as, ways to overcome them.

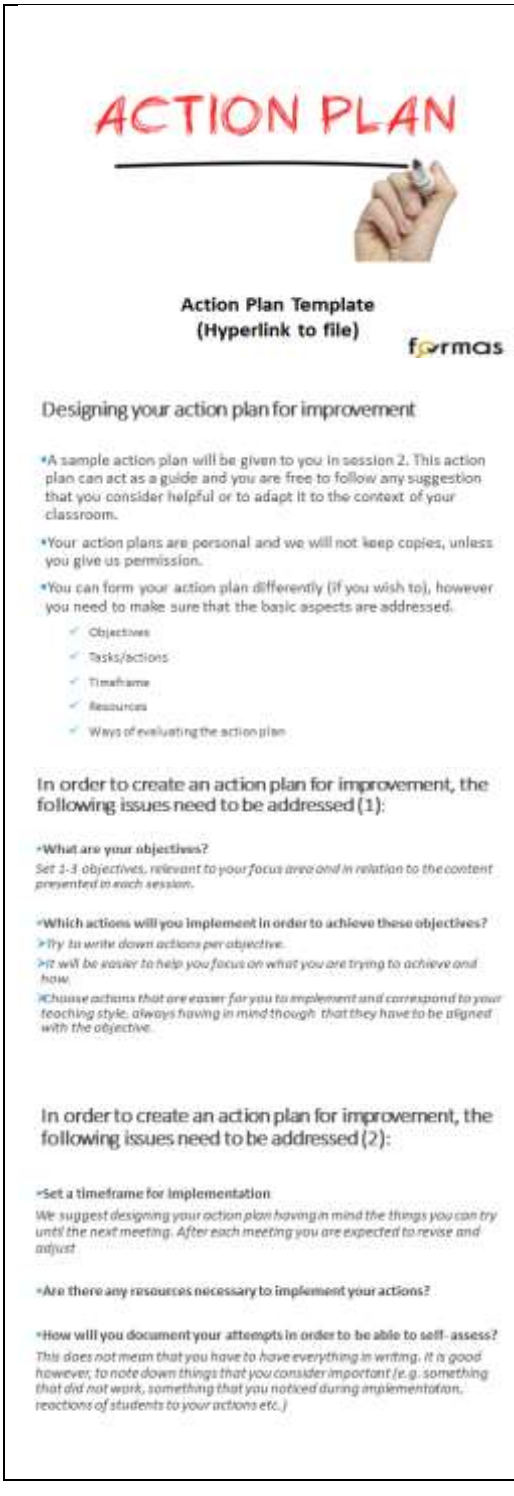
A brief description of how each training will be organized is also presented.

(*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*)

Slide 17

It is important to note that your role is to present the new knowledge in relation to assessment and guide them and support them through the process of improvement. Please emphasize your availability throughout the sessions to encourage teachers to make contact.

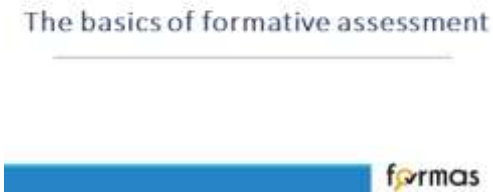
It is important to make clear that this is not training on how to teach Mathematics but on how to assess mathematics. So, the essence is not so much the mathematical content but the assessment skills necessary to assess this content.



Slides 18-21

Presentation of the action plan development process and their role. Some points to take into consideration:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts.*
- *Each teacher will create his/her own based on his/her needs, preferences, and teaching context (i.e. school, classrooms, students).*
- *An action plan does not need to be extensive. Short, focused, easy to develop and follow is the key.*
- *It is good to have a record of teachers' action plans however you will not keep copies of action plans unless the teacher gives you permission to do so.*
- *Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan.*
- *Teachers can work together (if they like) and exchange ideas to develop/revise/adjust their action plan.*
- *Trainers should be able to answer teachers' questions regarding the way they can adapt the trainers' suggestions into their context.*



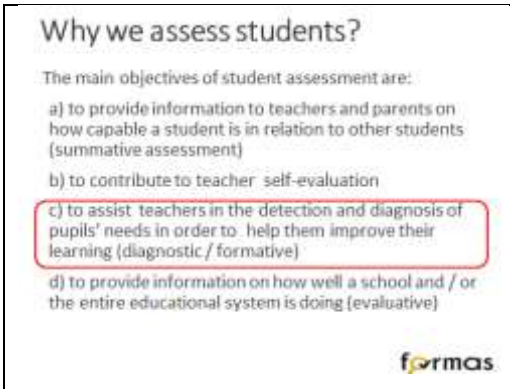
Slide 22

This last part of the 1st session aims to clarify some basic principles of formative assessment. It is possible, that our participants have participated in other training(s) about formative assessment with a completely different focus and organization. Our purpose is to ensure that we share a common understanding of what formative assessment really is, how it translates into action, and to address some possible misconceptions.

Slide 23

The phases of the assessment cycle process (for more details see Part A, section 2). Some points to take into consideration:

- *Although phases are identified, this is not a step-by step process. Sometimes you need to revise before closing the circle.*
- *Effective assessment requires the development of the skills required in all five phases. For example, if you have not constructed a good quality assessment task in the 'Constructing/ Selecting Assessment Tools/ Processes' phase this will affect the 'Analyzing, interpreting, and using assessment results' phase.*
- *Most of the time it is difficult to distinguish teaching from assessment. Assessment is an integral part of teaching and should be addressed as an independent process which you could or could not be used in a lesson. It is almost impossible to have a whole lesson without any assessment elements unless you are just providing a lecture without taking into consideration you students; needs and responses.*

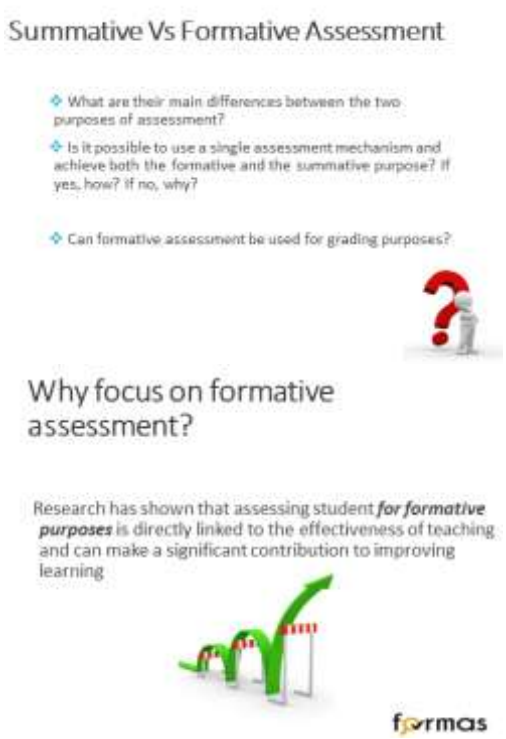


Slides 24-26

The purposes of assessment. It is important for participants to acknowledge that not every assessment is done for/serves the same purpose. This does not necessarily mean that assessment that serves different purposes is not necessary or important. However, formative assessment is the focus of this TPD.

It is also important for teachers to distinguish between formative and summative assessment. You could also refer to the terms 'assessment for learning' and 'assessment of learning' accordingly.

Summative assessment is about describing the overall achievement of a student usually for purposes of selection or comparison. On the other hand, **formative assessment** is about identifying a student's learning needs for appropriate action to take place to support his/her learning.



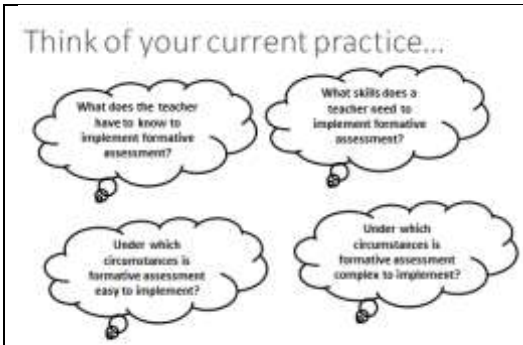
Unless assessment helps identify and address students' needs to help improve their learning, assessment cannot be considered as formative. Action taken, after needs are identified, is crucial for as assessment to be considered as formative.

You could use the *soup analogy* or the *garden analogy* to help teachers with the distinction between the two.

Our TPD focuses on formative assessment since research suggest that it can have a positive impact on student learning.

Another important issue here is that it is difficult to achieve both purposes at the same time. Although you could use the results of a summative test to provide constructive feedback to students about their strengths and weaknesses, it cannot be ignored that an assessment is designed to serve best a specific purpose. Thus, an assessment task designed to serve the formative purpose is not expected to have satisfactory discrimination indices (in order to be used for summative purposes too). Similarly, a test designed to serve the summative purpose may not provide adequate information for the individual needs of each student that allows teachers to provide constructive feedback to each student. For example, a zero score or full marks on a summative test gives no specific information about the student's needs.

NOTE
Our aim is not just to train teachers in using specific formative oriented strategies. Our focus is on developing the knowledge and skills teachers need to perform the assessment-related aspects of their work in a competent and professional manner to achieve the formative purpose of assessment. This will be accomplished by helping teachers become able to distinguish when and how to use each assessment skill to serve the formative purpose of assessment.



Slide 27
Reflection activity. The purpose of this activity is for teachers to critically reflect on their current practice. It is possible that common misconceptions are identified. In this case you should link with the next slides to address them.
This activity will also help teachers identify the difficulties there are facing when they try to implement formative assessment practices. Try to address this by helping them see how this training will help them.

NOTE
You could use a flipchart or a white board to write down teachers' responses to facilitate the discussion.

Slide 28-30

The purpose of these slides is to address common misconceptions regarding formative assessment. This is a crucial part of the training, given that sometimes these misconceptions make it difficult for quality formative assessment to occur, even if teachers are in favor and try to implement it.

NOTE

These misconceptions are discussed more thoroughly in Part A, Section 5 of the handbook under the titles:

- *Focus on the development of assessment skills rather than the use of specific strategies*
- *Skills involved in the use of basic techniques for both formal and informal situations*
- *Timing of an assessment is important but does not define purposes*
- *The principles of sound assessment refer to both formative and summative assessment*

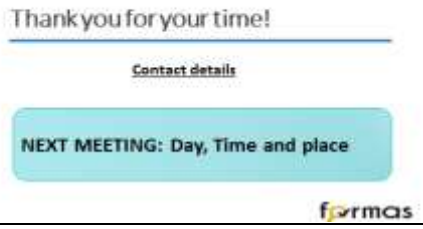
Slide 31

Reflection activity. The purpose of this activity is for teachers to reflect on the things discussed in this session.

Exit tickets (such as the 3-2-1), is a strategy that provides learners (in this case teachers) an opportunity to reflect and record their own comprehension and summarize their learning. It also gives teachers (in this case, you the trainer) the opportunity to identify areas that need to be clarified/ addressed, as well as areas of interest. Other types of exit tickets can also be used.

Completed exit tickets should be returned to you anonymously (to help teachers feel more comfortable to answer). Study the

	exit tickets after the end of the session and address possible issues raised at the beginning of the next session (session 2). NOTE *Exit ticket handout*

	**Slide 32** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately NOTE *Add contact details and next meeting details*

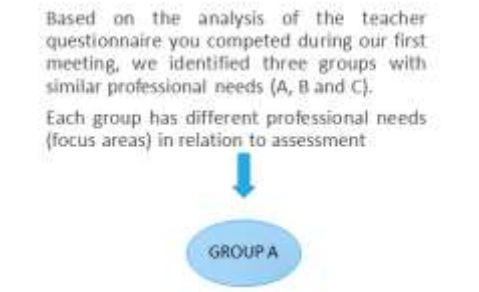
2.2. Sessions 2-5 for Group A

Group A- Session 2	
General Aims	1) Present the identified focus areas for Group A 2) Present the skills under emphasis for session 2 3) Examine an action plan that addresses the focus areas of Group A 4) Help teachers create a first draft of their individual action plan
Session Outline	▪ Presentation of the focus areas for Group A ▪ Creating a culture that can foster formative assessment ▪ Discussion of the template action plan for group A ▪ Creation of the first draft of the individual action plan
Important Information	✓ It is important to inform teachers that based on the analysis of the questionnaire data, three groups were identified. Each group has differentiated professional needs and will thus receive different training according to these needs. You are expected to refer to different groups of teachers based on their improvement priorities. The classification into these three groups is an attempt to create relatively homogenous groups in terms of their improvement priorities. That means that within a group, teachers might have similar but not necessarily the same improvement priorities.
Material/handouts	▪ Session 2-Group A PowerPoint handouts ▪ Application activity – Fostering a positive learning culture (A2a) (slide 8) ▪ Post-its (for A2a, slide 8) ▪ A3 poster paper X 4 (for A2a, slide 8) ▪ Application activity – Developing a "Growth Mindset" in your Students -A2b (slide 13) ▪ Action plan for Group A ▪ Empty action plans

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 2- Group A handouts



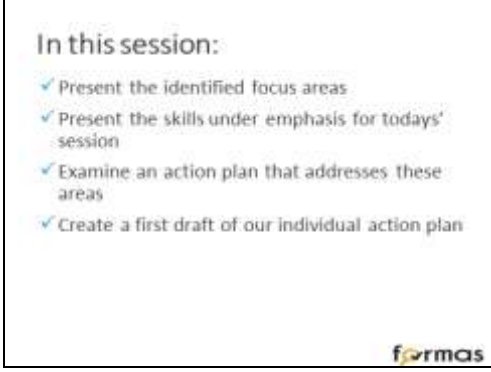
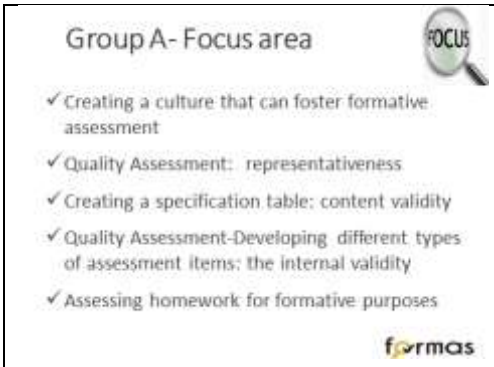
Slide 3

Participants are informed about the identification of 3 groups and that they belong to the group referred to as Group A. This grouping will occur for all next sessions.

Grouping was done based on the professional priorities they have identified themselves through the questionnaire. Again, we emphasize that the aim is to create relatively homogenous groups in terms of their improvement priorities. This will allow us to customize content according to teachers' needs. Of course, it does not mean that all members of the group have the same needs. Within a group, teachers might have similar but not necessarily the same improvement priorities.

NOTE

Participants may have already been informed of their group before session 2. For example, if the three groups receive training simultaneously, teachers are informed in advance about their group and location of meeting. If different training times/days occur for each group, then again participants are informed in advance when and where the meeting of their group is taking place. As mentioned in Part A of the handbook, if different trainers are used to offer the TPD, then rotation between trainers is expected.

	**Slide 4** Participants are informed about the topics/content to be covered during the session.
	**Slide 5** Presentation of the focus areas/skills to be addressed throughout the sessions of Group A. Teachers of group A are the ones situated at stage 1 (see Part A, Section 6 for a detailed description of the stage). Based on the skills included in this stage it is expected that teachers of Group A usually use assessment for summative purposes. Even though it is possible that they acknowledge the importance of formative assessment, they have not yet managed to establish a classroom culture that can successfully foster formative assessment practices, as well as, develop the necessary skills for implementing formative-oriented assessment practices. Therefore, throughout the next four session teachers of Group A will work on improving their skills in relation to promoting a learning culture that can foster formative assessment, as well as, in relation to the construction of representative and valid assessment tasks/instruments. Emphasis will also be given to the use of homework in ways that support student learning. NOTE *You should not give any details regarding the focus areas of the other two groups.*

Slides 6-7

Presentation of the focus of todays' session and what teachers are expected to be able to do by the end of the session (intended learning outcomes).

Slide 8

Application activity – Fostering a positive learning culture (A2a)

Rationale: Implementing formative assessment requires changes in the professional practice of teachers in relation to the classroom culture. Both teacher and students must have a shared understanding of, and a commitment to, assessment that promotes (and not just evaluates) learning. The purpose of this activity is for teachers to critically reflect on their current practices. Through this reflection, teachers are expected to identify possible shortcomings in their current practice and at the same time suggest actions they can take to improve it.

Give the A2a application activity handout (see Appendix A) and the post-its to all and an A3 paper to each group

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

	Ask teachers to write down each suggestion/idea on a post –it and pin it on the A3 paper of their group. Try to help teachers engage into a more critical review of their current practice and perhaps identify why sometimes a negative classroom culture is created. Allow around 20 minutes for teachers to discuss and create their poster. Then allow another 20 minutes for the groups to present their poster and discuss their suggestions with the whole group. It is possible that teachers' suggestions focus more on what student are expected to do. For example, students respect each other opinions, students do not make fun of mistakes. Try to remind them that the focus of the training is their skills. Help them identify ways that have to do with their role in the classroom rather than the role of students. For example, instead of suggesting that students should respect each other's opinions to suggest how they can achieve this in their classroom (e.g. model respect to different opinions, clearly state disapproval when lack of respect occurs etc.).

	**Slides 9-12** These slides provide some details on why a positive learning culture is important for the implementation of formative assessment and some suggestions on how to achieve it. Discuss the slides and ask teachers to identify suggestions that were not included in their posters. Then ask them to evaluate suggestions depending on how easy or difficult they are to implement. For example, how easy is to have high expectations from all students but at the same time for these expectations to be realistic based on students' needs? Or how to we manage to shift our focus from only celebrating success but at the same time acknowledge good performance? *Emphasize again that formative assessment is about improving student learning and not just evaluating it.*

Slide 13

Application activity – Developing a "Growth Mindset" in your Students -A2b

Rationale: One important factor influencing how students react to feedback is the way that students make sense of successes and failures in school. This subsequently affects if and how students will use feedback information. The purpose of this activity is for teachers to acknowledge that students might understand failures/success differently and to suggest ways to help student develop a mindset that focuses on growth and improvement.

Give the A2b application activity handout (Appendix A)

Create small groups as in the previous application activity.

Ask teachers to read the notes in their handout before proceeding with the activity. Make sure that the three different ways of how students make sense of their success/failures (*personalization*, *stability*, and *specificity*) are clear to teachers (a description of the three types is included in the A2b application activity handout).

After the activity is finished, discuss teachers' answers. Use the *A2b application activity- Suggested Answers (Appendix A)* document to guide you.

NOTE: Try to encourage teachers to suggest ways that have to do with mathematics (e.g. provision of rich, open-ended math tasks,

	removing the emphasis on speed, highlighting the importance of perseverance, pay attention to effort and/or process over result, creating opportunities for failure even for high-ability students).

	**Slides 14** *<u>Give a) the empty action plan handouts and b) the action plan template for Group A (Appendix B).</u>* Remind them that: ➢ *The action plan is a tool that will help them be more focused and punctual to their improvement efforts.* ➢ *Each teacher will create his/her own based on his/her needs, preferences, and teaching context (i.e. school, classrooms, students).* ➢ *An action plan does not need to be extensive. Short, focused, easy to develop and follow is the key.* ➢ *It is good to have a record of teachers' action plans however you will not keep copies of action plans unless the teacher gives you permission to do so.* ➢ *Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan.* ➢ *Teachers can work together (if they like) and exchange ideas to develop/revise/adjust their action plan.* Ask teachers to read the suggested actions under the ***O1. Create a culture that can foster formative assessment*** heading only. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on the empty action plan and create a first draft of their personal action plan *NOTE: remind teachers that they will need the action plan template in all sessions and thus they need to have it with them every time.*

	**Slide 15** It is important to stress that this training can have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized. (*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*) Information about the next meeting (Session 3). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

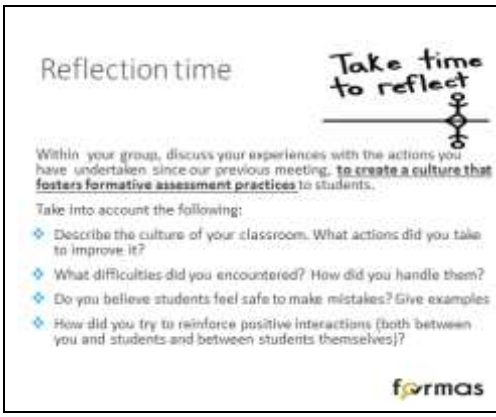
	**Slide 16** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group A- Session 3	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 3 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Quality Assessment: representativeness ▪ Creating a specification table: content validity ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the PowerPoint Presentation - Session 3- Group A ▪ Application activity – Setting Intended Learning Outcomes (ILOs) (A3a) (slide 8) ▪ Application activity – Specification Table (A3b) (slide 14) ▪ Written Test - Specification Activity -A3b- Written Test ▪ Application activity – Specification Table- A3b-Completed table ▪ Action plan for Group A (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session3- Group A handouts



Slide 3

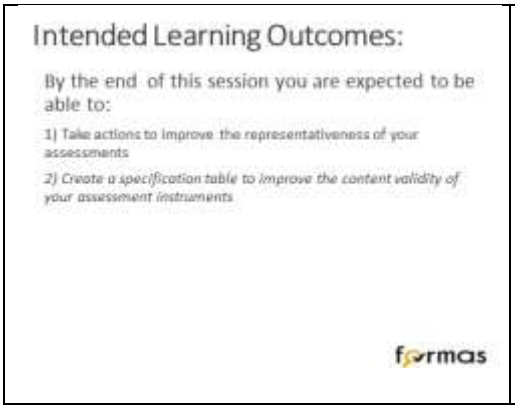
Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.

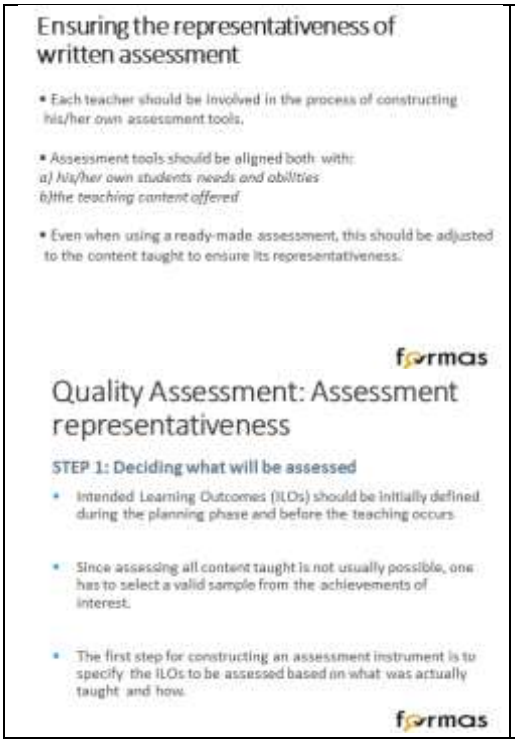
Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: Try to make connections between the content of the sessions. Creating a culture that can foster formative assessment is the first step before changing our assessment practices. Then, it is important to make sure that the assessment provided is of good quality for us to be able to correctly identify students' strengths and weakness. Identifying students' needs is a prerequisite for implementing formative assessment and we need to be able to create assessment tasks that students are capable to perform them.



Slide 5
Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the Intended Learning Outcomes (ILOs) is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.



Slides 6-7 (Quality Assessment: representativeness)

Student assessment should be representative of the teaching offered in terms of content, level of difficulty and emphasis given. For example, if you placed more emphasis on a specific concept to address students' learning needs, this should also be the case in your assessment instrument.

For student assessment to be representative one must align assessment with a) students' needs and b) the teaching offered (what was taught and how).

To achieve representativeness, you must first make sure that your set ILOs and that these are of good quality.

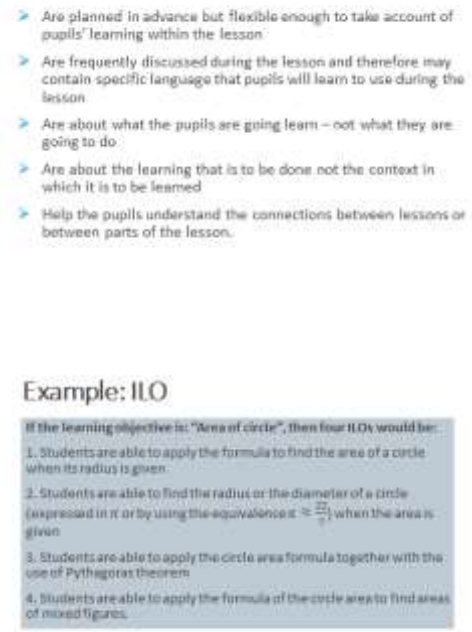
ILOs refer to what students are expected to be able to do by the end of a/ a series of lesson(s).

Slide 8 (Quality Assessment: representativeness)
Application activity – Setting ILOs (A3a)

Rationale: Learning outcomes are described as written statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning. Being able to define good quality ILOs is a necessary skill for teachers. However, sometimes teachers tend to translate teaching content or even assessment tasks into ILOs. The purpose of this application activity is to help teacher acknowledge the importance of good quality ILOs for assessment and to improve their skills in setting them.

	Give the A3a application activity handout Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity. Ask teachers to write down two ILOs for the learning objective "addition and subtraction of polynomials". Then, ask teachers to revise based on the information presented in slides 9 and 10. When providing feedback on teachers' ILOs consider the following: ➢ ILOs have one basic active verb ➢ They should be short sentences specifically describing the learning intended ➢ Make sure that it refers to what students are learning and not to what are doing (activity) ➢ Remind teachers that an ILO can be examined using a variety of different activities/tasks and not just a single activity. Allow around 15 minutes for teachers to discuss, set and revise their ILOs.

	**Slides 9-11 (**Quality Assessment: representativeness) These slides provide some details on the characteristics of good quality ILOs. They should be used to help teachers evaluate and revise the ILOs suggested in application activity A3a. *Note: Use the example (slide 11) to help teachers identify the importance of setting ILOs. Sometimes teachers consider the general objective (i.e. area of circle) as their learning goal. However, breaking this general objective into specific ILOs is necessary to better teach and subsequently better assess the knowledge/skills involved.*



Slide 12-13 (Creating a specification table: content validity)

A specification table (or *assessment blueprint*) is a valuable tool when constructing assessment instruments/tasks. It is used to align objectives, instruction, and assessment. For formative assessment, using a specification table is important since it improves the validity and representativeness of the assessment, allowing us to better identify students' learning needs.

Usually a specification table is a two-way matrix presenting assessment tasks in relation to the learning objectives and a classification of these objectives. For example, Blooms' taxonomy is used to classify educational learning objectives into levels of complexity and specificity.

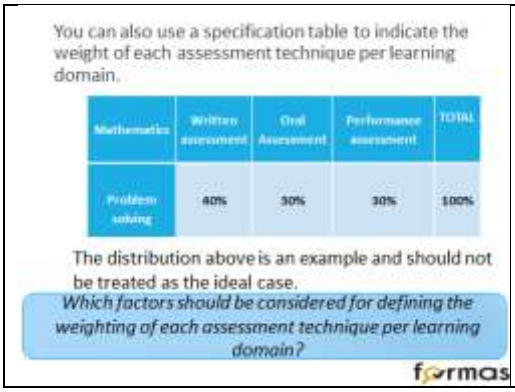
In this TPD, learning objectives were examined in relation to three dimensions: a) declarative knowledge, b) use of algorithms, and c) problem solving. This classification was decided based on the review of the literature in mathematics assessment but also based on the content analysis of the mathematics curricula in the four participating countries. The aim was to create a classification that is relevant and comparable across participating countries and that help us develop the instruments measuring student learning outcomes in mathematics. Specifically, *declarative knowledge* refers to student's ability to recall terminology, definitions, facts,

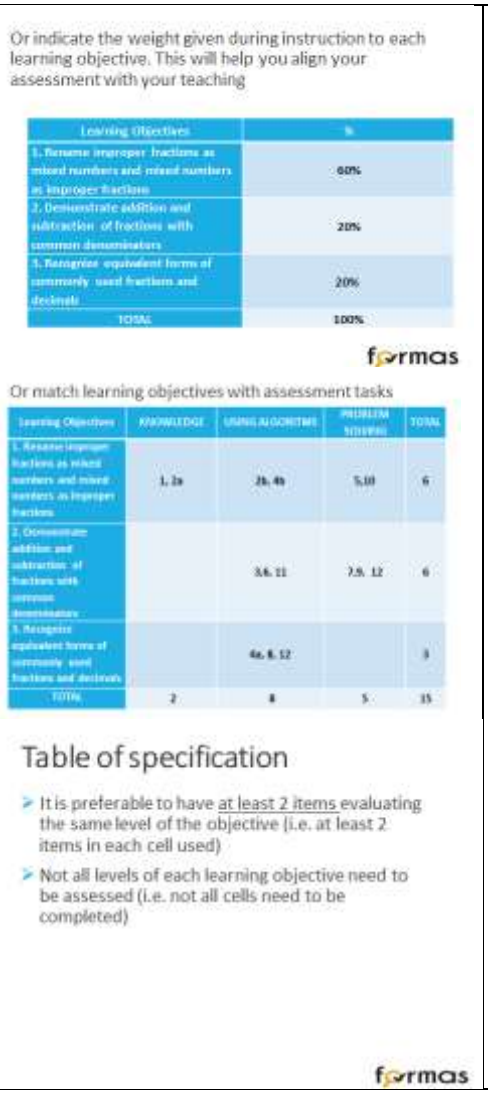
	principles, methods, structures etc. The dimensions of *using algorithms* refers to student's ability to to use an algorithm taught in a given situation. Finally, *problem solving* refers to student's ability to analyze an unknown/problematic situation and effectively use an algorithm or a series of algorithms to solve it. Of course, other classifications can be used depending on the subject, context and learning approach promoted. When introducing the concept of the specification table please have in mind the following: ➢ *Not all learning objectives can be examined using all three aspects* ➢ *Even if an objective can be examined with all three aspects, the teacher decides which aspects will be assessed based on the teaching preceded* ➢ *Each item can be used only once in a specification table* ➢ *Items in the form of 1a, 1b, 1c are considered different items and can be placed in the table independently* ➢ *It is preferable to have at least 2 items in each cell used*

	**Slide 14 (**Creating a specification table: content validity) **Application activity – Specification Table (A3b)** **Rationale: Teachers are expected to create a specification table prior to constructing an assessment instrument and fill it in while they are constructing the assessment tasks to be included. This implies that teachers have the skills to a) align learning objectives and assessment tasks and b) classify tasks based on specific dimensions. The aim of this application activity is for teachers to practice these two skills.** *Give a) the A3b application activity handout and b) the Written Test - Specification Activity -A3b- Written Test (Appendix A)* Create small groups as in the previous application activity. Ask teachers to study the written test given to them. It is a 35minute written test on algebraic expressions for 8th grade students. Then, ask teachers to work in their groups to fill in the specification table. They are expected to place each item in a cell of the specification table. To do so, for each item, they must first identify which aspect is examined and at which level *(i.e. knowledge, using algorithms and problem solving*). All items need to be placed in a cell, but not all cells need to include an item.

	The correct classification is presented in the document *Application activity – Specification Table- A3b-Completed table (see Appendix A).* When teachers finish, give them a copy of the *Application activity – Specification Table- A3b-Completed table handout.* Ask them to review the completed table and compare it with theirs. A justification of the classification follows: **Items 1a, 1b, 1d** Learning Objective: *Monomials (similar, equal, opposite)* Level: *Knowledge* Justification: Question items ask students either to recall facts about monomials or recognize types of monomials **Items 1c, 2a, 2e** Learning Objective: *Operations with monomials* Level: *Using Algorithms* Justification*: Question items require students to apply known algorithms involving operations with monomials* **Items 2b, 3, 4a, 4d** Learning Objective: *Addition and subtraction of polynomials* Level: *Using Algorithms* Justification: Question items require students to apply known algorithms involving addition and subtraction of polynomials **Items 5a_1*, 5b** Learning Objective: *Polynomials, addition / subtraction of polynomials* Level: *Problem Solving* Justification: Item 5a_1 asks students to apply addition and subtraction of polynomials to calculate the area of a rectangular frame. Item 5b asks students to translate a word description of an area to an algebraic representation in terms of a variable and then calculate the value of the variable for a given area. Intermediate process, in both cases, involve the operations of addition and subtraction of polynomials. ***** *Item 5a asks students to a apply conceptual knowledge on polynomial operations to develop suitable algebraic model and calculate the area of a rectangular frame. Part of the item (5a_1) assesses operations on addition and subtraction and the other part (5a_2) assesses operation on multiplication. Although the two parts do not appear as separate in the test, these are recognized in the specification table.* **Item 1e** Learning Objective: *Multiplication of polynomials* Level: *Knowledge*

	Justification: Item asks students to recognize a known polynomial identity. **<u>Items 2c, 2d, 3, 4b, 4c</u>** Learning Objective: *Multiplication of polynomials* Level: *Using Algorithms* Justification: Items involve operations with polynomials. **<u>Items 5a_2*</u>** Learning Objective: *Multiplication of polynomials* Level: *Problem Solving* Justification: Item 5a_2 asks for the conceptual understanding of polynomial multiplication which is part of the algebraic representation of a word problem. *See note above **<u>Items 2f, 4e</u>** Learning Objective: *Division of polynomials* Level: *Using Algorithms* Justification: Question items ask students to apply algorithms of division (either cancelling out common factors or long division). Finally, ask them to discuss the questions on the back of the handout and take notes. Allow approximately another 10 minutes for a whole group discussion.

	**Slide 15-18 (**Creating a specification table: content validity) A specification table can also be used as a two-way chart to describe a) the weight of each assessment technique for the assessment of a learning objective, b) the emphasis placed on a learning objective during teaching.



Slide 19-20

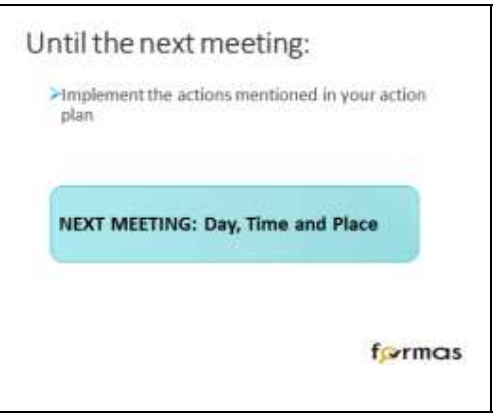
Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

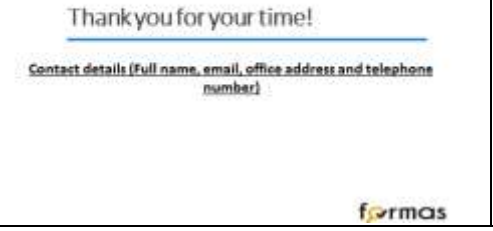
Remind them that:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *During the previous session each teacher has created his/her own based on their needs, preferences and teaching context (i.e. school, classrooms, particular students)*
- *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*

Ask teachers to also study the suggested actions under the ***O2. Ensure the representativeness of written assessment*** and ***O3. Improve the content validity of assessment by creating a***

	***specification table*** headings in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on their action plan and revise their actions.

	**Slide 21** It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized. (*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*) Information about the next meeting (Session 4). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

	**Slide 22** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group A- Session 4	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 4 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Quality Assessment: Developing different types of assessment items: the internal validity ▪ Assessment items using multi-dimensional approach to student understanding ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the Power Point Presentation - Session 4- Group A ▪ Application activity –Evaluating the quality of assessment items (A4a) (slide 8) ▪ Application activity - Multi-dimensional assessment of student achievement (A4b) (slide 13) ▪ *Item development guidelines* handout ▪ Action plan for Group A (some copies) ▪ Empty action plans (some copies)


formas

PROJECT TITLE:
PROMOTING FORMATIVE ASSESSMENT: FROM THEORY TO POLICY AND PRACTICE (FORMAS)

GROUP A - SESSION 4

Name of trainer(s)

Erasmus+

ACKNOWLEDGEMENTS

This project, entitled "Promoting Formative Assessment: From Theory to Policy and Practice (FORMAS)" has been funded with support from the European Commission. This communication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Co-funded by the Erasmus+ Programme of the European Union

Slides 1-2

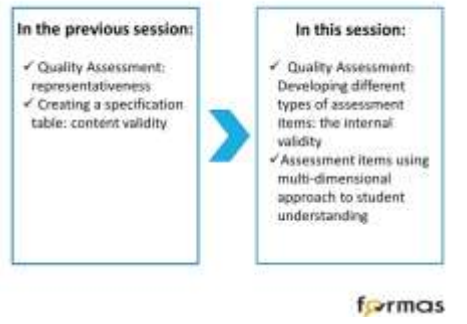
The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 4- Group A handouts

Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

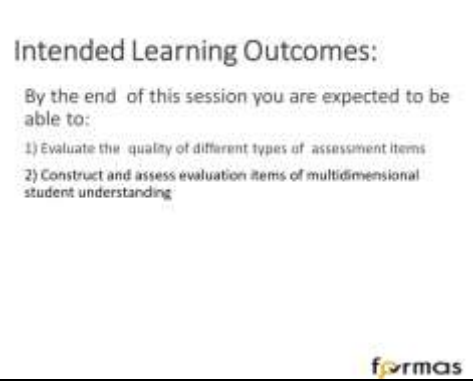
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.



Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: Try to make connections between the content of the sessions. In the previous session, we discussed that assessment should be representative of the teaching offered in terms of content, level of difficulty and emphasis given. We emphasized the need for setting good quality ILOs and using a specification table to align our teaching and ILOs with assessment items. Today, we are talking about item construction and how we can develop/choose good quality assessment items that evaluate in a more reliable and valid way our students' learning. We also emphasize that students' understanding in mathematics is multi-dimensional and that assessment should be designed to address this.



Slide 5

Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

Slides 6-7 (Quality Assessment: Developing different types of assessment items: the internal validity)

The decision about designing either **closed or open assessment items** depends on the nature of the information required.

Closed items typically:

- have one correct answer
- can be completed quickly
- assess one specific piece of knowledge, or a specific skill or procedure
- may provide limited information about student thinking or limited opportunity for students to demonstrate higher levels of understanding.

Open-ended items typically:

- have a range of appropriate responses (i.e. need criteria to evaluate them)
- take longer to complete (and evaluate)
- assess a range of knowledge and skills
- more likely to provide information about problem-solving strategies and thinking
- more likely to provide opportunity for students to demonstrate higher levels of understanding.

➢ Ask teachers to comment on these items types/subtypes and how often they use them in their maths classroom.

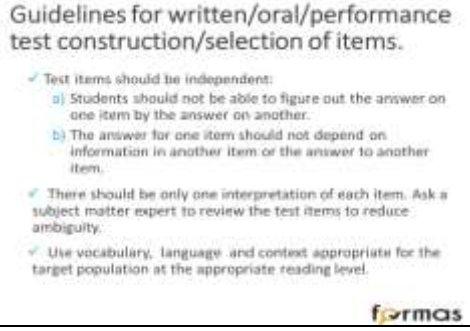
Slide 8 (Quality Assessment: Developing different types of assessment items: the internal validity)

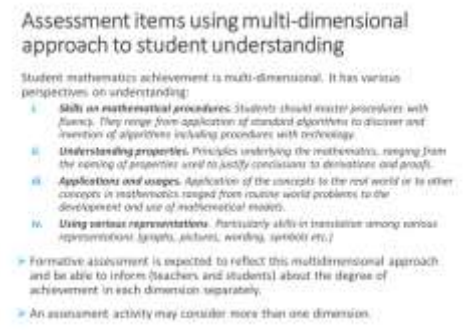
Application activity –Evaluating the quality of assessment items (A4a)

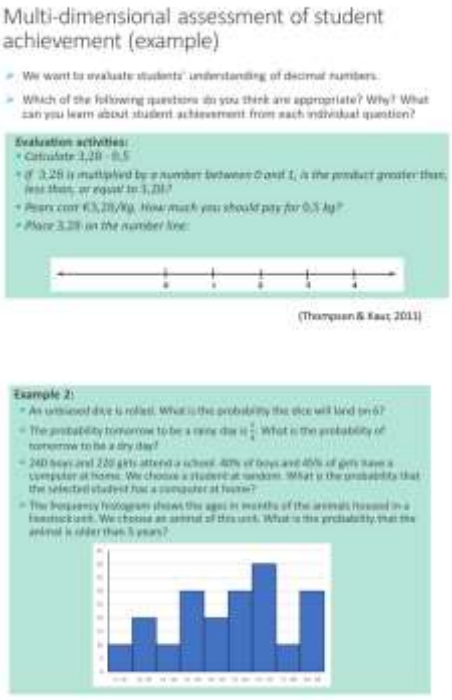
Rationale: High quality assessment tasks are necessary for formative assessment, as they allow us to better identify students' progress/needs in relation to the ILOs examined. Amongst others, teachers are expected to use a combination of different types of assessment tasks, examine both basic skills and procedural knowledge but also address higher order skills, use tasks that are aligned with the teaching offered and avoid bias. This application activity aims to support teachers in developing their item construction skills. Some "rules of thumb" for high quality item construction are provided to support them in the process.

Give the A4a application activity handout (Appendix A)

	Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least two groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity. Ask teachers to study the ***Item development guidelines*** given to them (Appendix A). Explain that these guidelines provide some "rules of thump" regarding the construction of each type of item. Creating good quality items helps us to improve the internal validity of our assessments and thus provide more useful information about students' learning. Then, ask teachers to work in their groups to evaluate the assessment items given to them, based on the guidelines; and suggest possible ways to improve them. Comments on the quality of the items are available in the ***Application activity –Evaluating the quality of assessment items (A4a)- Suggested Answer*s** handout (see Appendix A).

	**Slide 9 (**Quality Assessment: Developing different types of assessment items: the internal validity) This slide provides some general rules of thumb for the construction of assessment items. More detailed suggestions for each item type are provided in the *Item development guidelines* handout (see Appendix A).

	**Slide 10 (**Assessment items using multi-dimensional approach to student understanding Given that mathematics achievement is multi-dimensional, teachers are expected to assess students in ways that allow the collection of data on these different dimensions, so that corrective actions can take place. Using a one-dimensional approach to assess students' mathematical performance is possible to provide a shallow and unreliable picture of student learning and encourage unsound instructional practice.



Slides 11- 12 (Assessment items using multi-dimensional approach to student understanding

Each of the questions is considered as an appropriate assessment item. Each provides different insight into what students know about the concept of decimals. If used in combination, they can provide a more robust view of students' depth of understanding than would be obtained from an individual item.

Slide 13 (Assessment items using multi-dimensional approach to student understanding

Application activity - Multi-dimensional assessment of student achievement (A4b)

Rationale: Formative assessment is about identifying and addressing students' learning needs. This implies that different needs can be identified. Learning especially in mathematics is multidimensional and this needs to be taken into consideration when constructing assessments. This application activity aims to help teachers identify how different assessment items provide different insights into students' learning and acknowledge that by combining different items we collect more accurate and robust information about each student's needs.

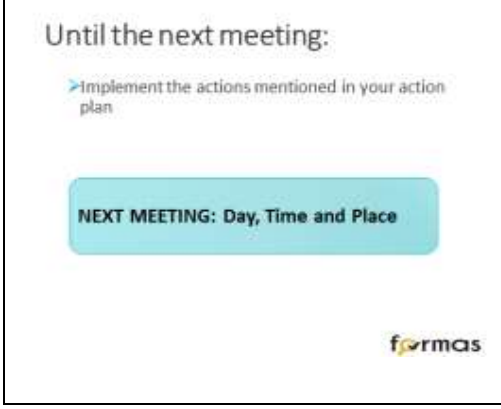
Give the A4b application activity handout (Appendix A)

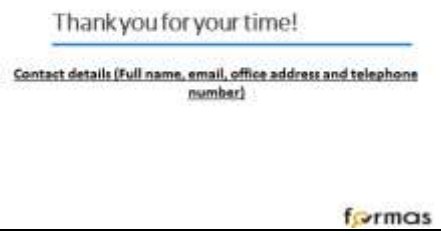
Create small groups as in the previous application activity.

Ask teachers to work in their groups to evaluate the assessment items given to them, taking into consideration both the guidelines used in the previous application activity and the discussion on the multidimensional character of learning. Then, ask them to suggest

	possible ways to improve them. Comments on the items are available in the ***Application activity - Multi-dimensional assessment of student achievement (A4b)-Suggested Answers*** handout (see Appendix A).

	**Slide 10-11** *<u>Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.</u>* Remind them that: ➢ *The action plan is a tool that will help them be more focused and punctual to their improvement efforts* ➢ *During the previous session, each teacher has created his/her own based on their needs, preferences and teaching context (i.e. school, classrooms, particular students)* ➢ *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.* Ask teachers to also study the suggested actions under the **O4. Improve the internal validity of assessment by developing different types of assessment items: the internal validity** headings in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on their action plan and revise their actions.

	**Slide 12** It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized. (*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*) Information about the next and final meeting (Session 5). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

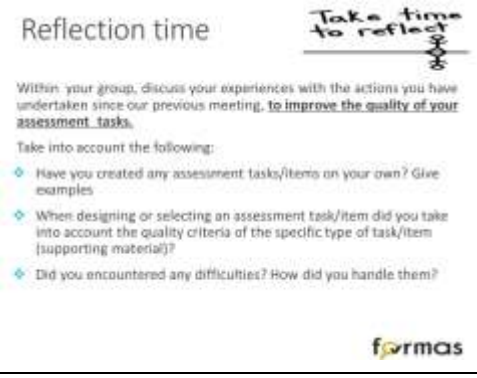
	**Slide 13** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group A- Session 5	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 5 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Assessing homework for formative purposes ▪ Managing Homework ▪ Re-examination of the action plan adding new aspects based on new content ▪ TPD formative evaluation ▪ Administrative issues
Material/handouts	▪ Handouts with the Power Point Presentation - Session 5- Group A ▪ Application activity – Assessing Homework (A5) (slide 9) ▪ "Constructive Homework Guidelines" handout (slide 9) ▪ Action plan for Group A (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

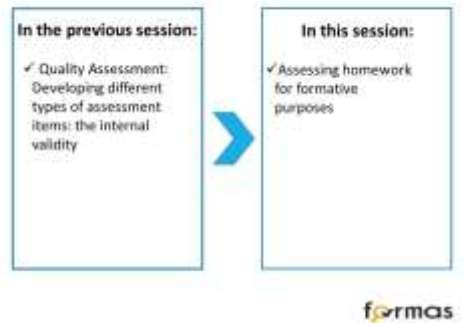
Give the Session 5- Group A handouts



Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

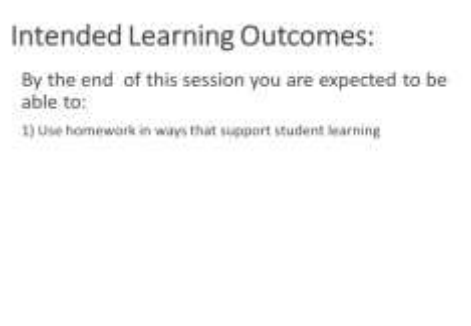
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.



Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: Try to make connections between the content of the sessions. In the previous session, we discussed about item construction and how we can develop/choose good quality assessment items that evaluate in a more reliable and valid way our students' learning. Today, we talk about how learning can be extended through good quality homework activities that evaluate in a more reliable and valid way our students' learning.



Slide 5

Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

Slide 6

Ask teachers to discuss the questions presented with the person/s sitting next to them and share their answers with the whole group.

Both positive and negative views of homework and its importance are expected.

Positive views about homework may include:

- teaches students to work independently and develop self-discipline.
- encourages students to take initiative and responsibility for completing a task.
- allows parents to have an active role in their child's education and helps them to evaluate their child's progress.
- It provides extra learning time

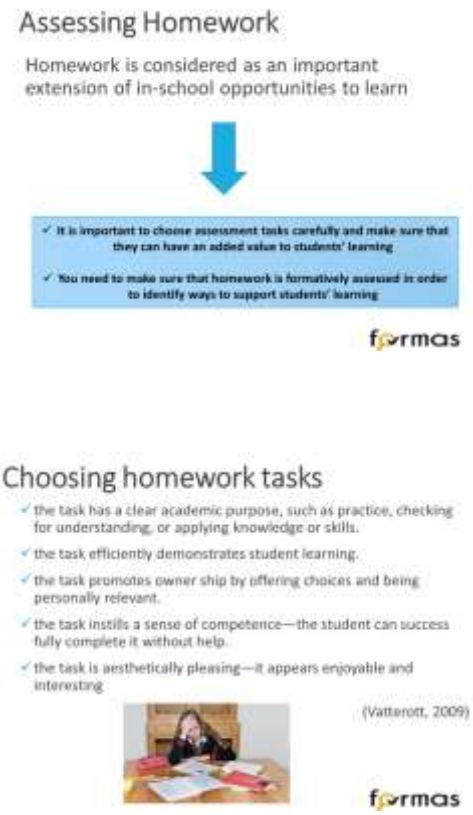
Negative views about homework may include:

- Many homework assignments are checked for completion and not accuracy
- Not enough time to give feedback on homework
- Homework is not usually the student's independent work
- Students view it a burden/punishment and not as an opportunity to learn

Various misconceptions might also arise such as:

- More homework= better results
- All students should have the same homework to be fair
- No homework is necessary if you do a good job in the classroom
- Homework is a good way to cover material that you did not have time to cover in class
- Assigning grades on homework for summative purposes is a good practice to ensure that homework is completed.

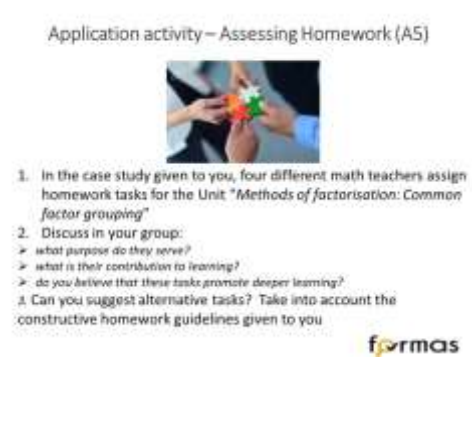
Use the next slides (slides 7-8) to address these misconceptions.



Slides 7-8 (Assessing homework for formative purposes)

Homework is recognized as an additional learning opportunity for students. It relates to the construct of quantity of teaching since it gives the chance to students to spend more time on a topic/aim.
However, to achieve the positive effects of homework specific conditions need to be satisfied. It is therefore important to emphasize that:

- Homework should not be extensive. Extensive homework often results to others (i.e. parents, tutors) doing the work or helping with the homework. Students often feel overwhelmed and stressed when extensive homework is assigned. Adjusting homework time to students' age, ability, and needs and to the home learning environment (i.e., whether it is supportive) is important.
- We should avoid assigning as homework what was left unfinished in the classroom. We need to make sure that we have provided students with opportunities to apply new knowledge (and thus, provide feedback to address difficulties, if any) before asking them to apply it at home.
- We do not assume that all students have a support system at home (*e.g. material, knowledgeable adults, technology*) that can help with homework. Differentiation of homework activities based on the students' support system is advised.
- Feedback on homework is not only about completion… It should be constructive and address positive and negative aspects of a student's work and address possible learning needs identified.
- As all feedback, feedback on homework should be provided as soon as possible to allow time for corrective actions to take place.
- Homework should be used for formative rather than summative purposes.

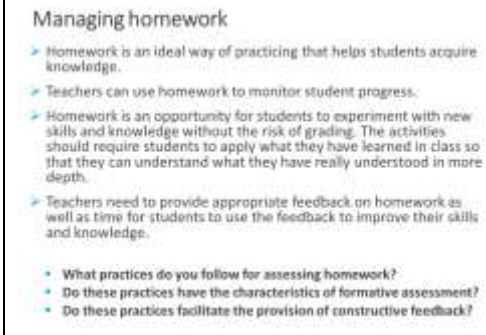


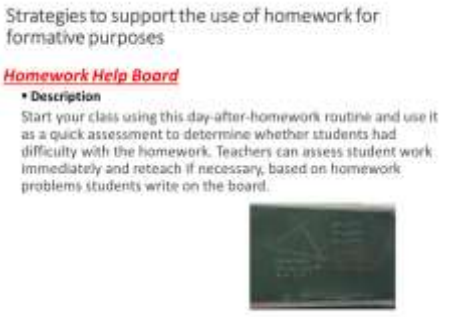
Slide 9 (Assessing homework for formative purposes)

Rationale: Homework can be used as an additional learning opportunity to classroom teaching. However, not all homework is supportive to learning. Teachers are expected to assign and treat homework in ways that can support student learning. This application activity aims to help teachers develop the skills to distinguish between good quality and bad quality homework and to design homework activities that can be used for formative purposes.

	Application activity – Assessing Homework (A5) *Give the A5 application activity handout and the "Constructive Homework Guidelines" handout (Appendix A)* Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity. Ask teachers to study the case study. It presents homework tasks assigned by four different maths teachers on the same unit. Then ask teachers to study the "Constructive Feedback Guidelines" handout provided and work in their groups to answer the questions provided. ***Teacher 1:*** Homework Task: For homework, answer all the exercises (1 to 8) in your book at pages 35 & 36. Discussion: ➢ *The task is not focused on the work done in class as it asks students to complete a range (1-8) of exercises. A description of how these exercises link to the content of teaching and the ILOs is missing* ➢ *Learning intentions of the assignment is not clear to the students* ➢ *The homework as given in a pile of exercises does not seem to provide for differentiation, either regarding the content, the process, or the outcome.* ***Teacher 2:*** Homework Task: For homework, answer all odd items of exercises 1 to 8, at pages 35 & 36. Discussion: ➢ *Asking students to solve only the odd numbered exercises might reduce the workload for students but provides no information on the focus of the homework and its relation to the work done in the class and the ILOs. It also provides no opportunity for differentiation based on individual student needs.* ***Teacher 3:*** Homework Task: For homework, make a small project describing different methods of factorisation Discussion: ➢ *No clear instructions given to students (eg. length, contents).* ➢ *Not clear what is expected from students* ➢ *No information on how this will be assessed (i..e assessment criteria)*

	➢ *Not clear how this homework relates to the ILOs and work done in the classroom.* ***Teacher 4:*** Homework Task: For homework, do the exercises on the given worksheet (below) $x^2 - 5x$ | $3x - 12$ | $2x^2 + 12x$ $x^2 + 3x$ | $4x^3 + 4x$ | $6a^2b - 2ab^2$ $8ax - 56a$ | $x^3 - 2x^2$ | $3x^2 - 12x$ $x^2 + 12x + 36$ | $x^2 - 18x + 8$ | $96x^3 - 84x^2 + 112x - 98$ Discussion: ➢ *A clear instruction to the exercise is missing (e.g. factorise completely the next algebraic expressions)* ➢ *Provision was taken to put items in a hierarchical order regarding their difficulty.* ➢ *Provision was also taken the homework items to be representatives of the factorisation methods taught in class.* ➢ *The homework does not facilitate for student independent work. For example, it could group items according to methods of factorisation employed and refer to specified pages in student textbook, or the work done in class, when students have difficulties to complete an item.*

	**Slide 10** (Managing Homework) Emphasis on the formative role of homework: ➢ aligned with ILOs ➢ appropriate for students' age/ability/needs ➢ can be completed by the student without the need of support ➢ students feel free to express difficulties in completing the homework and ask for teacher support ➢ constructive timely feedback is provided to support learning



Slides 11-13 (Managing Homework)

Homework help board

A useful strategy that allows teachers to better management homework check in terms of time and feedback.

Another variation is for students post anonymous questions about homework or a task on a board or in a homework box in the classroom. The teacher sorts through the questions at the beginning of class. If one or two students have a similar question, a student can be asked to answer the question. If many students have the same question, the teacher can reteach that concept themselves. Keeping the feedback anonymous encourages student contributions.

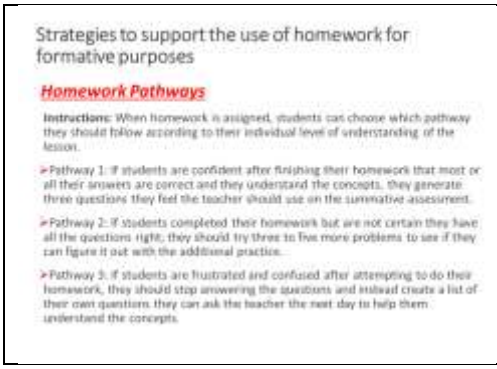
Ask teachers to also share other strategies they might use to check homework and adjust instruction.

Slides 14-15 (Managing Homework)

Homework Pathways

A useful strategy for assigning homework. For homework to work and help students progress in their learning, they need to be able to complete it and for this to happen, it has to be matched to their ability. When working in mixed ability classrooms, providing different homework pathways is a good practice to ensure that all students are able to complete the homework tasks assigned.

Ask teachers to also refer to other strategies they may use to assign homework based on students' needs/interests.



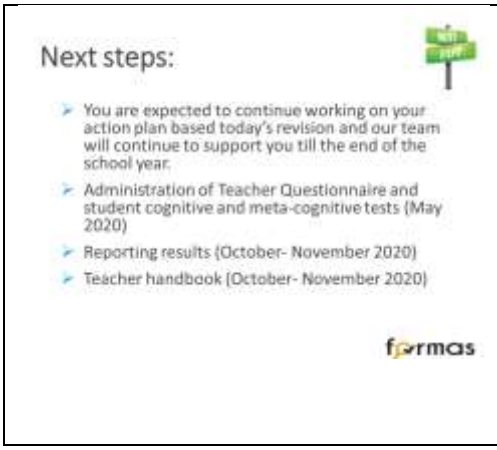
Slides 16-17

Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *During the previous session, each teacher has created his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students)*
- *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*
- *Even though this is our last session, we expect teachers to continue working on their actions until the end of the school year*

Ask teachers to also study the suggested actions under the ***O5. Assess homework for formative purposes*** heading in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.
Ask teachers to work on their action plan and revise their actions.



Slide 18

It is important to stress that this training can have positive impact only if they are actively involved in improving their practice even after this program ends.

Administrative information about the next steps (to be adjusted accordingly by each country).

This is the final session of the TPD course. However, teachers are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Make sure to stress your availability despite the end of the sessions and encourage teachers to make contact.

	**Slide 19** Ask teachers to spend some time to answer questions regarding the TPD course as part of its formative evaluation.

	**Slide 20** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in this professional development program. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details*

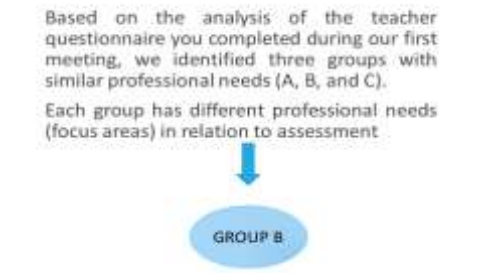
2.3. Sessions 2-5 for Group B

Group B- Session 2	
General Aims	1) Present the identified focus areas for Group B 2) Present the skills under emphasis for session 2 3) Examine an action plan that addresses the focus areas of Group B 4) Help teachers create a first draft of their individual action plan
Session Outline	▪ Presentation of the focus areas for Group B ▪ Use of different assessment techniques ▪ Discussion of the template action plan for group B ▪ Creation of the first draft of the individual action plan
Important Information	✓ It is important to inform teachers that based on the analysis of the questionnaire data, three groups were identified. Each group has differentiated professional needs and will thus receive different training according to these needs. You are expected to refer to different groups of teachers based on their improvement priorities. The classification into these three groups is an attempt to create relatively homogenous groups in terms of their improvement priorities. That means that within a group, teachers might have similar but not necessarily the same improvement priorities.
Material/handouts	▪ Session 2- Group B PowerPoint handouts ▪ Post-its (application activity, slide 8) ▪ Poster with red arrow (application activity B2a, slide 8) ▪ Application activity – Using different types of assessment techniques (B2b) ▪ Application activity – Using different types of assessment techniques (B2b)- Suggested answers handout ▪ Action plan for Group B ▪ Empty action plans

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 2- Group B handouts



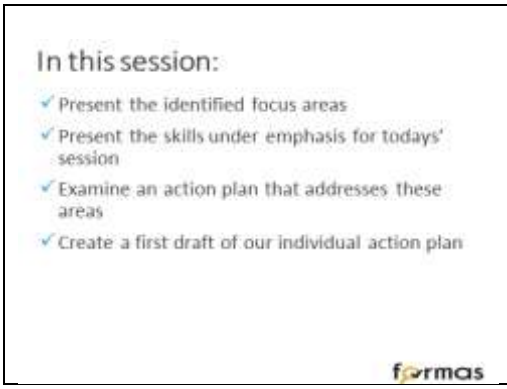
Slide 3

Participants are informed about the identification of 3 groups and that they belong to the group referred to as Group B This grouping will occur for all next sessions.

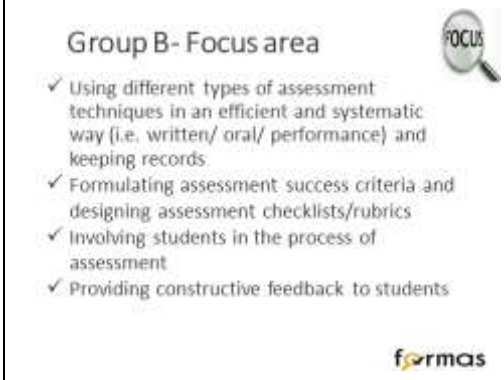
Grouping was done based on the professional priorities they have identified themselves through the questionnaire. Again, we emphasize that the aim is to create relatively homogenous groups in terms of their improvement priorities. This will allow us to customize content according to teachers' needs. Of course, it does not mean that all members of the group have the same needs. Within a group, teachers might have similar but not necessarily the same improvement priorities.

NOTE

Participants may have already been informed of their group before session 2. For example, if the three groups receive training simultaneously, teachers are informed in advance about their group and location of meeting. If different training times/days occur for each group, then again participants are informed in advance when and where the meeting of their group is taking place. As mentioned in Part A of the handbook, if different trainers are used to offer the TPD then rotation between trainers is expected.



Slide 4
Participants are informed about the topics/content to be covered during the session.

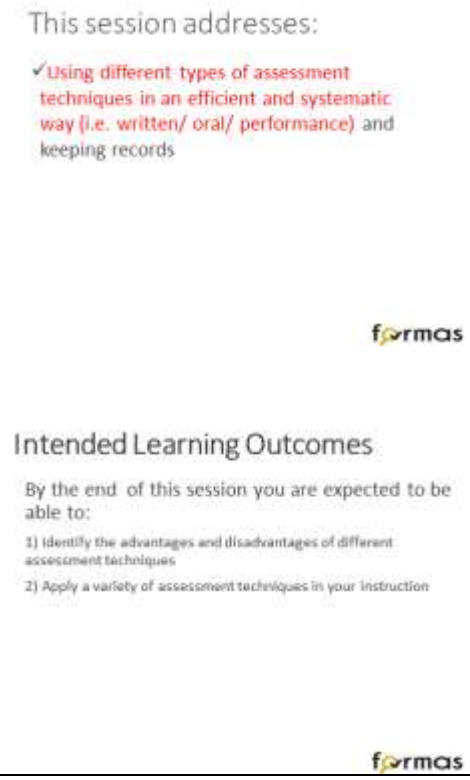


Slide 5
Presentation of the focus areas/skills to be addressed throughout the sessions of Group B.

Teachers of group B are the ones situated at stage 2 (see Part A, Section 6 for a detailed description of the stage). Based on the skills included in this stage it is expected that teachers of Group B usually use different techniques of assessment to measure achievement in mathematics but without defining appropriate success criteria and providing constructive feedback. Even though they give feedback to students about their learning and attempt to use assessment for formative purposes, the feedback provided is usually evaluative instead of constructive. Different assessment techniques are used to assess students in mathematics, but this is not done in a way that enables them to compare the results which emerge from the use of different types of assessment. In addition, they usually keep records of information elicited from written assessment and do not systematically.

Therefore, throughout the next four sessions teachers of Group B will work on improving their skills in relation to in formulating appropriate learning goals and criteria for success, recording assessment information from various assessment techniques, utilizing recording instruments such as checklists and rubrics and providing constructive feedback. Emphasis will also be given to involving students in the process of assessment.

NOTE
You should not give any details regarding the focus areas of the other two groups.



Slides 6-7
Presentation of the focus of todays' session and what teachers are expected to be able to do by the end of the session (intended learning outcomes)

Slide 8 (Using different types of assessment techniques)

Application activity- Collecting information (B2a)

Rationale: ***Documenting and using data on the knowledge, skills, attitudes, and beliefs of students to improve student learning is essential for formative assessment. There are multiple sources of information that contribute to measuring student learning. This application activity aims to help teachers reflect on their current practice and identify how they usually collect information about students' learning.***

Give the post-its to all and the A3 poster to each group

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

Ask teachers to think of a lesson they taught recently and discuss which information they collected about students learning and how. Then ask them to write down on post –its different ways they use to collect information about students' learning. Ask to them to pin the post-its on the A3 poster.

	NOTE 1: It is possible that teachers' suggestions/experiences focus more on formal ways to collect information. Try to remind them that on the fly assessments are also considered as ways for collecting information on students' learning (e.g. observation, oral questions, informal one-one talks). *NOTE 2: It is a common misconception that formal assessments are always summative, whereas informal or on the fly assessments serve the formative purpose. However, once again the purpose served depends on how the information elicited will be used. You can have informal assessments that are never used to inform students about their learning and how it can be improved (e.g., an impromptu oral question that identifies a misconception, but the teacher ignores it). At the same time, you can have formal assessments that are used to identify students' needs and guide future actions (e.g. provide constructive feedback on the results of a formal written test).* Allow time for groups to share their categorization and discuss possible differences.

	**Slide 9** (Using different types of assessment techniques) Presentation of how the terms ***assessment techniques*** and ***assessment tools*** are defined. It is important to help teacher distinguish the two terms. Ideally teachers are expected to use a variety of assessment techniques and tools. It is important to help teacher distinguish the two terms for them to be able to reflect on their practice. For example, it is possible that a teacher uses a variety of tools (e.g. written exercises, written tests, written quizzes) but all of them employ the same technique (written assessment).

Slide 10 (Using different types of assessment techniques)

Many modes of communication can be used in assessment. When assessment techniques are categorized based on the mode of student response; three basic types are recognized: *i) written assessment*, *ii) oral assessment*, and *iii) performance assessment*.

Written assessment refers to any assessment task that requires students to respond in writing. This type of assessment usually refers to the use of written tests. However, it also refers to quizzes, written assignments, written exercises, reports and projects. Writing is usually the most common mode of communication in student assessment (especially in mathematics).

Oral assessment refers to any assessment task that requires an oral response. For example, the use of questioning by the teacher or oral presentations by students. Assessment can be exclusively oral, or, as is frequently the case, can be combined with other modes of communication, depending on the nature of the assessment task. What makes the assessment 'oral' is that at least part of the assessment, and part of what counts towards a student's mark or grade, depends on what the student communicates by word of mouth.

Performance assessment refers to tasks that require students to create a product or response, or to perform a specific set of tasks to demonstrate their knowledge and skills.

- Performance assessment tasks yield a tangible product and/or performance that serves as evidence of learning (i.e. creating a 3D figure of a specific volume, using the ruler to measure distance, building a model).
- It is directly linked to observation, as the assessor is expected to observe the performance process or product in order to assess student learning
- Both incidental and planned observation are considered necessary when assessing students' learning since teachers have access to a rich and diverse range of evidence on student learning outcomes which without observation could be lost.

Slide 11 (Using different types of assessment techniques)

Discuss with the group. Ask them to consider the following:

- *Are these techniques relevant to mathematics?*
- *Which of them is more commonly used and why?*
- *Which one is not so commonly used? Why?*
- *Which ones are you using?*

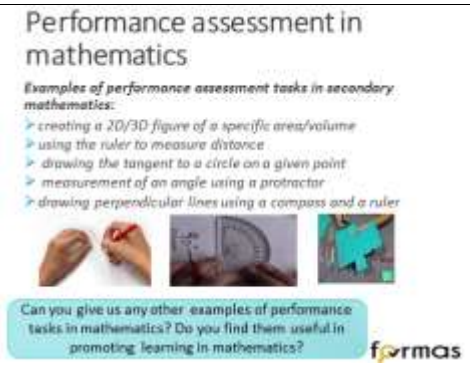
During the discussion consider the following:

- *It is expected that teachers mention more the use of written assessment. This view is usually justified with arguments in relation to accountability, evidence availability, reliability, practicality. Clarify that written assessment is indeed a valuable source of information and is considered appropriate for assessing several ILOs in mathematics. However, other techniques should also be employed (given that they are appropriate in relation to the ILO) to ensure more* ***valid, and reliable insights into students' learning.***
- *It is also expected that teachers mention assessment tools instead of assessment techniques. Remind them what was mentioned in slide 9. Assessment techniques is a wider concept referring to the methods used to assess learning, whereas assessment tools refer to the instruments/tools/strategies employed. For example, questions, presentations, debates are different tools under the oral assessment technique.*
- *Oral assessment is usually mentioned as part of the classroom discussion and not as a planned assessment activity. Acknowledge the need for unplanned oral assessment but emphasize the need for planned oral assessment activities that provide a more structured and targeted assessment of students' learning.*
- *Teachers usually see performance assessment as irrelevant to mathematics. They usually relate it to subjects where skill performance is more evident (i.e. arts, physical education, music). Acknowledge that performance assessment may not be an appropriate technique for some ILOs in mathematics, but this does not imply that it is irrelevant. Several ILOs related to skills (i.e. measuring, developing a model, using a ruler/protractor) require observation to be evaluated. Of course, for performance assessment to be used effectively, teachers need to become familiar with the nature of the performance tasks, what content and thinking skills the tasks assess, and what constitutes a high-quality response.*

Slides 12-16 (Using different types of assessment techniques)

Detailed presentation of the three main assessment techniques. The main objective here is for teachers to understand that *written, oral and performance assessment* can be done in different ways and take different forms.

Especially for mathematics teachers we should help them move away from the notion that mathematics can be assessed only through written assessment (usually in the form of exercises or tests).



Slides 17-18 (Using different types of assessment techniques)

Discuss with the group. Emphasize:

- *Assessment techniques hold an important role in ensuring the quality and effectiveness of assessment,*
- *They usually have an influence on how and what students learn (e.g. teaching to the test?)*
- *Learning is multidimensional and cannot be adequately measured by a single technique*
- *Current views of effective mathematic instruction value the complexity of mathematics*
- *Relying on only one technique will only reflect a part of students' achievement and learning*

Ask teachers to share examples of how the different techniques can be used in mathematics. For example, in an exercise asking students to measure an angle, performance assessment can be used to examine if a student can use a protractor correctly to measure the angle. At the same time oral assessment can be used to examine if the student can explain how they managed to measure the angle.

Slide 19 (Using different types of assessment techniques)

Make a reminder of the misconceptions discussed during the first session.

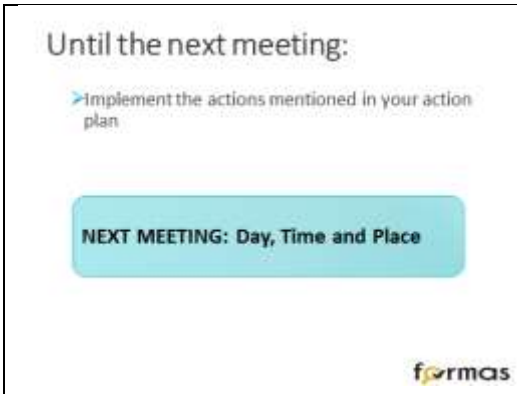
- You could have informal assessments that are never used to inform students about their learning and how it can be improved (e.g., an impromptu oral question that identifies a misconception, but the teacher ignores it). At the same time, you could have formal assessments that are used to identify students' needs and guide future actions (e.g. provide constructive feedback on the results of a formal written test).

	➢ Written assessment in the form of written tests is usually perceived as an inherently summative assessment. However, a teacher can design, administer, and use the data of a written test to identify and address students' learning needs to help them improve. ➢ At the same time, it is acknowledged that the purpose an assessment aims to serves defines how an assessment tool will be constructed and administered and how data elicited will be interpreted and used. Thus, it not assumed that the same assessment tool (i.e. a specific written test) can be used to serve both purposes at the same time.

	**Slide 20** (Using different types of assessment techniques) **Application activity – Using different types of assessment techniques (B2b)** ***Rationale: Using a combination of assessment techniques to assess students' learning provides more meaningful, valid, and reliable insights into students' learning. Teachers are expected to use a variety of assessment techniques to provide students with multiple opportunities to show what they know and can do. They are also expected to choose assessment techniques based on the learning goal to be assessed, since student achievement in relation to certain learning goals can be more appropriately measured by using specific techniques. For example, students' psychomotor skills in mathematics can be evaluated by using performance assessment techniques rather than written techniques. This application activity aims to help teachers identify when each technique can be used and become skilful in constructing assessment tasks that examine a specific ILO by employing a combination of techniques.*** *Give the B2b application activity handout (Appendix A)* Create small groups as in the previous application activity. Teachers need to create assessment tasks as explained below: Objective 1: written and oral Objective 2: oral and performance Objective 3: written and performance (*they fill in the white boxes not the grey ones)* When providing feedback, consider the following: ➢ Assessment tasks created do assess the learning objective set ➢ The right techniques are addressed ➢ The tasks created employ the requested technique ➢ Good quality assessment tasks are created (e.g. wording, clear instructions)

	Allow time for groups to present and discuss their exercises. The *Application activity – Using different types of assessment techniques (B2b)- Suggested answers handout (see Appendix A)* provides examples of assessment tasks that can be used to assess each objective with the requested techniques. After teachers have presented their own suggestions, share the handout and ask teachers to discuss the suggestions provided in relation to theirs.

	**Slides 21-22** *<u>Give a) the empty action plan handouts and b) the action plan template for Group B (Appendix B)</u>* Remind them that: ➢ *The action plan is a tool that will help them be more focused and punctual to their improvement efforts* ➢ *Each teacher will create his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students)* ➢ *An action plan does not need to be extensive. Short, focused, easy to develop and follow is the key.* ➢ *It is good to have a record of teachers' action plans however you will not keep copies of action plans unless the teacher gives you permission to do so.* ➢ *Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan.* ➢ *Teachers can work together (if they like) and exchange ideas to develop/revise/adjust their action plan.* Ask teachers to read the suggested actions under the **O1. Use different types of assessment techniques in an efficient and systematic way (i.e. written/ oral/ performance)** heading only. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on the empty action plan and create a first draft of their personal action plan *NOTE: remind teachers that they will need the action plan template in all sessions and thus they need to have it with them every time.*

	**Slide 23** It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized. (*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*) Information about the next meeting (Session 3). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

	**Slide 24** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group B- Session 3	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 3 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Formulating assessment success criteria and designing assessment checklists/rubrics ▪ Involving students in the process of assessment ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the Power Point Presentation - Session 3- Group B ▪ Application activity – Applying criteria for assessment (B3a) (slide 6) ▪ Application activity – Formulating success criteria(B3b) (slide 13) ▪ Action plan for Group B (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 3- Group B handouts

Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share their experiences. It is important to remind them that, implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

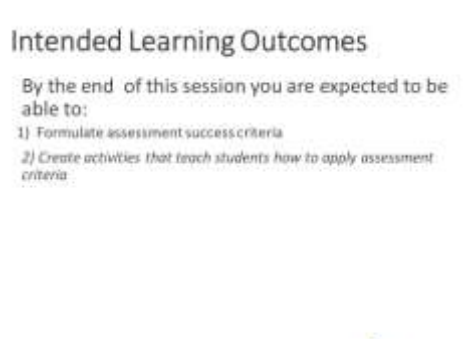
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental

Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session is presented.

NOTE

Try to make connections between the content of the sessions. The use of different types of assessment techniques is necessary to ensure that valid information about students' learning is collected. However, valid assessment also requires the formulation of good quality assessment criteria. Students can also be involved in this process. This will encourage them to take ownership of their learning and slowly develop the skills to self-assess.



Slide 5

Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows. Good quality assessment/success criteria are crucial for good quality assessment. Learning how to formulate success criteria will help them become more effective in their assessment.

Slide 6 (Formulating assessment criteria)

Application activity – Applying criteria for assessment (B3a)

Rationale: ***Assessment criteria are descriptive statements which help both teachers and students to evaluate whether an ILO has been achieved. This application activity aims to help teachers identify the properties of good quality assessment criteria. Teachers are also expected to acknowledge the importance of formulating assessment criteria and that different criteria can be set for the same ILO depending on students' grade, students' abilities, content covered, and emphasis given during instruction.***

Give the B3a application activity handout (Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

Ask teachers to study the assessment task and the success criteria given. They should first work independently to apply these criteria to evaluate the sample student's response to the task.

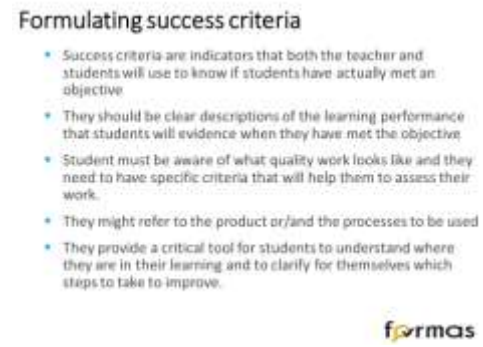
Then, ask teaches to discuss in their groups:

- *Did the criteria given help them evaluate the students' response?*
- *Did they use any other criteria not mentioned?*
- *Could a student apply these criteria to evaluate his/her own work?*

When providing feedback on teachers' ILOs consider:

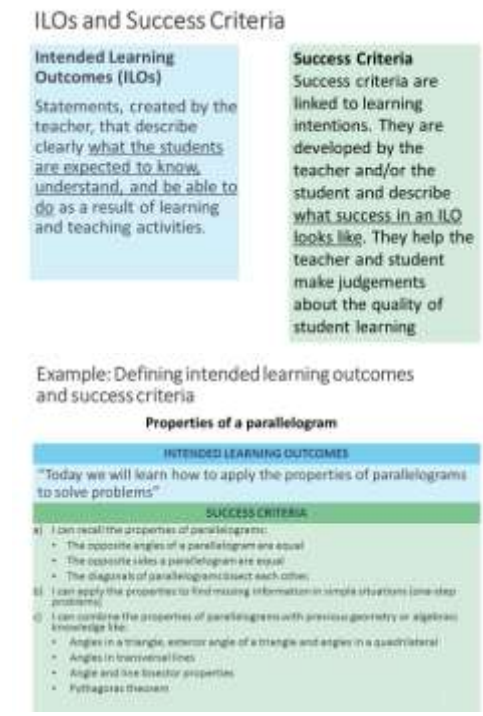
- ILOs have one basic active verb
- They should be short sentences specifically describing the learning intended
- Make sure that it refers to what students are learning and not to what they are doing (activity)
- Remind teachers that an ILO can be examined using a variety of different activities/tasks and not just a single activity.

Allow around 15 minutes for teachers to apply, discuss and set and revise their ILOs.



Slide 7 (Formulating assessment criteria)

The term 'success criteria' is synonymous with 'assessment criteria' but, it focuses (much more positively) on students' ability to succeed.



Slide 8-9 (Formulating assessment criteria)

The purpose here is for teachers to distinguish between intended learning outcomes/ learning intentions/learning objectives and success criteria.

Learning objectives should be de-contextualised and authentic (what you really want them to learn).

Success criteria are a breakdown of the learning objective. For **closed learning objectives** they are often chronological and are always compulsory (e.g. the steps in a mathematics algorithm). For **open learning objectives** they can be compulsory elements, or they might be things that you *could* include.

They allow students to answer the questions "How will we know?"

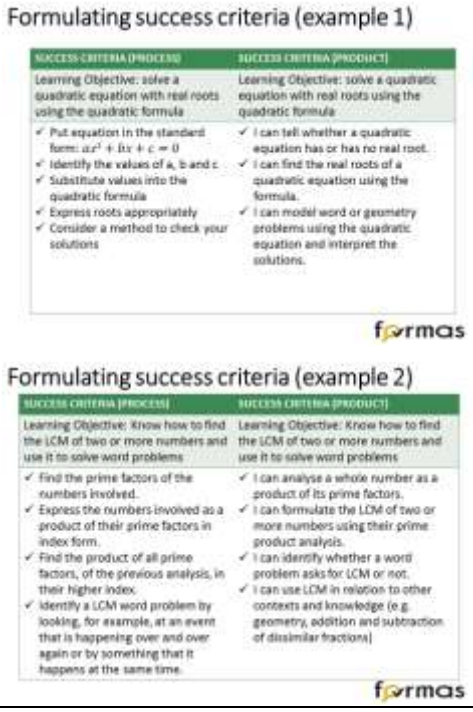
Success criteria provide the basis for feedback and reduce discrepancies between current student understanding and intended learning

Slide 10-12 (Formulating assessment criteria)

Use examples provided to discuss the quality of success criteria.

Consider the following:

- They are most effective when they are clear and specific to avoid ambiguity. If too general they risk becoming meaningless, providing little guidance to students
- Each student should be engaged with the criteria in meaningful ways that support learning throughout the lesson, project, or unit.
- Success criteria need to be known and shared
- They can be used across the curriculum



- Exemplary samples of work can also be provided to help clarify and communicate what quality looks like
- As learning objectives, success criteria need to be specific and measurable

Slide 13 (Formulating assessment criteria)
Application activity – Formulating success criteria(B3b)

Rationale: Effective teachers are expected to be able to formulate good quality assessment criteria. This application activity aims to help teachers develop this skill by involving them in the process of criteria formulation

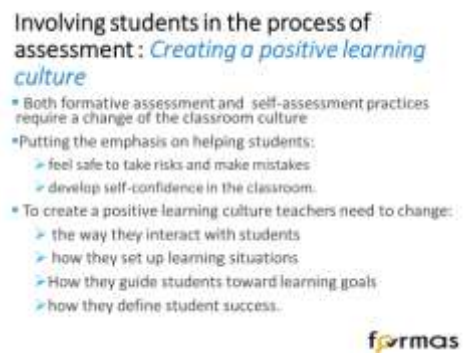
Give the B3b application activity handout

Create small groups as in the previous application activity.

Ask teachers to study the assessment task given. And work individually to formulate assessment/success criteria that can be used to evaluate a student's performance on the task.

Then, ask them to work in their groups to discuss and compare their criteria. When providing feedback to teachers about their criteria have in mind the following:

- Are they measurable?
- Are they applicable?
- Do they provide valuable insight about students' learning in relation to the learning objective?
- Is something missing/
- Is something not relevant to the objective?



Slide 14 (Involving students in the process of assessment)

Success criteria are valuable because they also encourage student to be engaged with their learning since they provide students the opportunity to:

- clarify their understanding
- identify success for themselves
- begin to identify where the difficulties lie
- discuss how they will improve
- monitor their own progress

Involving students in the process of assessment is imperative in formative assessment. We wish for students to take ownership of their learning and become actively involved. This will later help them become more successfully engaged in the process of peer and self-assessment and self- regulate their learning.

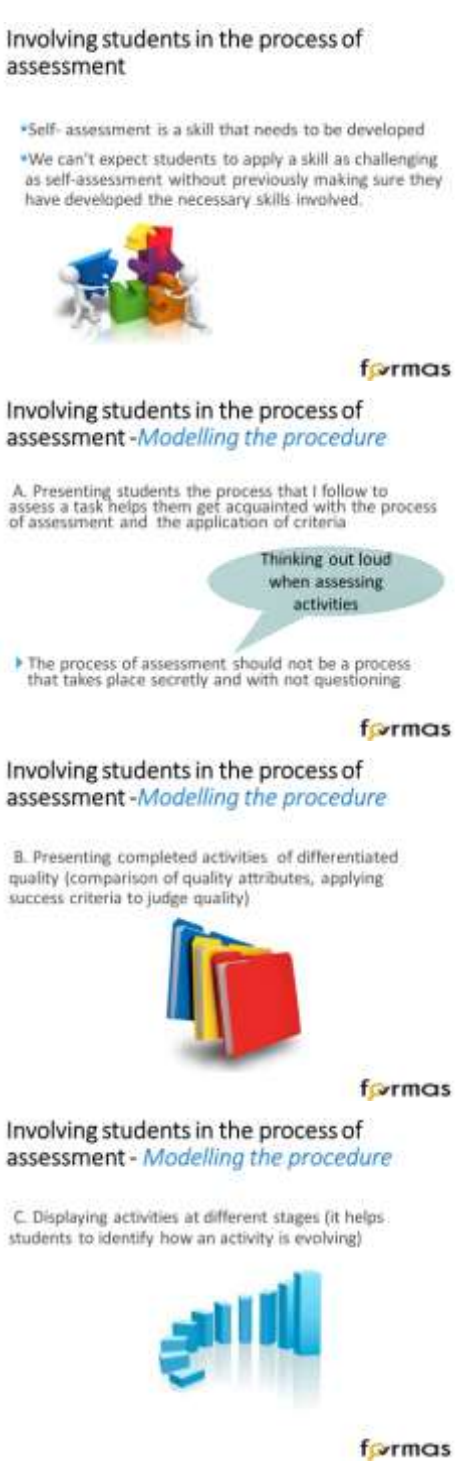
Creating a positive learning culture in the culture is the first step teachers need to take to achieve this. Teachers are expected to manage the learning culture of the classroom to maximise students' motivation to engage keenly with assessment.

Slide 15 (Involving students in the process of assessment)

Ask teachers to discuss their experience so far in involving students in the process of assessment.

Have in mind that:

- Some teachers may consider assessment a "teacher thing". Something that teachers do to students to check if they are learning as expected. These perceptions are usually generated due to the traditional way assessment is viewed by teachers. Emphasizing the formative orientation of assessment is necessary to help them identify the importance of student involvement.
- Another issue is their concerns about the quality of students' judgements and particularly students' ability to make accurate judgements about someone else's and/or their learning. For this reason, we emphasize student involvement for formative rather than summative purposes.



Slide 16-20 (Involving students in the process of assessment)

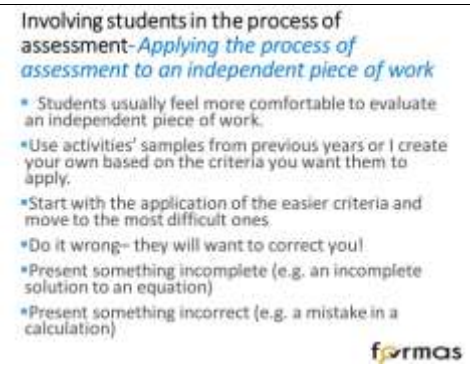
Involving students in the process of assessment is not something that you can achieve in a lesson. Not only you need to establish a classroom climate where involvement is accepted and appreciated (mentioned earlier as the first step, slide 14) but you also need to teach students the skills involved in assessment.

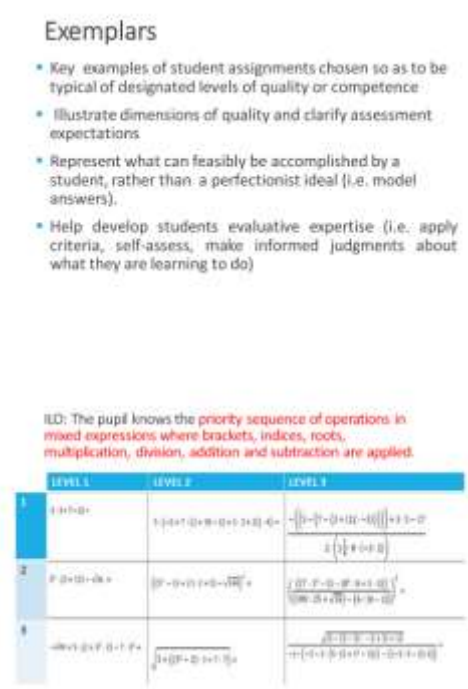
Assessment involves two inter-related activities: a) the development of knowledge and an appreciation of the appropriate standards and criteria and b) the capacity to make judgements about whether or not the work involved does or does not meet these standards.

The steps for introducing self- assessment involve:

(1) Changing the classroom culture
(2) Modelling the procedure
(3) Students applying the process of assessment to an independent piece of work
(4) Involving students in peer and self-assessment activities

The emphasis in this group is on the first three steps. These steps help student better comprehend the concept of criteria and how they can be used to evaluate learning achieved.





Slide 21-22 (Involving students in the process of assessment)

Samples of work (exemplars) provided to help clarify and communicate what quality looks like; have been argued to be a helpful tool when attempting to involve students in the process of assessment.

In the example provided, success criteria are exemplified by examples which vary in difficulty. The first level describes the ability of students to correctly apply the sequence of operations in simple expressions in three different cases:

- ✓ the student can correctly apply the sequence of operations where multiplication, addition and subtraction are involved.
- ✓ the student can further apply the sequence of operations in expressions with brackets.
- ✓ the student can correctly apply the sequence of operations in expressions with brackets, surds, and indices.

The second level assess the ability of students to correctly apply the sequence of operations in more complex numerical expressions in the cases of:

- ✓ nested brackets
- ✓ surds and indices in nested brackets and indices of brackets
- ✓ surds and indices in nested brackets and surds of brackets.

The third level assess students' ability to correctly handle the sequence of operations in fractional numerical expressions involving nested brackets, surds and indices.

Slide 23-24

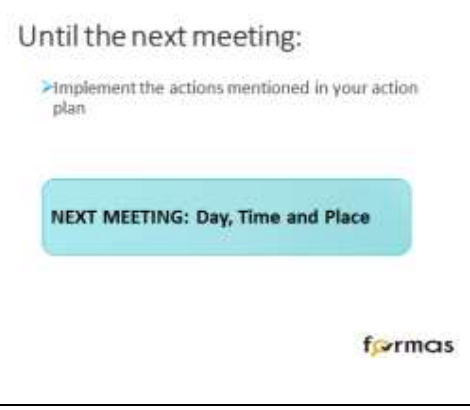
Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

1. *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
2. *During the previous session each teacher has created his/her own based on their needs, preferences and teaching context (i.e. school, classrooms, particular students)*
3. *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*

Ask teachers to also study the suggested actions under the ***O2. Formulate assessment success criteria and designing assessment checklists/rubrics*** and ***O3. Involve students in the process of assessment*** headings in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.

Ask teachers to work on their action plan and revise their actions.



Slide 25

It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized.

(*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*)

Information about the next meeting (Session 4).
Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

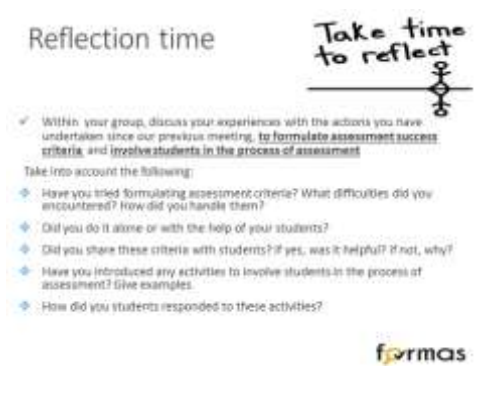
	**Slide 26** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group B- Session 4	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 4 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Recording assessment results from different assessment techniques ▪ Deigning assessment checklists/rubrics ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the Power Point Presentation - Session 4- Group B ▪ Application activity –Evaluating the quality of assessment items (B4) (slide 8) ▪ Action plan for Group B (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

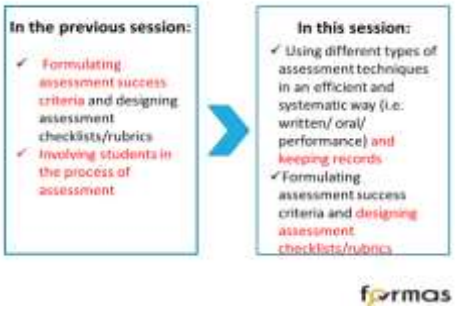
Give the Session 4- Group B handouts



Slide 3

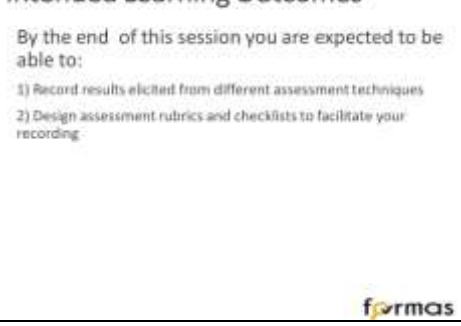
Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

NOTE
It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.



Slide 4
Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

NOTE
Try to make connections between the content of the sessions. In the previous session, we discussed why formulating assessment criteria is important and that sharing them with students helps them to become involved in the process of assessment. In this session, we move on to examine how we can use these criteria to record evidence about students' learning. We will focus on how we can develop rubrics and checklists to record data elicited through various assessment techniques (as discussed in session 2)



Slide 5
Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

Slide 6 (Recording assessment results from different assessment techniques)

Ask teachers to discuss the questions presented with the person/s sitting next to them and share their answers with the whole group.

Have in mind that:

- It is possible that teachers mention that they usually record information for the data elicited from written tests. Acknowledge that recording assessment tests results is important especially for summative purposes but emphasize that data from other techniques of assessment are also necessary, especially if we wish to use these data for formative purposes
- It is possible that teachers provide no access to the records to key stakeholders (i.e. students, parents). They might communicate the results but not the records. Emphasize that records can also be used by other stakeholders besides the teachers. This of course requires that recording is done is ways that facilitate their formative use.

	➢ Some teachers might appear negative to record keeping. This is usually the case when recording is mostly associate with teacher accountability. Emphasize that recording is done so that assessment information is available to be used in various ways and most importantly to provide guidance on how students/classrooms should be supported in their learning. Of course, no one implies that teachers must keep records of everything that happens in a classroom.

	**Slides 7-9** (Recording assessment results from different assessment techniques) In session 2 we discussed that learning is multidimensional and cannot be adequately measured by a single technique. The importance of using a combination of assessment techniques to examine student learning was highlighted especially in the subject if Mathematics. We also included relevant actions in our action plan. Now we emphasize that data elicited through these different techniques should also be recorded for them to be available for future use (especially for formative purposes). Note: *It is important to emphasize that recording data is of no use unless these data are later used to impact our teaching and our students' learning. Our aim here is not to encourage teachers to record everything. We acknowledge how time-consuming recording can be. However, at the same time we acknowledge that most teachers already keep records. Our aim is to help them do it in a more effective way.*

Slides 10-12 (Designing checklists/rubrics)

Checklists and rubrics are two common recording tools. Both require setting assessment criteria (discussed in the previous session) based on which you record students' performance in relation to these criteria.

A checklist is a set of criteria that enable us to evaluate whether an ILO has been met.

A rubric is a tool to **define the expectations** of an ILO with ways to indicate **different levels of effectiveness** in meeting those expectations.

Checklists are more easily created and applied. However, they provide restricted insight into students' learning. For example, a checklist might include 5 criteria that help us examine if an objective has been met. A student might check positive on all five criteria, but still show low-quality performance since there is no description of the level of attainment or the quality expected.

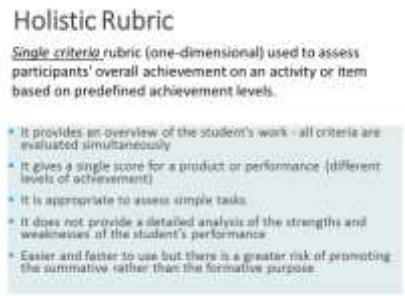
On the other hand, rubrics are more difficult to be created and applied as they require a better understanding of assessment criteria and how these are applied on a student's work. They also require more design time. However, they provide more detailed and accurate information on a students' learning.

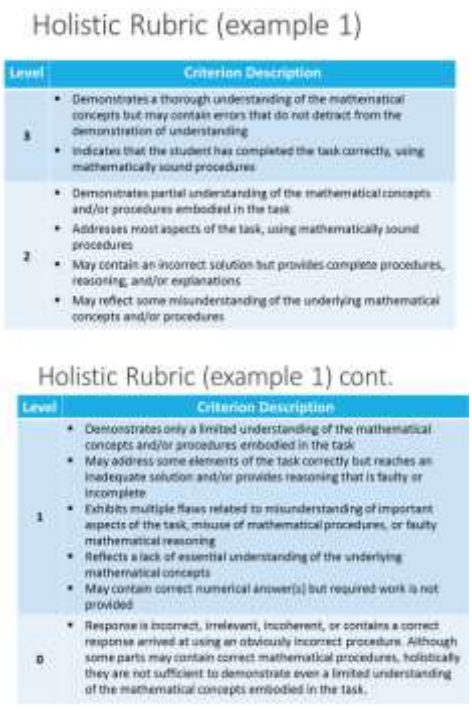
Some further advantages of rubrics include:

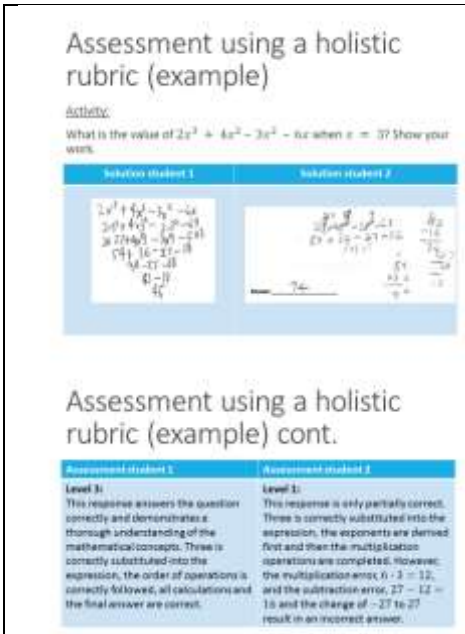
- ✓ They improve student performance by clearly showing the student how their work will be evaluated and what is expected.
- ✓ They help students become better judges of the quality of their own work.
- ✓ They allow assessment to be more objective and consistent. Rubrics force the teacher to clarify his/her criteria in specific terms.
- ✓ They reduce the amount of time teachers spend evaluating student work. However, they need more time to be constructed.
- ✓ They promote student awareness about the criteria to use in assessing self and peer performance.
- ✓ They provide useful feedback to the teacher regarding the effectiveness of the instruction.
- ✓ They provide students with more informative feedback about their strengths and areas in need of improvement.
- ✓ They accommodate heterogeneous classes by offering a range of quality levels.
- ✓ They are easy to use and easy to explain.

Note: *It is important to make clear, that both rubrics and checklists are not tools to evaluate learning. You need assessment*

	tasks for that. You then record the data elicited from the assessment tasks with the help of checklists/rubrics. Thus, no matter how detailed/well designed a checklists/rubric if the assessment tasks are not appropriate or of good quality, you will not be able to elicit valid and reliable information about students' learning.

	**Slide 13** (Designing checklists/rubrics) A **holistic rubric** is a one-dimensional rubric. It usually lists three to five levels of performance, along with a broad description of the characteristics that define each level. The levels can be labelled with numbers (such as 1 through 4) or words (such as *Beginning* through *Exemplary*).

	**Slides 14-17** (Designing checklists/rubrics) Ask teachers to study the example provided in slides 14 and 15 and identify why this rubric is holistic. Teachers are expected to mention that: ➢ Students can be categorized into 4 levels (i.e. 0,1,2,3) based on their overall performance ➢ The description provided for each criterion is broad. Slide 16 presents two student answers to a given task. Ask teachers to evaluate the sample answers using the levels presented in the holistic rubric example presented above. Teachers are expected to mention that: ➢ Student 1 should be considered as level 3. His/her response is correct, and it can imply that he/she demonstrates a thorough understanding of the mathematical concept assessed. He/she has substituted into the expression, the order of operations is correctly followed, all calculations and the final answer are correct. ➢ Student 2 should be considered as level 1 as his/her answer is only partially correct. Three is correctly substituted into the expression, the exponents are derived first and then the multiplication operations are completed. However, the multiplication error, $6 \cdot 3 =$



12, and the subtraction error, $27 - 12 = 16$ and the change of -27 to 27 result in an incorrect answer.

The justification on level classification is presented in slide 17.

Finally, ask teachers to suggest other examples of learning objectives for which a holistic rubric can be used. Teachers' answers may include:

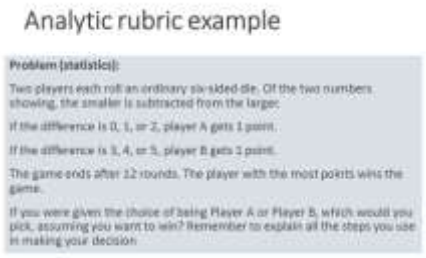
- ✓ assessing the ability of students in problem solving.
- ✓ rubrics assessing learning achievement in solving first or second-degree equations in one variable.
- ✓ rubrics for assessing learning achievement in solving geometrical problems involving congruent or similar triangles.

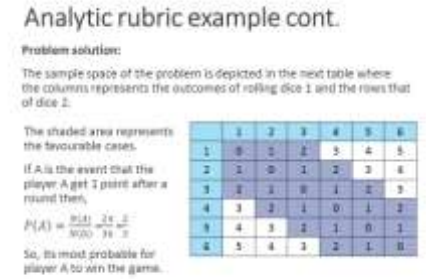
Slides18-19 (Designing checklists/rubrics)

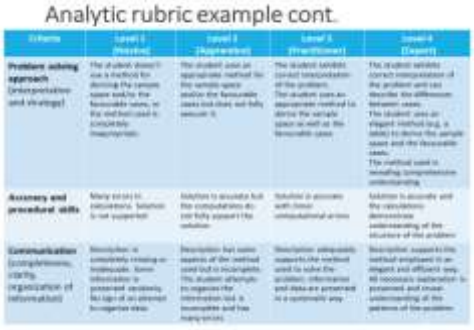
An **analytic rubric** breaks down the elements of an objective into parts, allowing the teacher to itemize and define exactly what aspects are strong, and which ones need improvement. This gives the opportunity for more specific feedback to be provided.

The basic steps for designing an analytic rubric are presented in slide 19. When designing analytic rubrics teachers must also have in mind the following:

- ✓ A reasonable number of criteria is used (no more than 5)
- ✓ Only include criteria that have been addressed during teaching
- ✓ Is not to big (should fit in one page to make use easy)
- ✓ The language used is suitable for intended users (i.e. students, teachers, school, parents)
- ✓ Descriptions refer to the performance and not to the student
- ✓ Negative language is avoided
- ✓ Proficiency levels are easily distinguishable from one another







Slide 20-22 (Designing checklists/rubrics)

Slide 20 presents an assessment task in statistics.

Slide 21 presents a student's answer to the above task.

Slide 22 presents an analytic rubric example. First, ask teachers to study the example provided and identify why this rubric is analytic. Teachers are expected to mention that:

- More than one criterion is used
- Students can be categorized into 4 levels (i.e. 0,1,2,3) based on their performance on each criterion
- The description provided for each criterion is detailed

Then, ask teachers to evaluate the sample answer in slide 21 using the rubric. Teachers are expected to mention that regarding:

- ✓ "Problem solving approach" criterion, the student is classified at level 4: The student interprets the problem correctly. The table used to describe the sample space is appropriate and shows that the student is able to identify the differences between the cases. The student exhibits a comprehensive understanding of the problem.
- ✓ "Accuracy and procedural skills" criterion, the student is classified as expert (level 4). Solution is correct and the process followed to the solution is also correct.
- ✓ "Communication" criterion, the student has described the solution in an efficient and meaningful way including all necessary explanation. The student is classified as belonging to level 4

Finally, ask teachers to suggest other examples of learning objectives for which an analytic rubric can be used. Teachers' answers may include:

- ✓ Area and volume measurement for cuboids and solids by revolution.
- ✓ Proportional relations and applications in real problems.

Slide 23 (Designing checklists/rubrics)

Application activity – Designing an assessment rubric (B4)

Rationale: Rubrics are valuable tools for recording assessment information for formative purposes. They provide specific and

detailed information about a student's performance in relation to an ILO, which helps teachers provide more targeted feedback about the student's strengths and areas in need of improvement. This application activity aims to help teacher become more skilful in rubric design (i.e. choose appropriate rubric type based on the ILO, set good quality criteria, provide quality descriptions of the different levels).

Give the B4 application activity handout (see Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

Ask teachers to study the assessment tasks given and identify the objective each one examines. Then ask them to decide what kind of rubric is more appropriate for each one and to develop it.

- Remind teachers that holist rubrics are more appropriate to record results in relation to more simple objectives, whereas analytic rubrics are more appropriate for more complex objectives.
- Remind teachers that rubrics are designed in relation to the objective and to specific exercises/tasks. So, there should not include specific answers/steps elated to the task

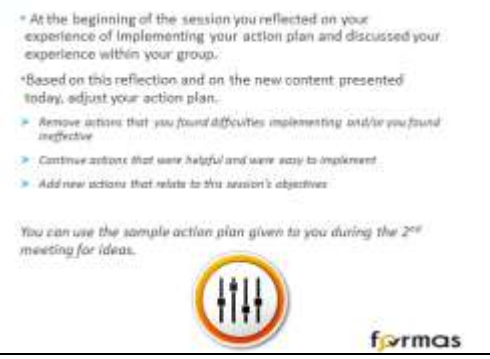
Slide 24-25

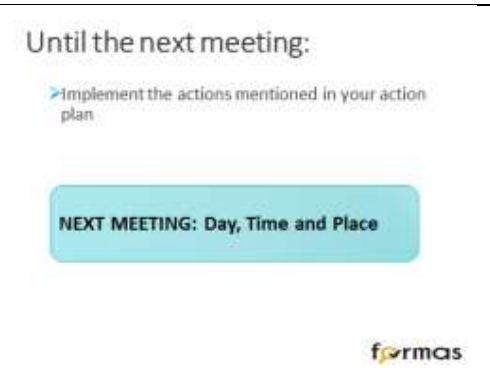
Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *During the previous session each teacher has created his/her own based on their needs, preferences and teaching context (i.e. school, classrooms, particular students)*
- *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*

Ask teachers to also study the suggested actions under the **O2. Formulate assessment success criteria and design assessment checklists/rubrics** heading in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.

	Ask teachers to work on their action plan and revise their actions.

	**Slide 26** It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized. (*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*) Information about the next and final meeting (Session 5). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

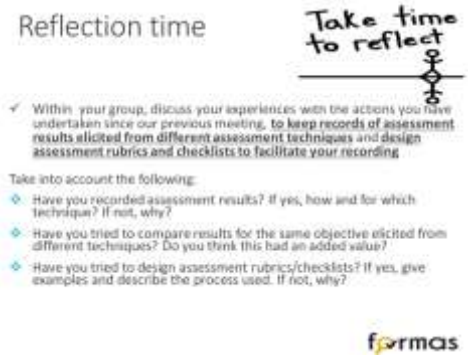
	**Slide 27** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group B- Session 5	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 5 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Providing constructive feedback to students ▪ Re-examination of the action plan adding new aspects based on new content ▪ TPD formative evaluation ▪ Administrative issues
Material/handouts	▪ Handouts with the Power Point Presentation - Session 5- Group B ▪ Application activity – Types of feedback (B5**)** (slide 9) ▪ Action plan for Group B (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

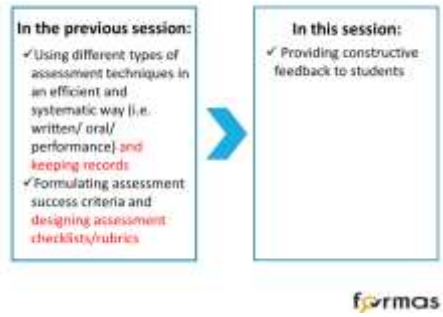
Give the Session 5- Group B handouts



Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

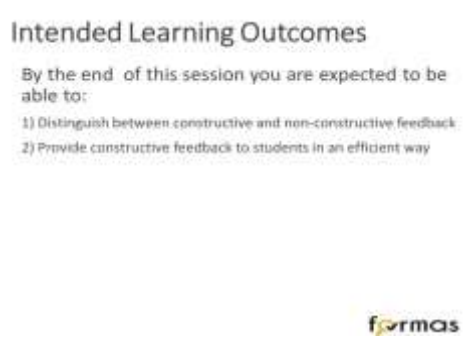
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.



Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: Try to make connections between the content of the sessions. In the previous session, we discussed about the importance of keeping records of students' performance for assessment information to be available for future use. Data recorded should then be used to provide constructive feedback to stakeholders about how student's learning is going and how it can be further improved. Today, more details on how this constructive feedback can be provided is given.



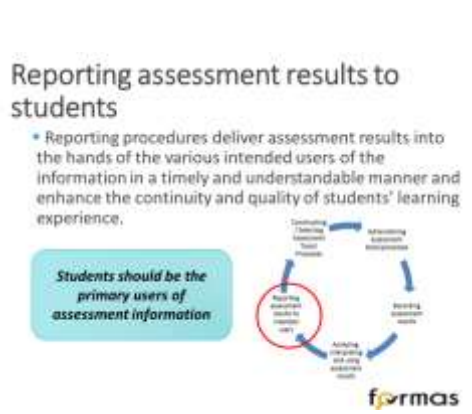
Slide 5

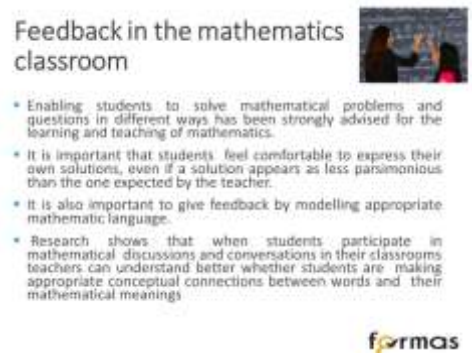
Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

<table>
<tr>
<td> 
</td>
<td>Slide 6 (Providing constructive feedback to students)

Ask teachers to discuss the questions presented with the person/s sitting next to them and share their answers with the whole group.

Have in mind the following:
➢ Teachers might refer mostly to communication with students during classroom instruction. Acknowledge that such communication is desirable but should be done in ways that support student learning (not just inform students of their performance). Also mention that planned communication with students regarding their learning is also a valuable tool
➢ It is possible that teachers focus on the communication of information regarding a students' performance on specific tasks/assessment. Try to shift the focus to the communication of information about the students' learning and progress instead of assessment results in terms of grades, success/failures etc.
➢ It is expected that teachers might mention a lack of interest on behalf of students in taking actions to improve their learning based on information provided. Explain that using assessment information for improvement is a metacognitive skill and not all students have managed to develop, it regardless of their age. It is important for teachers to find ways to explain to students why assessment information is valuable for their learning and teach them how they can use it for their benefit.</td>
</tr>
</table>



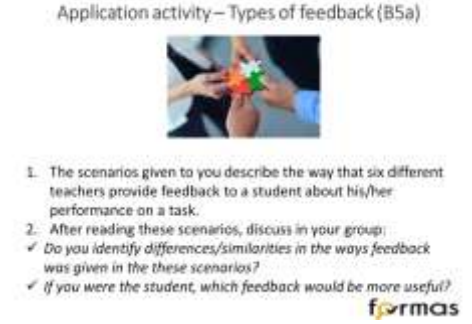


Slides 7-8 (Providing constructive feedback to students)

Reporting results to intended users (i.e. students, parents/guardians, school administration) is one of the main phases of the assessment process.

The communication of assessment results bridges the gap between the recorded data, their analysis and interpretation and their use by the involved participants. Indeed, for intended users to act upon assessment information, they must first be made aware of such information.

Reporting procedures deliver assessment results into the hands of the various intended users of the information in a timely and understandable manner and enhance the continuity and quality of students' learning experience. They also provide all intended users of assessment with knowledge of results that can be later used to adjust in ways that support learning.



Slide 9 (Providing constructive feedback to students)

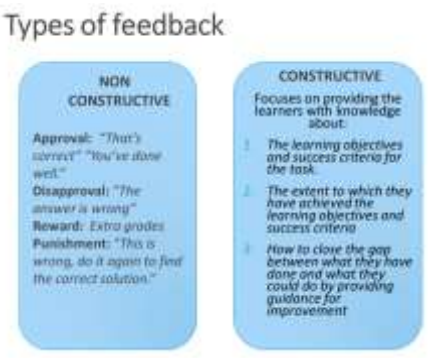
Application activity – Types of feedback (B5)

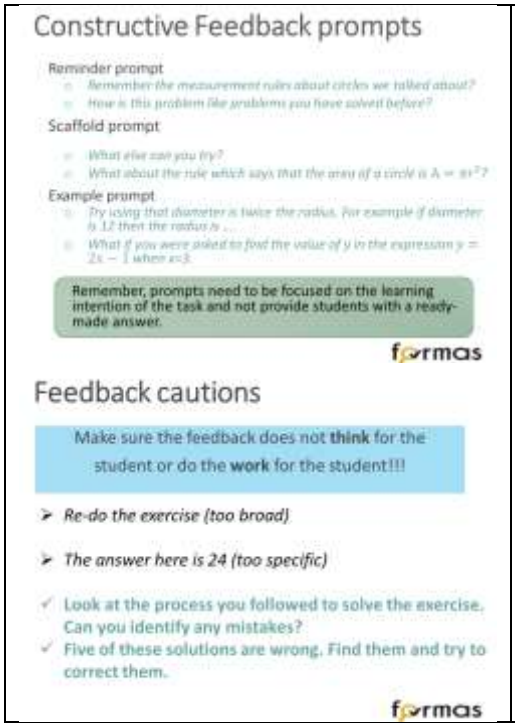
Rationale: Constructive feedback is an essential element of formative assessment. Teachers are expected to be able to provide student with feedback that can be used to move their learning forward. This application activity aims to help teachers identify the qualities of constructive feedback.

Give the B5a application activity handout (Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at

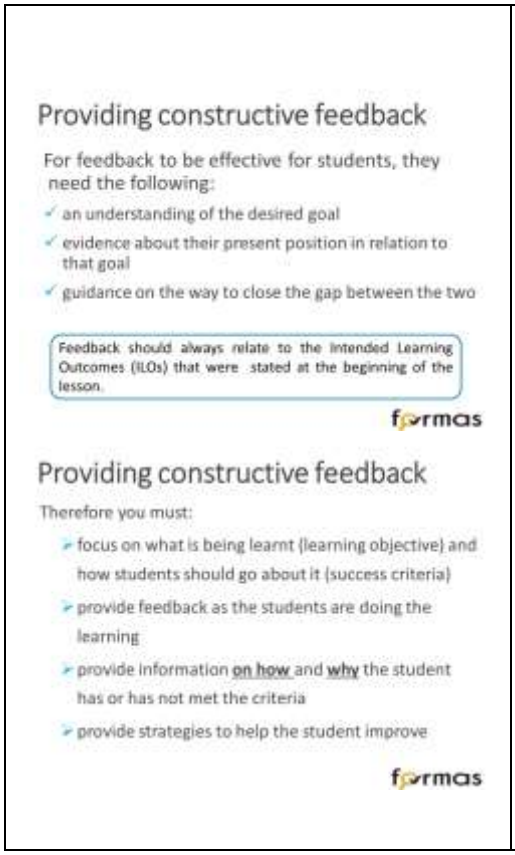
	least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity. Ask teachers to study the scenarios given. The scenarios present feedback provided by six different mathematics teachers to a student about his/her performance on an assessment task. **Feedback Scenario A** ***'**Correct, but this is not what I was expecting from you to do'* Discussion: The teacher acknowledges the student's answer as correct. However, he/she clearly states his/her disapproval on the process followed. Enabling students to solve mathematical problems and questions in different ways is an important aspect of effective mathematics teaching. It is important that students feel comfortable to express their own solutions, even if a solution is not the one expected by the teacher. Even if using a specific process is required (i.e. based on what was taught in the classroom), the teacher should provide more specific guidance on how this can be achieved. **Feedback Scenario B** '*Wrong! You are not applying what you were taught'* Discussion: The teacher acknowledges the student's answer as wrong and clearly states his/her disapproval. The feedback lacks specific information on why the answer is wrong, what was expected from the student and how the student can proceed to find the correct answer. **Feedback Scenario C** Discussion: This scenario is an example of constructive feedback. It presents a dialogue between the student and teacher, which has a main aim to provide guidance to help the student take actions to improve his/her learning. The teacher provides different types of prompts to help the student move his/her learning forward. **Feedback Scenario D** *Wrong! Does any other student want to try*? Discussion: The teacher acknowledges the student's answer as wrong. The specific student has no information on why the answer is wrong, what was expected and how he/she can proceed. Instead, the teacher chooses to direct the question to another student. This action gives the impression that the teacher is more interested in getting the right answer than in assessing and supporting the student's learning. **Feedback Scenario E** *Correct! However, can you reach the same answer applying a special case of factorisation you were taught?*

	Discussion: As in scenario A, the student applied a different process than expected. The teacher acknowledges the student's answer as correct but instead of showing disapproval (as in scenario A) he/she asks the student to try again using a specific process taught. The teacher's feedback acknowledges students' right to to express their own solutions but also clarifies expectations about the process to be followed. Most importantly, it provides the student another opportunity to show if he/she is able to apply what was as expected, thus collecting more valid information on student's learning. **Feedback Scenario F** *Raise up your exercise book and show me your sketches.* *Teacher: (very pleased. Almost all the class has drawn 'perpendicular' lines.)* Discussion: This scenario presents a non- verbal feedback to a performance assessment task. Our communication with students is not restricted to verbal communication. It also includes non-verbal communication (*e.g. face expressions, body movement/posture, eye contact*). The teacher here shows his/her satisfaction about the overall performance of students. However, this feedback provides no specific information to individual students. All students, whether they have managed to draw 'perpendicular' lines or not, received the same feedback. No information was provided as to if and why each response was correct or not. In addition, feedback was focused on the final product and not the process followed. Ask teachers to work in the groups to answer the questions provided.
	**Slides 10-12** (Providing constructive feedback to students) While discussing with teachers the difference between constructive feedback have in mind the following: ➢ Positive and constructive feedback is not the same thing. You can give student positive feedback (*e.g. well done, keep trying, I believe in you, I am sure you can make it*) but that does not provide the student with information on the extent he/she has achieved the learning objectives or how to proceed to improve his/her learning. ➢ Imagine you that you are a struggling student trying to solve a mathematics problem. If the teacher's feedback just includes comments like "keep trying", "I am sure you can do", these comments may sound encouraging but they provide you with no information to address the difficulties you face. So, it is possible, that instead of encouraged you feel more disappointed in you self because your teacher



believes you can do if you just continue trying it, but you actually can't!

- Now, imagine that you are a high achieving student. You are most of the time able to complete/answer tasks provided by the teacher with success. Every time, the teacher acknowledges your success (e.g. well done, this is correct, you solved it as always). But again, even if this type of comments might have a positive impact on your self-esteem you have no information on what to do next to move you learning forward.
- It is important for teachers to understand that feedback is not necessarily a "positive thing". Feedback refers to any response the teachers gives to a student. So even if a teacher gives no feedback to a student (*e.g. ignoring his/her response, not responding to a question etc*.) the student has received feedback (e.g. the teacher does not care/ he/she disapproves). Our communication with students is not restricted to verbal communication. It also includes non-verbal communication (*e.g. face expressions, body movement/posture, eye contact*).



Slides 13 – 16 (Providing constructive feedback to students)

The process of communicating or reporting assessment results entails two basic decisions:

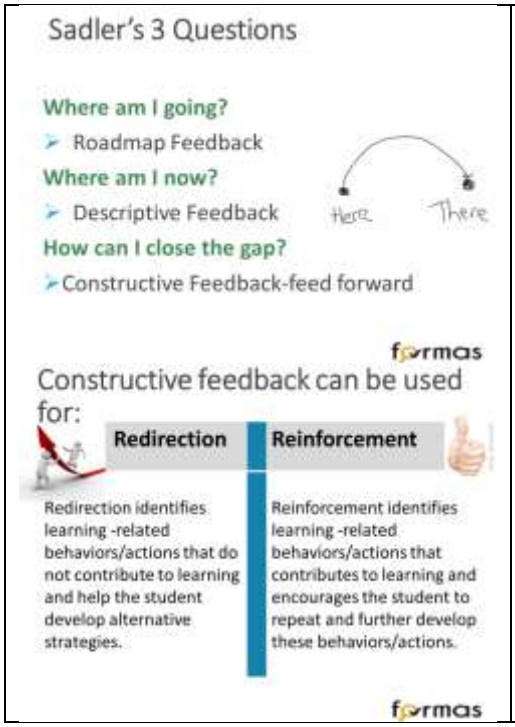
a) what purpose is intended to be served through the assessment and
b) which are the best reporting methods or tools to fulfil this purpose

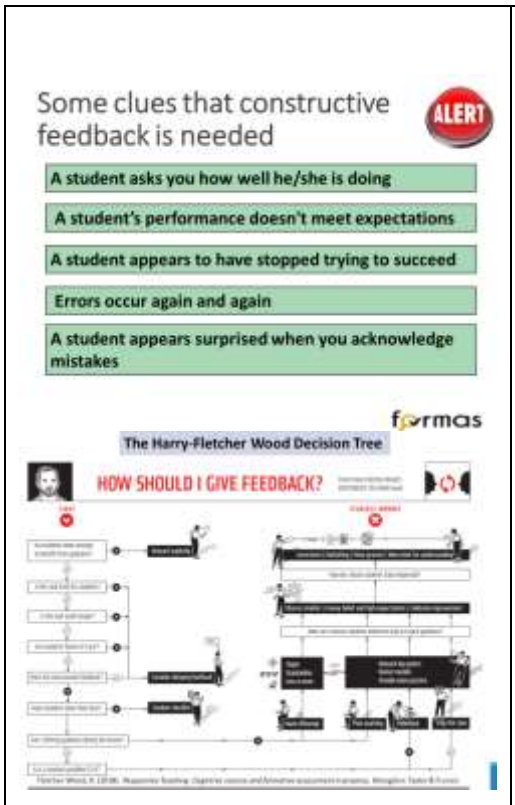
Various methods can be used to report students' learning progress. The selected method(s) must be in alignment with the purpose the assessment wishes to serve and must be used appropriately to serve this purpose.

Effective communication of results occurs when:

- ✓ everyone understands the meaning of the achievement goal and the symbols used to convey information,
- ✓ when the information underpinning the communication is accurate
- ✓ when the communication is tailored to the intended audience in the aspects of timing, detail and format.

It is also important to note that feedback is not only necessary when redirection is needed but also to reinforce positive behaviours.





Slides 17 – 18 (Providing constructive feedback to students)

Ask teachers to share when they provide feedback to students and which students' behaviours consider as signs that feedback is needed.

Note: *Remind students' once again that providing constructive feedback is not relevant only when mistakes occur. Positive behaviours also need reinforcement through feedback*

The Harry-Fletcher Wood decision tree is a helpful tool to recognize how you should provide feedback. It is important to note that the degree of support to be provided depends, amongst others, on each student' self-regulation skills, level of ability, ability to work independently, the task and what the teacher aims to achieve each time.

Slides 19-20

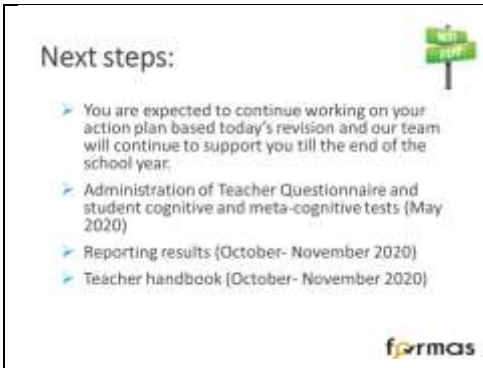
Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *During the previous session, each teacher has created his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students)*
- *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*
- *Even though this is our last session, we expect teachers to continue working on their actions until the end of the school year*

Ask teachers to also study the suggested actions under the ***O4. Provide constructive feedback to students*** heading in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.

Ask teachers to work on their action plan and revise their actions.

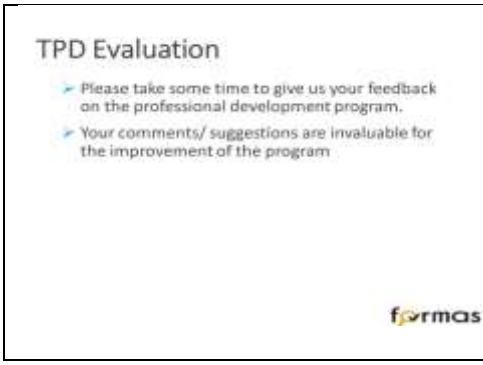


Slide 21

It is important to stress that this training can have positive impact only if they are actively involved in improving their practice even after this program ends.

Administrative information about the next steps (to be adjusted accordingly by each country).

This is the final session of the TPD course. However, teachers are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Make sure to stress your availability despite the end of the sessions and encourage teachers to make contact.



Slide 22

Ask teachers to spend some time to answer questions regarding the TPD course as part of its formative evaluation.

	**Slide 23** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in this professional development program. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details*

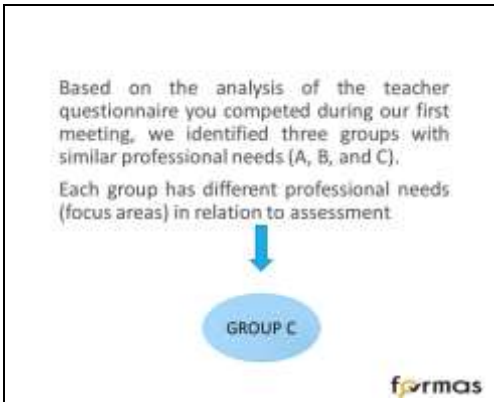
2.4. Sessions 2-5 for Group C

Group C – Session 2	
General Aims	1) Present the identified focus areas for Group C 2) Present the skills under emphasis for session 2 3) Examine an action plan that addresses the focus areas of Group C 4) Help teachers create a first draft of their individual action plan
Session Outline	▪ Presentation of the focus areas for Group C ▪ Implementation of peer/self - assessment ▪ Differentiation and assessment ▪ Discussion of the template action plan for group C ▪ Creation of the first draft of the individual action plan
Important Information	✓ It is important to inform teachers that based on the analysis of the questionnaire data, three groups were identified. Each group has differentiated professional needs and will thus receive different training according to these needs. You are expected to refer to different groups of teachers based on their improvement priorities. The classification into these three groups is an attempt to create relatively homogenous groups in terms of their improvement priorities. That means that within a group, teachers might have similar but not necessarily the same improvement priorities.
Material/handouts	▪ Session 2- Group C PowerPoint handouts ▪ Application activity – Setting ground rules for assessing peers' work (C2a) handout ▪ Application activity – Fostering culture that accepts differentiation in assessment (C2b) handout ▪ Post its for C2b (slide 16) ▪ A3 paper for C2b (one per group) ▪ Action plan for Group C ▪ Empty action plans

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 2- Group C handouts



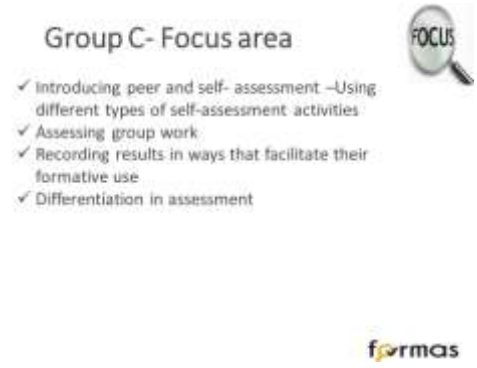
Slide 3

Participants are informed about the identification of 3 groups and that they belong to the group referred to as Group C. This grouping will occur for all next sessions.

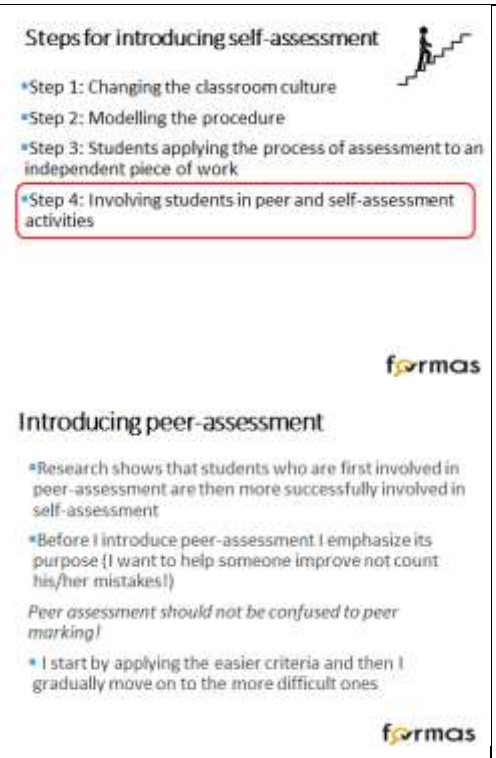
Grouping was done based on the professional priorities they have identified themselves through the questionnaire. Again, we emphasize that the aim is to create relatively homogenous groups in terms of their improvement priorities. This will allow us to customize content according to teachers' needs. Of course, it does not mean that all members of the group have the same needs. Within a group, teachers might have similar but not necessarily the same improvement priorities.

NOTE

Participants may have already been informed of their group before session 2. For example, if the three groups receive training simultaneously, teachers are informed in advance about their group and location of meeting. If different training times/days occur for each group, then again participants are informed in advance when and where the meeting of their group is taking place. As mentioned in Part A of the handbook, if different trainers are used to offer the TPD then rotation between trainers is expected.

	**Slide 4** Participants are informed about the topics/content to be covered during the session.
	**Slide 5** Presentation of the focus areas/skills to be addressed throughout the sessions of Group C. Teachers of group C are the ones situated at stage 3 (see Part A, Section 6 for a detailed description of the stage). Based on the skills included in this stage it is expected that teachers of Group C use a variety of assessment techniques to measure students' learning and usually keep records of information elicited not only from written assessment but from other techniques as well. However, recording is usually not done in ways that facilitate the formative use of the information available. In addition, they appear to assess group work but not in a systematic way and their assessment is primarily concerned with the team's overall performance rather than with each student's contribution to the teamwork. Finally, teachers situated at stage 3 are expected to have already established a culture that encourages students' involvement in the process of assessment. However, both peer and self-assessment for formative purposes and differentiated assessment practices are not yet systematically and efficiently introduced. Therefore, throughout the next four session teachers of Group C will work on improving their skills in relation to introducing peer and self-assessment, assessing group work, recording results in ways that facilitate their formative use and applying differentiation aspects in their assessment practice. NOTE *You should not give any details regarding the focus areas of the other two groups.*

Intended Learning Outcomes: By the end of this session you are expected to be able to: 1) Identify ways you can improve the implementation of peer assessment in your classroom 2) Identify ways you can improve the implementation of self assessment in your classroom 3) Identify the different characteristics of student that need to be taken into account in the differentiation of student assessment 4) Acknowledge the importance of differentiation in all phases of the assessment process formas	**Slide 6** Presentation of the focus of todays' session and what teachers are expected to be able to do by the end of the session (intended learning outcomes).
Formative assessment and self-assessment Self-assessment for formative purposes helps students to: ✓Become responsible for their learning ✓Identify the next steps in the learning process ✓Feel safe to make mistakes ✓Become more positive and improve their self-concept ✓Be actively involved in their learning ✓Become independent learners ✓Develop intrinsic motives/ set high expectations formas	**Slide 7** (Implementation of peer/self – assessment) **Linking self- assessment and formative assessment.** Make sure to remind teachers what was mentioned in session 1: self- assessment is not a "formative assessment technique". It is a tool that can be used for formative, as well as summative purposes. Therefore, just introducing self-assessment activities is not enough to achieve the formative purpose of assessment. Discuss why being able to self- assess is an essential metacognitive skill for all. Ask teachers as to whether they believe someone's skill to self- assess can be improved and how.
Introducing self-assessment •Self-assessment is a skill that needs to be developed •We can't expect students to apply a skill as challenging as self-assessment without previously making sure they have developed the necessary skills involved. •Self-assessment skills need to be taught, modelled and scaffolded  formas	**Slide 8** (Implementation of peer/self – assessment) Self-assessment is the act of reflecting and monitoring on both learning processes and outcomes. Presentation of the basic steps for introducing self-assessment. Emphasis on the fact that self-assessment is a skill and thus it can be developed, but support needs to be provided. Especially in secondary education, it is possible that teachers introduce self- assessment activities assuming that students of this age are/or should be able to self- assess by now. But if students have never been taught how to do it why do we assume that they know how?



Slides 9-10 (Implementation of peer/self – assessment)

Presentation of the steps for introducing Student Self-Assessment (SSA). The literature suggests that an incremental, structured implementation of SSA that gradually introduces SSA formats is more likely to be beneficial for students.

When discussing SSA with teachers have in mind the following:

- Students who are more convinced of the learning benefits when applying rigorous self-assessment of their learning will also do this more accurately.
- SSA requires training in which students receive feedback about their own SSA so as to become more accurate self-assessors.
- The use of concrete, specific, and well-understood criteria or reference points when evaluating one's own work are necessary.
- Teachers are expected to explicitly monitor SSA comments and considerately provide feedback that corrects any illusions of competence or incompetence may help develop greater SSA accuracy.
- It more important that students are able to accurately detect or diagnose what is wrong or right about their work and why it is that way than be able to accurately predict a holistic or total score or grade their work might earn.

Slide 11 (Implementation of peer/self – assessment)

Application activity- Setting ground rules for assessing peers' work (C2a)

Rationale: Peer assessment is a valuable tool for involving students in the process of assessment. However, students are usually not acquainted with the process or rules that guide assessment practices. This application activity aims to help teachers identify some ground rules that can guide the effective involvement of students in the process of peer-assessment.

Give the Application activity – Setting ground rules for assessing peers' work (C2a) handout (Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

Ask teachers to think of a time they introduced a new way of working in their classroom (e.g. first peer/self-assessment, first group work, first computer assisted work etc.) Then ask them to think of how students responded to this new way of work. It is possible that teachers mention the extra time needed until students

	get acquainted with how they are supposed to work and cooperate. Ask them to write down ground rules that could help them implement peer assessment more efficiently. Allow some time for groups to share and discuss their suggestions. Teachers are expected to suggest rules such as: ➢ No demoralising, destructive comments are allowed. ➢ Peer assessment is done to help our peers learn better and not to count mistakes ➢ Comments need to be related to the criteria set ➢ Comments refer to the performance not the person ➢ I base my assessment only on the criteria not on my personal relations with my peer

	**Slides 12-15** (Differentiation and assessment) Discuss with the group about differentiation. The following issues could be emphasized: ➢ We deal with diverse communities of learners (e.g. mixed- ability classroom reality) ➢ Students vary in many ways and teachers must be aware of these varieties as they plan teaching and assessment ➢ differentiation is an organized, yet flexible way of proactively adjusting teaching and learning to accommodate each child's learning needs and preferences to achieve maximum growth as a learner ➢ To understand how students learn and what, they already know, formative assessment practices are essential. ➢ If you differentiate instruction (or elements of it) then you must also differentiate assessment otherwise your assessment will not be representative of your teaching. ➢ When looking at assessment, differentiation can occur across and within all phases of the assessment process (see slide 15) Ask teachers to share examples of how their current students are different and how this impacts the students' learning, as well as their teaching.

Slide 16 (Differentiation and assessment)

Application activity – Fostering culture that accepts differentiation in assessment (C2b)

Rationale: Implementing differentiation in assessment requires changes in the professional practice of teachers in relation to the classroom culture. The purpose of this activity is for teachers to critically reflect on their current practices in relation to fostering a culture that acknowledges students' diversity and accepts differentiation practices in assessment. Through this reflection, teachers are expected to identify possible shortcomings in their current practice and at the same time suggest actions they can take to improve it.

Give the post-its to all and the A3 poster to each group

Create small groups as in the previous application activity.

Ask teachers to suggest ways to foster a culture in a classroom that acknowledges students' diversity and accepts differentiation practices. Ask them to exchange current practices that seem to be effective but also think of new actions they can take.

Teachers should write down each suggestion on a post-it and create a poster outlining the characteristics of a culture that accepts differentiation in assessment**.** Ask to them to pin the post-its on the A3 poster.

Allow time for groups to share and discuss their suggestions.

Teachers are expected to suggest ways such as:

- Discussion with students about how they differ from each other to help them acknowledge diversity in their classroom.
- Discussion with students about the purpose of assessment and the need for it to be differentiated to meet their needs.
- Students are challenged to work to their own potential.
- Students' interests or learning preferences are acknowledged.
- Emphasis on progress in learning not on assessment performance/grades.
- Provision of constructive feedback that student understand and can act upon.
- Creating opportunities for all to participate.
- Encouraging different solutions/approaches.
- Students feel safe to make mistakes.

	➢ Discussion with students to get to know them (e.g. interests, home learning environment, personal traits that affect learning, motivation). ➢ Communicating with parents to inform and explain differentiated approaches to assessment

 	**Slides 17-18** (Differentiation and assessment) Differentiated assessment is the way by which teachers modify and match assessment with the varied characteristics/profiles of students to meet the students' individual needs, thereby enhancing their learning and boosting their ability to show what they have learned. Adding aspects of differentiation in assessment is considered as perhaps the most challenging aspect of differentiated practice. Many teachers who appear positive in adding elements of differentiation in their teaching, express hesitation in doing so for assessment. Concerns about fairness, accountability, practically and reliability are usually expressed. Slides 17 and 18 discuss some common reactions to attempts to differentiate assessment. Ask teachers to provide relevant examples/experiences if available and how they addressed them.

Slides 19-20

Give a) the empty action plan handouts and b) the action plan template for Group C (Appendix B).

Remind them that:

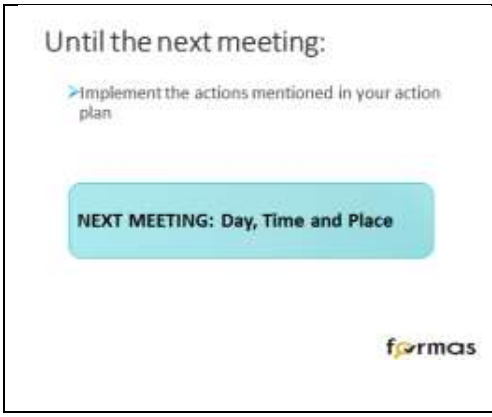
- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *Each teacher will create his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students)*
- *An action plan does not need to be extensive. Short, focused, easy to develop and follow is the key.*
- *It is good to have a record of teachers' action plans however you will not keep copies of action plans unless the teacher gives you permission to do so.*
- *Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan.*
- *Teachers can work together (if they like) and exchange ideas to develop/revise/adjust their action plan.*

Ask teachers to read the suggested actions under the ***O1.*** **Introduce peer and self- assessment –Using different types of self-assessment activities** and **O2. Differentiate assessment** headings only.

Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.

Ask teachers to work on the empty action plan and create a first draft of their personal action plan.

NOTE: remind teachers that they will need the action plan template in all sessions and thus they need to have it with them every time.



Slide 21

It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized.

(*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*)

Information about the next meeting (Session 3).
Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

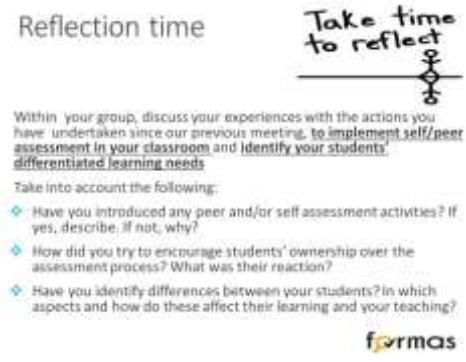
	**Slide 22** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group C – Session 3	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 3 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Different types of self-assessment activities ▪ Assessing group work ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the Power Point Presentation - Session 3- Group C ▪ Application activity – Assessing Group Work (C3a) handouts (slide 19) Application activity – Evaluating group work through a peer-assessment rubric (C3b) (slide 22) ▪ Action plan for Group C (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

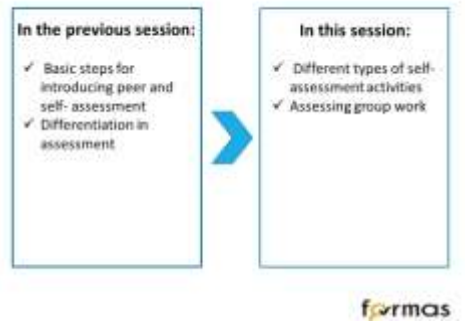
Give the Session 3- Group C handouts



Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary in order for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental



Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session is presented.

Note: Try to make connections between the content of the sessions. In the previous session we discussed the gradual introduction of self-assessment activities and emphasized that both formative assessment and differentiation require changes both in the classroom culture and in the way students and teachers interact with each other and the material/content. This session moves a step forward and makes specific reference to strategies that can be used to introduce self-assessment activities, as well as, how to deal with group work and its assessment.

Slide 5

Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

Slide 6 (Different types of self-assessment activities)

Ask teachers to discuss the questions with the people sitting close to them.

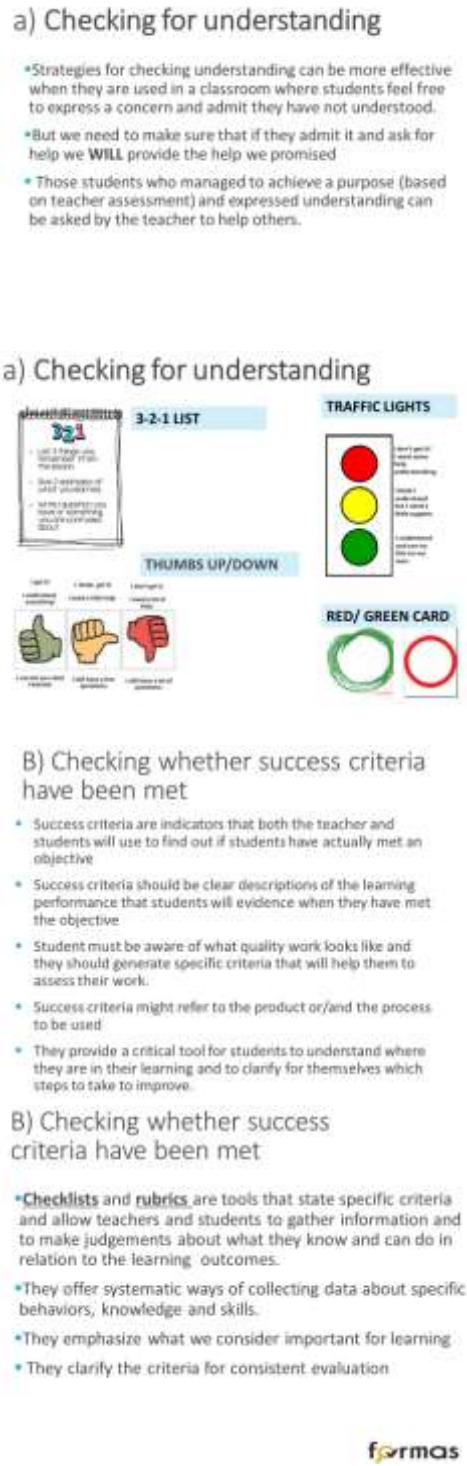
Have in mind that:

- It is possible that teachers refer to activities that are not actual self –assessment activities (*i.e. showing the correct answer on the board and asking everyone to correct theirs, giving the test with the solutions*).
- It is important to note the difference between self-correction and self- assessment. Self- assessment requires student to apply criteria to evaluate their answers and not just to compare it with the correct one.

Slide 7 (Different types of self-assessment activities)

There are different kinds of self- assessment activities depending on what students are expected to do.

a) Students are asked to evaluate whether they have understood something and are able to apply it independently.
b) Students are asked to evaluate their learning product (e.g. answer, model, solution, oral response etc.) based on specific criteria.
c) Students are asked to reflect on the learning process (not only on the product). For example, identify helpful learning strategies or identify the main points.



Slide 8- 14 (Different types of self-assessment activities)

Presentation of different strategies that can be used to help students check for their understanding.

Note 1: *Remind teachers what was discussed in the introductory session. There are no "formative" strategies. Even if a practice appears as formative oriented, if the information elicited is not used to make adjustments and provide support to help students improve their learning, then the formative purpose is not met.*

Note 2: Not all strategies are suitable for all classrooms, subjects and/or age groups. The strategies mentioned are suggestions and it is up to the teachers to select one of them or a different one based on what is most suitable both for them and for their students.

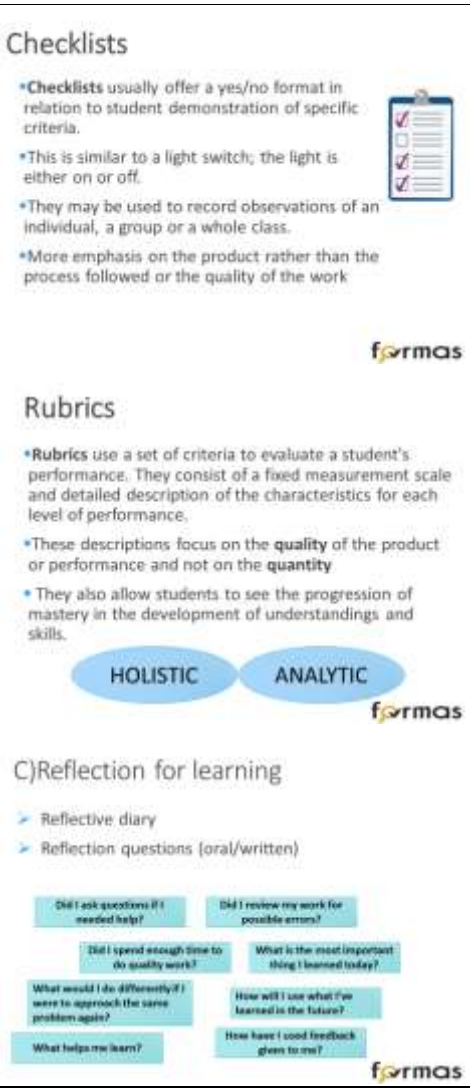
Note 3: *Rubrics and checklists are not the focus of this group and are only mentioned as tools for helping student check whether success criteria have been met. If ask, have in mind the following:*

Holistic rubric: a single-criteria rubric (one-dimensional) used to assess participants' overall achievement on an activity or item based on predefined achievement levels.

- It provides an overview of the student's work - all criteria are evaluated simultaneously.
- It gives a single score for a product or performance (different levels of achievement).
- It is appropriate to assess simple tasks.
- It does not provide a detailed analysis of the strengths and weaknesses of the student's performance.
- Easier and faster to use but there is a greater risk of promoting the summative rather than the formative purpose.

Analytical Rubric: a *two-dimensional* rubric with levels of achievement as columns and assessment criteria as rows. Allows you to assess participants' achievements based on multiple criteria using a single rubric.

- It gives performance levels for each criterion separately.
- It is suitable for the evaluation of multidimensional concepts/goals.
- It provides more specific information or comments.
- It helps students to better understand the quality of the work expected.
- It takes longer to build and implement.
- Provide students a clear understanding of expectations.
- Communicate specific and immediate feedback.



- Help students to become self-reliant, self-directed, and self-assessing learners.

Slide 15 (Different types of self-assessment activities)

Ask teachers to discuss the questions.

- Ask them to share if they have used another strategy and identify its type (checking for understanding, check if success criteria have been met or reflection on learning).
- If no experience in these strategies is mentioned ask teachers to think of how students in their classroom check for understanding, check if success criteria have been met or reflect on their learning. It is possible that they do involve students in these activities but have never seen it as part of the self- assessment process.

Slide 16 (Assessing group work)

Moving on to the second aspect under focus for the session: group work and its assessment.

Ask teachers to discuss their experience so far with group work in mathematics. Consider the following:

- It is possible that some teachers consider group work irrelevant to the subject of maths. Remind teachers that group work is about learning through interaction which is imperative in all subjects.
- Some teachers relate group work with classroom management problems or incidents of misbehaviour. Indeed, if students are not used to or trained to work in groups it is possible that behaviour problems may arise. This is the reason, organizing group work and preparing/training student accordingly is important before introducing a group task.
- Group work is important because, if planned appropriately, it enhances student-student interaction and therefore can lead to positive impact on learning. It is not merely a sitting arrangement or a grouping practice.

Slide 17-18 (Assessing group work)

- It is important to help teachers understand that effective group work is not just about organizing students in groups and asking them to work together on a task.
- Group work can aid learning when positive interactions between students and between the teacher and students occur. If students sit in groups but work individually and independently on the task given, then this is not considered as an effective practice of group work.
- In, addition when the focus is on the outcome and not the process it is possible that negative interactions between students occur. For example, high achievers may reject a group member that is not that competent in math as his/her performance may have a negative effect on the outcome.
- Considering the criteria mentioned in slide 17 before assigning a group task, its important.

Slide 19 (Assessing group work)
Application activity – Assessing Group Work (C3a)

<u>Rationale:</u> Group activity is not something you just decide on the fly since many aspects need to be considered and decisions need to be made. This application activity aims to help teachers identify the main decisions that need to be made when organizing a group activity.

<u>Give the C3a application activity handout (Appendix A)</u>

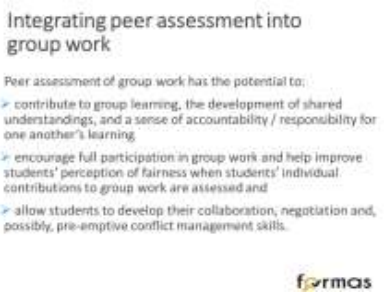
Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small, try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

When teachers incorporate group assignments and activities into their lessons, they must make thoughtful decisions regarding how to organize the group, how to facilitate it, and how to evaluate the completed work.

Tell teachers to imagine that they need to organize a group activity in their next lesson. Ask teachers to use the table provided to help them decide how to organize it.

Then in their groups, teachers need to present their rationale and justify their decisions. Ask teachers to be open to constructive feedback by fellow- teachers and revise their table if necessary.

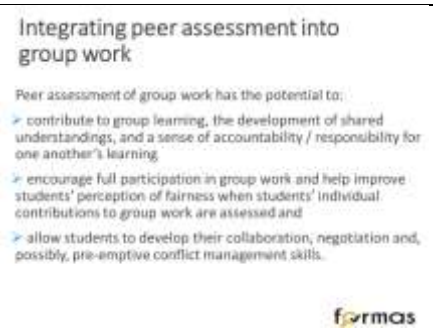
Note: Decision taken are not standard. They always depend on various aspects such as the learning objective, the synthesis and culture of the classroom, psychical space, the time available etc..



Slide 20-21 (Assessing group work)

It is important to take advantage of an assigned group work to involve students in their assessment (*check for understanding, apply criteria, reflect about the group's learning and operation etc.), as* well as the assessment of their peers.

Linking group work with peer-assessment also acts as a classroom management strategy. It is hard for a teacher to have a solid sense of an individual student's participation and contribution in group work. Usually during group work, teachers usually wander around the classroom during activities and get an impression of who's engaged and who isn't.



Slide 22 (Assessing group work)

Application activity – Evaluating group work through a peer-assessment rubric (C3b)

Rationale: Assessing group work has added challenges. Rubrics are valuable tools for recording assessment information for formative purposes especially when peer assessment is involved. This application activity aims to help teachers identify aspects of group work that can be included in its assessment.

Give the C3b application activity handout

Create small groups as in the previous application activity.

Ask teachers to study the peer assessment rubric provided. Additional questions:

- What type of rubric is it (holistic/analytical) and why?
- Evaluate the criteria set based on what was mentioned in the previous sessions.
- Can the rubric be used for formative purposes?

Note: we need to clarify to teachers that the criteria included in a rubric to assess group work are not standard. The criteria included each time, depend on various factors such as the task assigned, students' age, the learning objective, student' previous experience in group work etc. Of course, the criteria still need to be of good quality and provide valuable information.

Slides 23-24

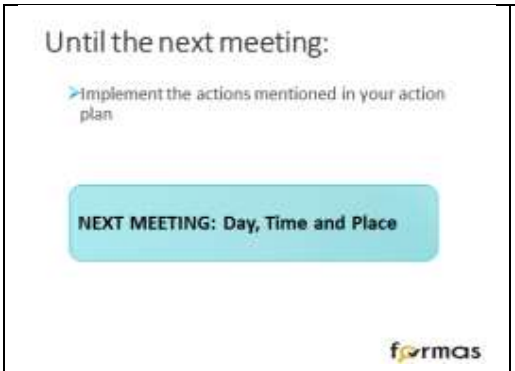
Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

1. *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
2. *During the previous session, each teacher has created his/her own based on their needs, preferences and teaching context (i.e. school, classrooms, particular students)*
3. *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*

Ask teachers to also study the suggested actions under the ***O1. Introduce peer and self- assessment –Using different types of self-assessment activities*** and ***O3. Assess group work*** headings in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please.

Ask teachers to work on their action plan and revise their actions.



Slide 25

It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized.

(*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*)

Information about the next meeting (Session 4).
Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

Slide 26

Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately.

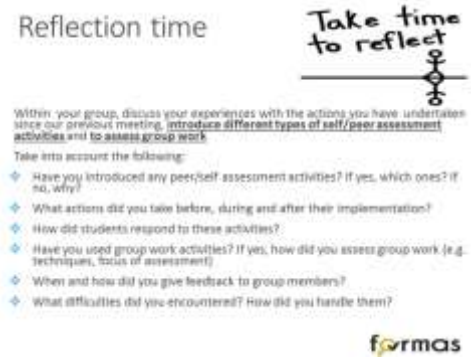
NOTE
Add contact details and next meeting details

Group C – Session 4	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 4 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Assessing Homework ▪ Challenges of differentiation: *assessment administration and homework* ▪ Re-examination of the action plan adding new aspects based on new content
Material/handouts	▪ Handouts with the Power Point Presentation - Session 4- Group C ▪ Application activity – *The slow pace student scenario (C4a)* (slide 7) ▪ Application activity –*Responding to students' questions during assessment administration (C4b)* (slide 8) ▪ Action plan for Group C (some copies) ▪ Empty action plans (some copies)

Slides 1-2

The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

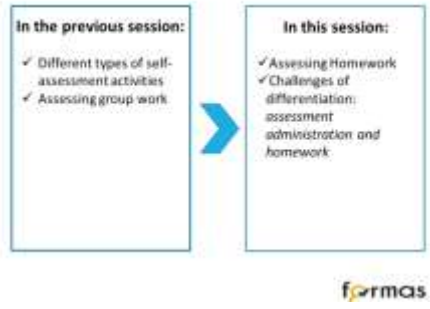
Give the Session 4- Group C handouts



Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that, implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

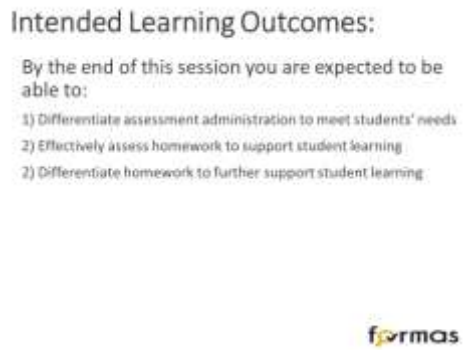
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental



Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: *Try to make connections between the content of the sessions. In session 2, we acknowledged the importance of differentiation in all phases of the assessment process. Today, we become more specific, and address differentiation and its challenges in relation to homework and assessment administration*.



Slide 5

Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.

Slide 6

We discussed in the previous sessions about the need to foster a classroom culture that acknowledges students' diversity and accepts differentiation practices. One step towards this end, is to address the challenge of adding differentiation elements in: *a) assessment administration* and *b) homework*.

Slide 7 (Challenges of differentiation: *assessment administration)*

Application activity – The slow pace student scenario (C4a)

Rationale: Students in classroom differ in many ways. Processing speed is one of them. When the differences in speed are small, these can even be left unidentifiable. But when slow processing speed is interfering with learning progress, academic performance, classwork and homework completion, special attention is required. The purpose of this exercise is for teachers to identify how slow pace can impact the quality of the assessment information collected and identify how assessment administration can be differentiated to better address a slow-paced student's needs.

Give the C4a application activity handout (Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small, try to create at least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity.

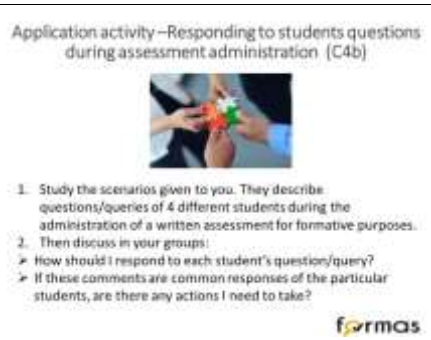
Ask teachers to study scenario given to them and discuss the questions set.

NOTE:
The scenario presents a student that does not manage to finish his/her assessment on time. This is something quite common mathematics classrooms. The purpose of this exercise is to help teachers examine this incident from a formative (i.e. I need information about the student's learning) rather than a summative assessment perspective (i.e. the assessment results elicited are fair, since all students had the same time to finish). Questions to discuss:

- *Why was the student unable to finish? (Lack of knowledge skills/ bad time management, slow reaction pace?).*
- *What assessment information has the teacher gathered?*
- *How should we respond depending on the reasons identified?*

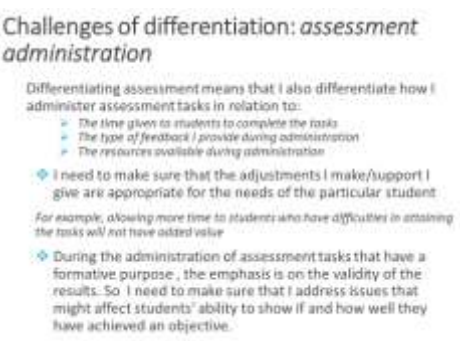
The emphasis here should be that formative assessment aims to identify students' strengths and weaknesses to enable the provision of specific and targeted feedback. Uncompleted exercises do not necessarily mean lack of knowledge. If a student is unable to finish an assessment the teacher is excepted to first examine why this happened. Information about the exercises that were left unfinished, the frequency that this happens, student's performance during classroom instruction, student's performance

	in other subjects, non-verbal communication during administration are some things to be considered. Based on the reasons identified, the teacher is then expected to take action. Again, the main aim is to help students learn. Improving students' reaction and processing speed, helping them deal with assessment anxiety, addressing possible lack of skills/knowledge, improving motivation are some of the aspects that might need attention.

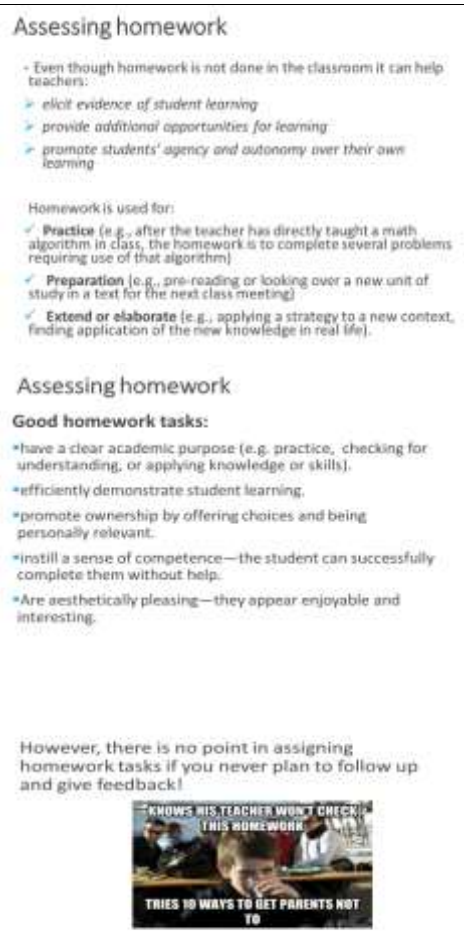
	**Slides 8** (Challenges of differentiation: *assessment administration)* **Application activity–Responding to students' questions during assessment administration (C4b)** ***Rationale: Effective teachers are expected to be able to follow appropriate procedures during assessment administration. Whereas external assessments are typically more standardized in terms of timing, setting and teacher support, the administration of classroom assessment rests mainly on teacher's decisions. When assessment is done for formative purposes, these decisions need to be differentiated based on students' needs. This application activity aims to help teachers identify how the process of administration can be differentiated to better support different students' needs.*** *Give the C4b application activity handout (Appendix A)* The second application activity also addresses the challenge of differentiation in relation to assessment administration. The different scenarios are expected to help teachers identify that the assessment administration challenge is not only about giving student more time to finish an assessment activity. This is indeed a common misconception. For example, if someone is lacking the skills/knowledge to respond to an activity even if more time is provided this will not change and the result will be the same. Differentiating administration is not only about time, but also about the type and amount of support provided during administration, the scaffolding technique, the room organization, the material provided etc. Ask teachers to study the scenarios and discuss the questions set. Student A *Is this exercise like the one we did yesterday?* Discussion: It is possible that the student tries to make connections with what was taught in class. Whereas this can be perceived as positive, is it also possible that the student is not able or not confident to identify what he/she has to do. He/she might be trying

	to get the teacher to give him/her a clue on how to proceed. The aim is not for students to mechanically complete similar exercises (procedural Vs conceptual understanding). Thus, the first step here if for the teacher to re-examine the exercises he/she uses. It is possible that same/similar exercises are used both in class and in assessment. In addition, the teacher must examine whether issues of ability/confidence are present. If the student is not able to identify what he/she must do, the teacher must examine the reasons behind this *(e.g. instructions, wording, lack of knowledge, etc.)*. If the student is able but needs reassurance, then this should also be addressed. <u>Student B</u> *I have not understood the instructions of the exercise. It is not clear to me what I am supposed to do.* Discussion: The reason for this response could be that the student has a general difficulty understanding and following instructions. If a student struggles with following instructions this impacts on his/her ability to reach the desired outcome and thus complete tasks effectively. In such as case, the teacher must first identify the reason for this difficulty *(e.g. comprehension of language, especially concepts and vocabulary; attention and concentration, working memory, non-achievement of ILO examined etc.*). Based on the reason(s) identified the teacher must make the necessary adaptations during assessment administration *(e.g. provide clarifications, give the instruction orally, use simple and direct language, provide visual aids, provide scaffolding prompts etc.*). <u>Student C</u> *Do I need to find the least common factor to solve this exercise?* Discussion: The student here seeks for confirmation on the process to be followed. One possible reason for this response is that he/she does not feel confident enough or is afraid to make mistakes. Given that this is repeated behaviour, perhaps the appropriate response is not to confirm/deny the student's suggestion. This would just help the student proceed with solving this exercise but will not help to prevent this reaction in future assessments. The teacher should consider alternative responses that can help the student take ownership of his/her learning *(e.g. I am confident that you know the answer to this question; Read the instruction again… has your question been answered? Think of the steps you need to follow to solve this exercise and you will get your answer; Why don't you try and see?)*. Another possible reason for this response is that the student does not fully acquire the knowledge/skills covered in class and thus is unsure on how to proceed when these are examined in different contexts (i.e. an

	assessment exercise). This calls for a different approach during assessment administration *(e.g. ask the student to think aloud on how he/she should solve the exercise to identify possible difficulties/misconceptions; ask the student to justify his/her question; ask the student to recognizing connection with what was taught in class etc.)*. <u>Student D</u> *The answer here is 7, right?* Discussion: The student here seeks for confirmation on the answer. Despite of whether the answer is correct or wrong the fact that the student has the need for the teacher to confirm it is a sign that he/she is not confident enough to work independently. Given that the student is doing this repeatedly, the teacher should try and help the student become more independent in his/her learning *(e.g. avoid any verbal and non-verbal communication that shows approval/disapproval while the student is working; remind that the purpose of the assessment is to improve their learning; mistakes are opportunities for learning; encourage the use of confirmatory processes to validate their answer, emphasis on the process and not just the product/answer)*

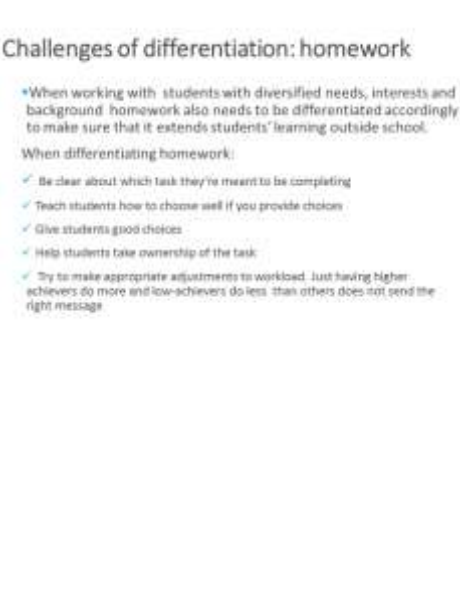
	**Slide 9** (Challenges of differentiation: *assessment administration)* The application activities provided an insight into the different challenges that teachers face when administering assessment tasks. It is acknowledged that the discussion about differentiating assessment administration usually focuses on whether additional time should be allowed for some students. However, additional time is not always the answer. It is important for teachers to be able to identify the appropriate adjustments to ensure that the results elicited with be valid and representative of what the student knows and can do.

	Slides 10-12 (Assessing Homework*)* Homework is recognized as an additional learning opportunity for students. It relates to the construct of quantity of teaching since it gives the chance to students to spend more time on a topic/aim. Before deciding on the type and content of homework, teachers must decide why homework is assigned. Homework is not only about practice; it could also be used to prepare the next lesson or provide opportunities for extension/elaboration of what was taught in class.



Then teachers must design/choose good quality homework tasks (see slide 11 for good homework tasks characteristics) that are appropriate for achieving the purpose decided.

Finally, the need to follow up on homework should be emphasized. If a teacher assigns homework but never follows up, then students might start considering homework as "a task to be done" and not a learning opportunity. Some students may even stop doing it since no one will know! In addition, if a teacher just checks if homework is done but spends no time to actually review it and provide feedback, then it is possible that students end up to copy the solutions or ask someone to do it for them.

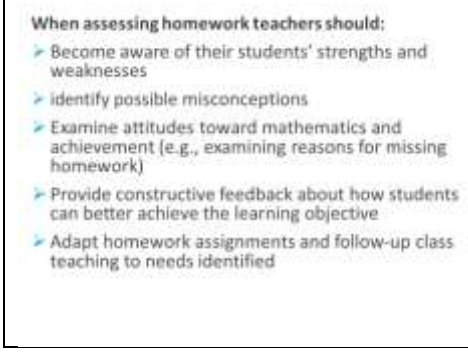


Slides 13-14 (Challenges of differentiation: *homework)*

Differentiated homework is an extension of differentiated instruction outside of the classroom. Differentiation is even more important in homework, given that there's no teacher to provide guidance if students face difficulties in completing the assigned homework.

It is important to emphasize:

- Differentiated homework is not about personalising homework for each student!
- Not all tasks lend themselves to differentiation, so not every piece of homework needs variations.
- We should avoid assigning as homework what was left unfinished in the classroom.
- We make sure that we have provided students with opportunities to apply new knowledge (and thus, provide feedback to address difficulties, if any) before asking them to apply it at home.



- We do not assume that all students have a support system at home (*e.g. material, knowledgeable adults, technology*) that can help with homework.
- Feedback on homework is not only about completion… It should be constructive and address positive and negative aspects of a student's work and address possible learning needs identified.
-

As all feedback, feedback on homework should be provided as soon as possible to allow time for corrective actions to take place.

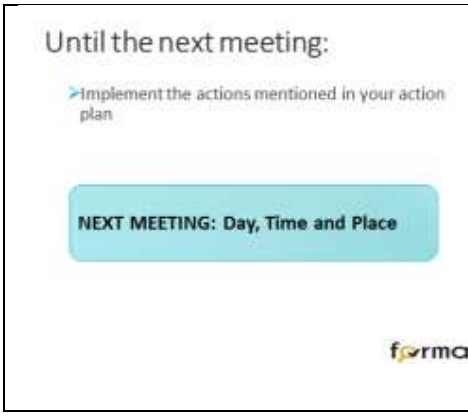
Slides 15-16

Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.

Remind them that:

- *The action plan is a tool that will help them be more focused and punctual to their improvement efforts*
- *During the previous session, each teacher has created his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students)*
- *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.*

Ask teachers to also study the suggested actions under the **O2. Differentiate assessment** heading in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on their action plan and revise their actions.



Slide 17

It is important to stress that this training could have positive impact only if they are actively involved in improving their practice. A brief description of how the next sessions will be organized.

(*reflection on actions taken → new knowledge → application of new knowledge → reflection and revision/adjustment*)

Information about the next and final meeting (Session 5). Make sure to stress your availability throughout the sessions for support/feedback and encourage teachers to make contact.

	**Slide 18** Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in the professional improvement. Ask participant to express any concerns/questions and address the appropriately. NOTE *Add contact details and next meeting details*

Group C – Session 5	
General Aims	1) Reflect on teachers' attempts to implement actions from their personal action plans 2) Present the new skills under emphasis for session 5 3) Re-examine their personal action plan adding new aspects based on new content
Session Outline	▪ Recording results in ways that facilitate their formative use ▪ Challenges of differentiation: *assessment recording* ▪ Re-examination of the action plan adding new aspects based on new content ▪ TPD formative evaluation ▪ Administrative issues
Material/handouts	▪ Handouts with the Power Point Presentation - Session 5- Group C ▪ Application activity – Recording results in ways that facilitate their formative use (C5a) (slide 7) ▪ Application activity – Recording results in ways that facilitate their formative use (C5b) (slide 9) ▪ Application activity – Responding to students' questions during assessment administration(C5c) (slide 10) ▪ Application activity – Recording assessment and differentiation (C5d) handout (slide 12) ▪ Action plan for Group C (some copies) ▪ Empty action plans (some copies)

Slides 1-2

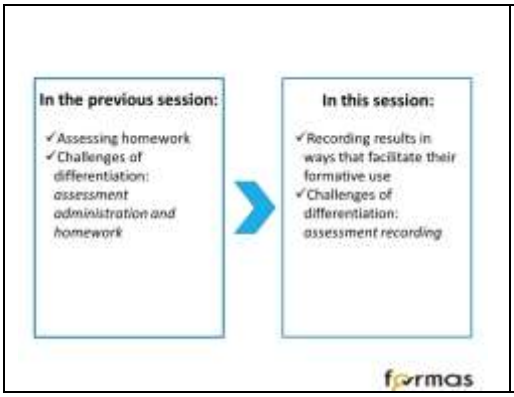
The first two cover slides of all presentations used in the TPD include the information required by the project's funding bodies. Please make sure that no alterations (besides adding the trainer/s details) are made.

Give the Session 5- Group C handouts

Slide 3

Participants are asked to reflect on their attempts to implement actions from their personal action plan. Your role here is to facilitate the discussion, making teachers feel comfortable to share. It is important to remind them that implementation efforts in-between sessions are necessary for improvement in their assessment practice to be achieved. Use the questions in the slide to guide discussion.

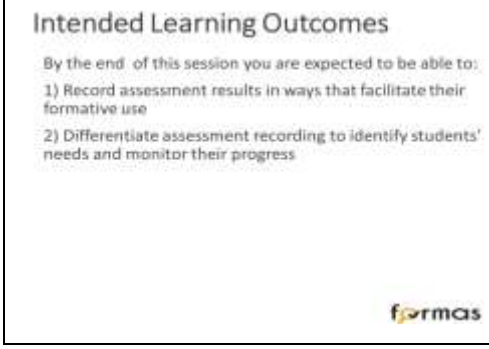
Note: It is possible that some teachers have not actively engaged with their action plan. Try to help them identify why and help them overcome possible barriers. You should not be judgmental.



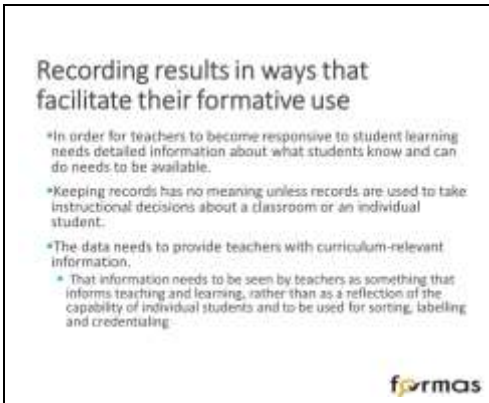
Slide 4

Structuring activity – Participants share what they have learnt during the previous meeting. Then, the new topics/content to be covered during this session are presented.

Note: Try to make connections between the content of the sessions. The previous session addressed assessment differentiation in relation to two aspects: homework and assessment administration. Today, we address another aspect of assessment (remind the phases of the assessment process mentioned in the first session): assessment data recording.



Slide 5
Presentation of what teachers are expected to be able to do by the end of the session (intended learning outcomes). Presenting the ILOs is an orientation strategy that helps teachers become more motivated and engaged with the content that follows.



Slide 6 (Recording results in ways that facilitate their formative use)

An enormous proportion of daily assessment may never be used for formative purposes, unless evidence is recorded. Even when records are kept, these usually refer to data elicited from written tests.

Of course, one cannot expect teachers to document everything that happens in a classroom! However, the purpose, importance, process and effective use of documentation needs to be acknowledged by teachers.

It is expected that record keeping is used for improvement (formative) purposes rather than for accountability. Therefore, record keeping must be done in ways (tools, format etc.) that allow the use of data for formative purposes.

Slide 7 (Recording results in ways that facilitate their formative use)
Application activity – Recording results in ways that facilitate their formative use (C5a)

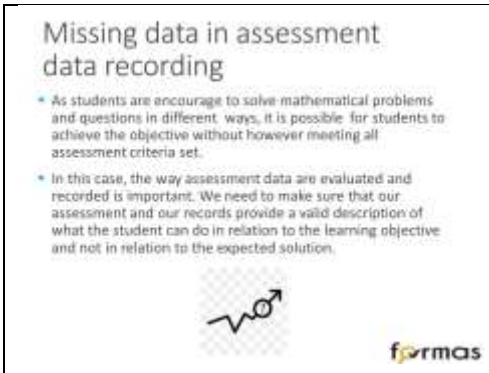
Rationale: Recording makes assessment information available for future use. When assessment is done do serve the formative purpose, recording assessment information in ways that enables its use to support learning is essential. This application activity aims to help teachers develop their assessment recording skills. Teachers are expected to set meaningful assessment criteria that provide a clear insight on how students' learning is going, align assessment tasks with ILOs and design record sheets that enable the use of assessment information to support learning.

Give the C5a application activity handout (Appendix A)

Ask teachers to create groups of 3-4 (depending on the number of teachers). Even if the number of teachers is small try to create at

	least 2 groups. This will allow a better exchange of ideas and will ensure that all will participate in the activity. Ask teachers to study the two assessment activities provided and then: ➢ Identify assessment criteria for each activity. ➢ Place each activity in the appropriate box of the specification table*. ➢ Create a record sheet to show how information elicited can be recorded. Possible responses on the questions above are provided in the **Application activity – Recording results in ways that facilitate their formative use (C5a)- Suggested Answers** handout. During the discussion have in mind the following: ➢ Assessment criteria are descriptive statements help both teachers and students to evaluate whether an ILO has been achieved. ➢ Different criteria can be set for the same ILO depending on grade, students' abilities, content covered, emphasis given during instruction etc. ➢ A specification table is a two-way matrix presenting assessment tasks in relation to the learning objectives and a classification of these objectives. In this TPD, learning objectives were examined in relation to three dimensions: a) declarative knowledge, b) use of algorithms, and c) problem solving. This classification was decided based on the review of the literature in mathematics assessment but also based on the content analysis of the mathematics curricula in the four participating countries. Of course, other classifications can be used depending on the subject, context and learning approach promoted. ➢ Specifically, *declarative knowledge* refers to student's ability to recall terminology, definitions, facts, principles, methods, structures etc. The dimensions of *using algorithms* refers to student's ability to to use an algorithm taught in a given situation. Finally, *problem solving* refers to student's ability to analyze an unknown/problematic situation and effectively use an algorithm or a series of algorithms to solve it. **It is possible that teachers are not familiar with the term "Specification table". A specification table (or assessment blueprint) is used to identify the achievement domains being measured and to ensure that a fair and representative sample of items appear on the test.* ➢ *If necessary, explain the term briefly having in mind the following:* ➢ *For each learning objective three dimensions can be examined: a) declarative knowledge, b) use of algorithms, and c) problem solving.*

	➢ *Not all learning objectives can be examined using all three aspects.* ➢ *Even if an objective can be examined with all three aspects, the teacher decides which aspects will be assessed based on the teaching preceded.* ➢ *Each item can be used only once in a specification table.* ➢ *Items in the form of 1a, 1b, 1c are considered different items and can be placed in the table independently.* ➢ *It is preferable to have at least 2 items in each cell used.*

	**Slide 8** (Recording results in ways that facilitate their formative use) Missing data refer to data that are not available regarding the observation/ILO of interest. The problem of **missing data** is relatively common and can have a significant effect on the conclusions that can be drawn from the data. We design assessments tasks to evaluate specific intended learning outcomes (ILOs). We then set specific criteria to examine whether a student has successfully accomplished the task. But it is possible that a student has not met all criteria set, but still has achieved the ILO under evaluation. It is therefore important, especially in mathematics classrooms, to make sure that the criteria set, and the data recorded in relation to them provide a valid description of the student's learning in relation to the ILO's.

	**Slide 9** (Recording results in ways that facilitate their formative use) **Application activity – Recording results in ways that facilitate their formative use (C5b)** ***Rationale: Data recorded should provide a valid description of a student's learning in relation to the ILO's. This application activity aims to help teachers acknowledge that just keeping generic information about a student's does not provide valuable insight regarding his/her learning and that follow up actions based on assessment information is necessary*** *Give the C5b application activity handout (Appendix A)* Ask teachers to study the record sheet provided. The record sheet presents the performance of 15 students (i.e., a mathematics classroom) in a specific assessment activity.

	Then, ask them to study the assessment activity, the results of students and answer the questions provided. During the discussion have in mind the following: ➢ In this example, the recording focuses on information in relation to the answer provided by the student. Specifically, for each student the letter representing his/her selection on the multiple-choice item is recorded. ➢ Multiple-choice items are considered a good choice when trying to examine possible misconceptions in relation to an ILO. In this case, one is the correct answer and each of the 3 distractors should ideally examine a specific misconception. However, only one of distractions is able to inform the teacher about possible misconceptions (e.g. A(3,4) is informing teachers that students consider only the left part of the equality neglecting the role of the right part of it) It is not always possible to identify three different types of misconception to be used as distractors so the teacher should be flexible enough in deciding whether a multiple choice or other type of question could be used. ➢ During the discussion participants are asked to identify the weak distractors and modify them in informing ones. For example the distraction D(5,-2) could be changed to D(-5,-2) to inform the teacher about a misconception of changing signs while solving for x. ➢ The way information is recorded does not help the teacher to easily group students' answers for appropriate actions to take place. Therefore, using a different format that enables grouping students per answer would have been more helpful (e.g. creating horizontal columns for each answer and ticking in the appropriate cell). ➢ When students' answers are grouped it is possible to examine how many students managed to answer correctly, which and how many students have the same misconception. ➢ It is also important to note that more than one items assessing the same ILO need to be used. This means that another exercise checking the same ILO, preferably of a different type, should also be used to check for internal validity. ➢ Future actions based on the results may include amongst others whole-classroom re-teaching, therapeutic work for specific groups of students, one-one feedback sessions for individual students.

Slide 10 (Challenges of differentiation: *assessment recording)*

Application activity – Responding to students' questions during assessment administration(C5c)

Rationale: Recording assessment information is expected to provide information about students' learning and how to better support it. This implies that other information that may support/hinder the learning process are also important. This application activity aims to help teachers acknowledge other sources of assessment information (i.e. students' behaviour during assessment administration) and adapt the recording process to include such information.

Give the C5c application activity handout (Appendix A)

Remind teachers of the scenarios studied during the previous meeting. They described questions/queries of 4 different students during the administration of a written assessment for formative purposes. Remind what was discussed during the previous meeting:

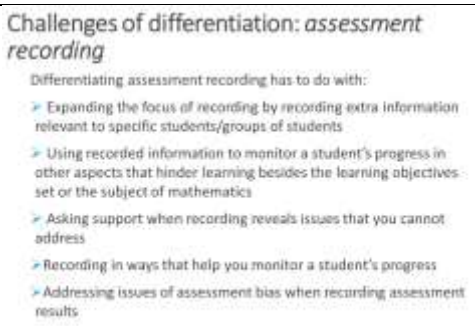
- *Assessment administration challenge is not only about giving student more time to finish an assessment activity.*
- *Differentiating administration is not only about time, but also about the type and amount of support provided during administration, the scaffolding technique, the room organization, the material provided etc.*

Then, ask them to study the scenarios again but this time having in mind that these students have similar reactions every time they are assigned an assessment.

Then, suggest ways they could adapt the recording of assessment to address the difficulties these students appear to face.

These suggestions may include:

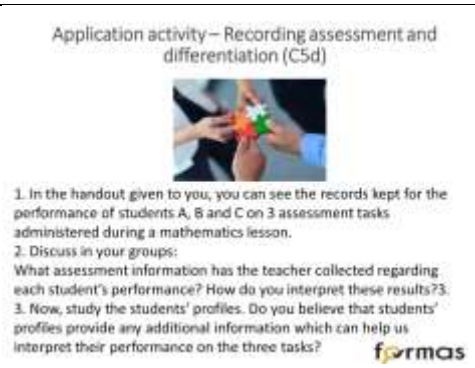
- Adding an extra column to record information about how frequently this behaviour occurs and identify possible trends.
- Keeping individual records to show details on the actions taken (by the students and teacher) to address these difficulties.
- Use assessment information to monitor progress in relation to these behaviours.



Slide 11 (Challenges of differentiation: *assessment recording)*

The application activities so far, provided an insight into the different challenges that teachers face when recording assessment information.

Assessment recording is one of the main phases of the assessment process and teachers are expected to use assessment recording in ways that promote student learning. Applying elements of differentiation to the recording process is of course a big challenge since many teachers consider recording merely an accountability obligation rather than as a tool to promote learning.



Slide 12 (Challenges of differentiation: *assessment recording)*
Application activity – Recording assessment and differentiation (C5d)

Rationale: Teachers should be able to record assessment information in ways that allow student diversity to be taken into consideration. This application activity aims to help teachers acknowledge that for recording to be used in support of learning, information about students that may affect their learning/performance also needs to be taken into consideration (e.g. learning pace, language proficiency etc).

Give the C5d application activity handout (Appendix A)

Create small groups as in the previous application activity.

The last application activity addresses the challenge of differentiation in relation to assessment recording.

The handout presents the records kept for the performance of students A, B and C on 3 assessment tasks administered during a mathematics lesson.

Ask teachers to discuss in their groups:

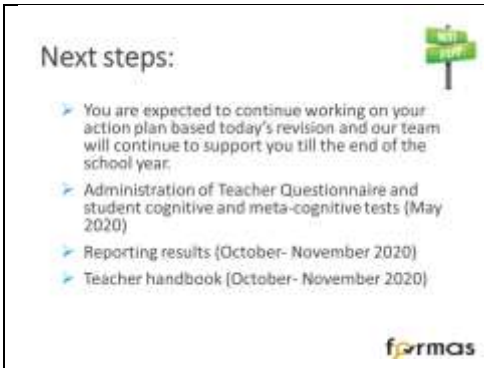
- What assessment information has the teacher collected regarding each student's performance?
- How do they interpret these results?

Now, ask them to study the students' profiles.

Student A is an immigrant. She came in the country 2 months ago and does not speak the language. She is very competent in calculations involving mathematics.
Student B is a student who struggles with maths. She finds it difficult to put new knowledge into context. She tries reciting formulas and other material taught in class, but she can't reach a strategy to apply them effectively to solve exercises or problems.

	She is frustrated and afraid of disappointing her parents' expectations on her. **Student C** is a student with learning difficulties. He finds it difficult to comprehend written instructions/content but is very competent in problem solving when the instructions are given orally Do they believe that students' profiles provide any additional information which can help them interpret their performance on the three tasks? Ask them to elaborate taking into consideration what was discussed earlier about the challenges of recording. Information to guide the discussion are available in the **Application activity – Recording assessment and differentiation (C5d)- Suggested answers** handout.

	**Slides 13-14** *Ask teachers for their action plan. If someone has forgotten to bring it, give them an empty one.* Remind them that: ➢ *The action plan is a tool that will help them be more focused and punctual to their improvement efforts* ➢ *During the previous session, each teacher has created his/her own based on their needs, preferences, and teaching context (i.e. school, classrooms, students).* ➢ *This is the time to revise and adjust their action plan based on new content and on their reflection at the beginning of the session.* ➢ *Even though this is our last session, we expect teachers to continue working on their actions until the end of the school year.* Ask teachers to also study the suggested actions under the ***O2. Differentiate assessment*** and ***O4. Record results in ways that facilitate their formative use*** headings in the template action plan. Make sure that teachers understand that the actions listed are suggestions and that they can choose/alter or add as they please. Ask teachers to work on their action plan and revise their actions.



Slide 15
It is important to stress that this training can have positive impact only if they are actively involved in improving their practice even after this program ends.

Administrative information about the next steps (to be adjusted accordingly by each country).

This is the final session of the TPD course. However, teachers are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Make sure to stress your availability despite the end of the sessions and encourage teachers to make contact.

Slide 16
Ask teachers to spend some time to answer questions regarding the TPD course as part of its formative evaluation.

Slide 17
Closing slide. Make sure to thank everyone for their participation and emphasize our appreciation for the effort and time they devote in this professional development program. Ask participant to express any concerns/questions and address the appropriately.

NOTE
Add contact details

CONCLUDING REMARKS

This handbook is addressed to teacher educators interested in supporting teachers to improve their skills in student assessment. It aims to support teacher trainers in the delivery of a TPD program in student assessment which was designed under the FORMAS project. The course has already been implemented in four countries (i.e. Cyprus, Greece, The Netherlands, and Belgium). The handbook included two parts. The first part of the handbook presents the theoretical background based on which the TPD program was developed. The second part of the handbook provides some guidelines with suggestions for the practical implementation of the TPD course in terms of administration and delivery. It is acknowledged that teacher trainers play an important role in the effectiveness of any TPD intervention and thus, we expect that trainers wishing to implement the TPD course will make all necessary adjustments based on their background and expertise to better address the needs of the participating teachers in other countries. We hope that you will find this handbook useful for organizing and delivering your TPD courses. We are also happy to share with you the experiences you may have in teaching this course since we believe that through establishing a network of tutors using the dynamic approach to promote formative assessment can help us to learn from each other and further improve this approach that aims in improving quality and equity in education.

Appendix A: Application Activities

Application Activities for Group A (sessions 2-5)

formas

Application activity – Fostering a positive learning culture (A2a)

1. Work in your groups and suggest ways to foster a positive learning culture in a classroom. Exchange current practices that seem to be effective but also think of new action you can take
2. Write down each suggestion on a post-it and create a "positive learning culture" poster

NOTES

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Developing a "Growth Mindset" in your Students -A2b

1. Study the "Developing a growth mindset" notes below.

- One particularly important factor influencing how students react to feedback is the way that students make sense of successes and failures in school
- When you ask students about the reasons for success or failure – for example, their answers differ in three important ways: ***personalization, stability,*** **and** ***specificity*****.**

Personalization: Students attribute successes and failures to internal factors (how smart they are, how much effort they put in) or external factors that are outside their control (whether their teacher likes them, good or bad luck).

Stability: Students attribute successes and failures to relatively fixed factors, such as being smart, while others attribute successes and failures to transient factors, such as how much or how little effort they put into that particular task.

Specificity: Students differ in the way they generalize from particular examples of successes and failures to other areas of experience. Some students overgeneralize success or failure, so they take success or failure in one aspect of one's life as being indicative of the likely outcomes in completely unrelated areas. In contrast, others consciously limit the meaning of success to only the specific aspects of their experience in which they are successful.

Ideally, students should attribute their success and failures to ***internal*** *(i.e. taking ownership of their learning),* ***instable*** *(i.e. emphasis on effort and potential for improvement)* and ***specific factors*** *(i.e. identifying successes and failures as indication of specific positive/negative learning behaviors).*

2. Work in your groups to examine how different students make sense of successes and failures in mathematics and fill the table provided.

Sample attribution	**Personalization**	**Stability**	**Specificity**
I feel confident in Maths because I am smart			
I can't solve this exercise, I am not good at math			
I can solve all exercises my math teacher assigns because I'm good at math			
I don't understand math because my math teacher this year is not good			
No matter how much I try, I am already very behind. There is no way I am going to catch up.			
I have no worries for this year's Maths, I was a great student last year			
I am not good at math, everyone else can solve the exercises faster than me.			

3. Taking into account the above examples of students, suggest ways to help students develop a growth mindset taking into account the above examples of students

Suggestions

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Developing a "Growth Mindset" in your Students -A2b (Suggested Answers)

4. Study the "Developing a growth mindset" notes below.

- One particularly important factor influencing how students react to feedback is the way that students make sense of successes and failures in school
- When you ask students about the reasons for success or failure – for example, their answers differ in three important ways: ***personalization, stability,*** **and** ***specificity*****.**

Personalization: Students attribute successes and failures to internal factors (how smart they are, how much effort they put in) or external factors that are outside their control (whether their teacher likes them, good or bad luck).

Stability: Students attribute successes and failures to relatively fixed factors, such as being smart, while others attribute successes and failures to transient factors, such as how much or how little effort they put into that particular task.

Specificity: Students differ in the way they generalize from particular examples of successes and failures to other areas of experience. Some students overgeneralize success or failure, so they take success or failure in one aspect of one's life as being indicative of the likely outcomes in completely unrelated areas. In contrast, others consciously limit the meaning of success to only the specific aspects of their experience in which they are successful.

Ideally, students should attribute their success and failures to ***internal*** *(i.e. taking ownership of their learning),* ***instable*** *(i.e. emphasis on effort and potential for improvement)* and ***specific factors*** *(i.e. identifying successes and failures as indication of specific positive/negative learning behaviors).*

5. Work in your groups to examine how different students make sense of successes and failures in mathematics and fill the table provided.

Sample attribution	**Personalization**	**Stability**	**Specificity**
I feel confident in Maths because I am smart	*Internal factors*	*Stable factors*	*Generalization*
I can't solve this exercise, I am not good at math	*Internal factors*	*Stable factors*	*Generalization*
I can solve all exercises my math teacher assigns because I'm good at math	*Internal factors*	*Stable factors*	*Generalization*
I don't understand math because my math teacher this year is not good	*External factors*	*Instable factors*	*Specific*
No matter how much I try, I am already very behind. There is no way I am going to catch up.	*Internal factors*	*Stable factors*	*Generalization*
I have no worries for this year's Maths, I was a great student last year	*Internal factors*	*Stable factors*	*Generalization*
I am not good at math, everyone else can solve the exercises faster than me.	*Internal factors*	*Stable factors*	*Generalization*

6. Taking into account the above examples of students, suggest ways to help students develop a growth mindset taking into account the above examples of students

Suggestions

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Setting ILOs (A3a)

1. Write down two (2) intended learning outcomes (ILOs) for the learning objective "addition and subtraction of polynomials", Grade B.
2. Use the information provided in the slide 9 to evaluate your ILOs and make revisions if necessary

ILO 1

ILO 2

COMMENTS/REVISIONS

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Specification Table (A3b)

1. Study the written test given to you.
2. Then, work in your groups to fill in the specification table. Try to identify which objective each item assesses and at which level. Write down the item's number on the relevant cell.
3. Now look at the completed performance table and compare with yours
4. When you are finished, discuss with your group the questions following.

Content: (Algebraic expressions)	**Knowledge**	**Using Algorithms**	**Problem Solving**	**Total Items**
Monomials (similar, equal, opposite)				
Operations with monomials				
Addition and subtraction of polynomials				
Multiplication of polynomials				
Division of polynomials				
Total Items				

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Specification Table (A3b)

Written Assessment
8th Grade: Algebraic Expressions
Time allowed: 35΄

1. For each one of the next prepositions state wether its correct or wrong. Circle the right statement.

a) The quotient of two monomials is always a monomial. **Correct/Wrong**

b) The monomial $-\frac{1}{3}\alpha b^2$ is of second degree. **Correct/Wrong**

c) The sum of two opposite monomials is zero. **Correct/Wrong**

d) The monomials $4xy$ and $4x^2y^3$ are like. **Correct/Wrong**

e) The relation $(\chi - \psi)(\chi + \psi) = \chi^2 - \psi^2$ is an algebraic identity. **Correct/Wrong**

2. Perform the operations:

a) $\left(+4\alpha^2\right)\cdot\left(-2\alpha\right) =$

b) $(7-\chi^2-5\chi)+(6\chi-\chi^2) =$

c) $3\chi y^2\left(-3\chi+2\chi^2y^3\right) =$

d) $(\kappa-4)(\kappa+1) =$

e) $8\alpha^2b^3 : \left(-16\alpha b^{-4}\right) =$

f) $\left(-12\beta c+6c^2-18c^3\right) : \left(-6c^2\right) =$

3. Expand the polynomial A = $(y-1)^2-(y-3)(y+3)-y(y-2)$**. Give your answer in the simplest form stating also its degree.**

4. Let $\rho(\chi)=\chi+2$ **and** $\varphi(\chi)=2\chi^2+3\chi-2$**. Perform the operations:**

a) $\rho(\chi)-\varphi(\chi)=$

b) $\rho(\chi)\cdot\varphi(\chi)=$

c) $[\rho(\chi)]^2=$

d) $\varphi(-2)=$

e) $\varphi(\chi):\rho(\chi)=$

5. Let the rectangle painting ΕΖΗΘ and its rectangle frame ΑΒΓΔ. The length ΕΖ of the painting is (3χ + 2) cm and its width ΖΗ is (3χ – 2) cm. The frame has a width of 1 cm around the panting.

a) Prove that the area of the frame is (12χ + 4) cm^2.

b) If the area of the frame is 40 cm^2, figure out the value of x.

Co-funded by the Erasmus+ Programme of the European Union

formas

Application activity – Specification Table (A3b)- Suggested Answers

1. Study the written test given to you.
2. Then, work in your groups to fill in the specification table. Try to identify which objective each item assesses and at which level. Write down the item's number on the relevant cell.
3. Now look at the completed performance table and compare with yours
4. When you are finished, discuss with your group the questions following.

Content: (Algebraic expressions)	**Knowledge**	**Using Algorithms**	**Problem Solving**	**Total Items**
Monomials (similar, equal, opposite)	1a, 1b, 1d			**3**
Operations with monomials		1c, 2a, 2e		**3**
Polynomials, addition / subtraction of polynomials		2b, 3, 4a, 4d	5a_1, 5b	**6**
Multiplication of polynomials	1e	2c, 2d, 3, 4b, 4c	5a_2	**7**
Division of polynomials		2f, 4e		**2**
Total Items	**4**	**14**	**3**	**21**

Co-funded by the Erasmus+ Programme of the European Union

Erasmus+

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity –Evaluating the quality of assessment items (A4a)

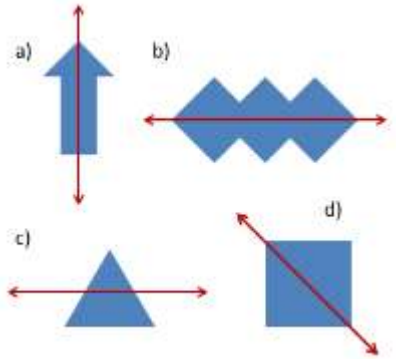
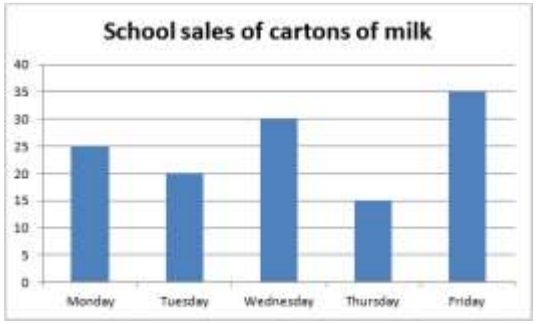
1. Study the item development guidelines given to you. These guidelines provide some "rules of thump" regarding the construction of each type of item.
2. Then, work in your groups to evaluate the assessment items given to you based on the guidelines
3. Are there items that can be improved? If yes, make suggestions

Activity	Your evaluation	Possible suggestions for improvement
1. The elements of the set $A = \{89^\circ, 260^\circ, 125^\circ, 48^\circ, 3^\circ, 182^\circ, 154^\circ, 27^\circ, 300^\circ, 179^\circ\}$ are measures of angles. If I choose randomly an angle in the set A, what is the probability of the events: a) A: the angle is acute b) B: the angle is reflex.		

2. In a survey, 200 persons were asked about the number of movies they have watched at the cinema, during the last month. The results of the survey are given in the next table, where two figures are missing. It is known that 25% of those participated in the survey have watched two movies.

Number of movies	Number of persons
0	30
1	60
2	
3	
4	20
5	10

a) Figure out the missing numbers in the table
b) Construct a bar-chart that depicts the information given by the survey.
c) If a person in the survey is chosen at random what is the probability (as a percentage %):
   i. To have watched exactly 3 movies
   ii. To have watched at least 1 movie
   iii. To have watched at most 3 movies.

3. Which of these do not show a line symmetry?  		
4. The graph shows the number of cartons of milk sold each day of the week at a school.  How many cartons of milk did the school sell that week? a) 115 b) 125 c) 25 d) None of the above		

5. Sofia has paid € 102 for a jacket on 15% sales. The original price of the jacket was: a) €130 b) €110 c) €120 d) €90		

Co-funded by the Erasmus+ Programme of the European Union

Erasmus+

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity –Evaluating the quality of assessment items (A4a)- Suggested Answers

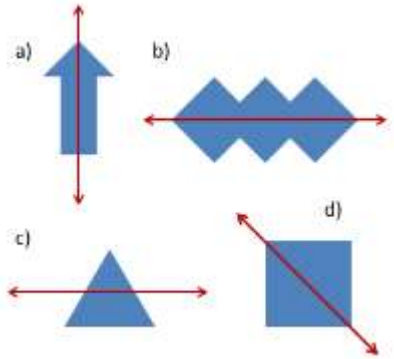
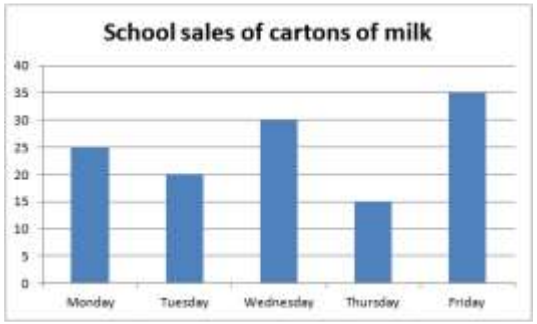
1. Study the item development guidelines given to you. These guidelines provide some "rules of thump" regarding the construction of each type of item.
2. Then, work in your groups to evaluate the assessment items given to you based on the guidelines
3. Are there items that can be improved? If yes, make suggestions

Activity	Your evaluation	Possible suggestions for improvement
1. The elements of the set $A = \{89^\circ, 260^\circ, 125^\circ, 48^\circ, 3^\circ, 182^\circ, 154^\circ, 27^\circ, 300^\circ, 179^\circ\}$ are measures of angles. If I choose randomly an angle in the set A, what is the probability of the events: c) A: the angle is acute d) B: the angle is reflex.	*The intention of the teacher was to evaluate understanding in probability definition. However, failure of the student to give a correct answer might reside on failure to recall definitions of angles (e.g. reflex and convex angles)*	

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>2. In a survey, 200 persons were asked about the number of movies they have watched at the cinema, during the last month. The results of the survey are given in the next table, where two figures are missing. It is known that 25% of those participated in the survey have watched two movies.

<table><tr><th>Number of movies</th><th>Number of persons</th></tr><tr><td>0</td><td>30</td></tr><tr><td>1</td><td>60</td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr><tr><td>4</td><td>20</td></tr><tr><td>5</td><td>10</td></tr></table>
d) Figure out the missing numbers in the table
e) Construct a bar-chart that depicts the information given by the survey.
f) If a person in the survey is chosen at random what is the probability (as a percentage %):
iv. To have watched exactly 3 movies
v. To have watched at least 1 movie
vi. To have watched at most 3 movies.</td><td>Consecutive inter-related questions.

Not clear objective of assessment</td><td></td></tr>
</table>

3. Which of these do not show a line symmetry?  	*Negatively stated question*	
4. The graph shows the number of cartons of milk sold each day of the week at a school.  	*Problem with distractors, it uses "None of the above". If an examinee can eliminate any of the other choices, this choice can be automatically eliminated as well.*	

How many cartons of milk did the school sell that week? a) 115 b) 125 c) 25 d) None of the above		
5. Sofia has paid € 102 for a jacket on 15% sales. The original price of the jacket was: e) €130 f) €110 g) €120 h) €90	*One of the distractors is weak.*	

Erasmus+

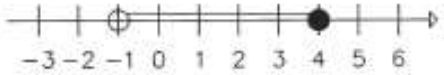
Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity - Multi-dimensional assessment of student achievement (A4b)

1. Study the activities that are given to you. Then work with your teams to evaluate the assessment activities given. Base your evaluation on the multidimensional assessment of student achievement.
2. Are there activities that can be improved? If so, make suggestions.

Assessment Activity	How do you evaluate it?	Improvement suggestions
1. Match the next graph to one of the given inequalities.  *a)* $-1 \leq x < 4$ *b)* $-1 \leq x \leq 4$ *c)* $-1 < x < 4$ *d)* $-1 < x \leq 4$		
2. Next is the solution of George to the equation: $3x + 12 = 5x - 4$ $3x + 12 = 5x - 4$ (Step 1) $\Rightarrow -2x = -16$ (Step 2) $\Rightarrow x = 8$ i. Is George's answer correct? ii. Which properties has George applied in each step of the solution?		

3. Answer the next questions: i. What is 15% of 20? ii. What percentage of 20 is 16? iii. I bought a TV for €250 at sales with 30% discount. What is the regular price of the TV?		
4. The area of a rectangle is $14{,}4cm^2$. If its length is multiplied by 4 and its width is reduced to a half, the rectangles area would be: i. $7{,}2\ cm^2$ ii. $14{,}4\ cm^2$ iii. $28.8\ cm^2$ iv. $57{,}6\ cm^2$		
5. State a problem the solution of which is given by the equation $3x + 12 = 5x$		
6. Use the next table to solve the equation $2x - 6 = 5x + 3$		

x	6-2x	4x
-2	10	-8
-1	8	-4
0	6	0
1	4	4
2	2	8
3	0	12

Erasmus+

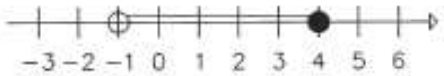
Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity - Multi-dimensional assessment of student achievement (A4b)- Suggested Answers

1. Study the activities that are given to you. Then work with your teams to evaluate the assessment activities given. Base your evaluation on the multidimensional assessment of student achievement.
2. Are there activities that can be improved? If so, make suggestions.

Assessment Activity	How do you evaluate it?	Improvement suggestions
1. Match the next graph to one of the given inequalities.  *e)* $-1 \leq x < 4$ *f)* $-1 \leq x \leq 4$ *g)* $-1 < x < 4$ *h)* $-1 < x \leq 4$	The activity assesses: i. Understanding of properties ii. Using and translating among representations	

2. Next is the solution of George to the equation: $3x + 12 = 5x - 4$ $3x + 12 = 5x - 4$ (Step 1) $\Longrightarrow -2x = -16$ (Step 2) $\Longrightarrow x = 8$ iii. Is George's answer correct? iv. Which properties has George applied in each step of the solution?	The activity assesses: i. Skills in mathematical procedures involved in the solution of linear equations. ii. Understanding of properties of equities	
3. Answer the next questions: iv. What is 15% of 20? v. What percentage of 20 is 16? vi. I bought a TV for €250 at sales with 30% discount. What is the regular price of the TV?	The activity assesses: i. Skills in procedures involved in deducing the percentage of a number. ii. Understanding properties of proportions iii. Using concepts to solve real world problems	
4. The area of a rectangle is $14{,}4cm^2$. If its length is multiplied by 4 and its width is reduced to a half, the rectangles area would be: v. $7{,}2\ cm^2$ vi. $14{,}4\ cm^2$ vii. $28.8\ cm^2$ viii. $57{,}6\ cm^2$	The activity assesses: i. Understanding of properties of quadrilaterals ii. Skills in numerical procedures iii. Application of concepts to solve problems	
5. State a problem the solution of which is given by the equation $3x + 12 = 5x$	The activity assesses: i. Application of concepts to model and solve problems	

6. Use the next table to solve the equation $2x - 6 = 5x + 3$ x | 6-2x | 4x -2 | 10 | -8 -1 | 8 | -4 0 | 6 | 0 1 | 4 | 4 2 | 2 | 8 3 | 0 | 12	The activity assesses: i. Using and translating among representations	

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Assessing Homework (A5)

Case Study

After teaching an introductory lesson on factorisation and particularly the first two paragraphs of Unit 2 (book 2), i.e. introduction to factorisation and finding common factors and factorisation by grouping, four different teachers assign the next homework:

Teacher 1:
- For homework answer all the exercises (1 to 8) in your book at pages 35 & 36.

Teacher 2:
- For homework answer all odd items of exercises 1 to 8, at pages 35 & 36.

Teacher 3:
- For homework make a small project describing different methods of factorisation

Teacher 4:
- For homework do the exercises on the given worksheet (below)

$x^2 - 5x$	$3x - 12$	$2x^2 + 12x$
$x^2 + 3x$	$4x^3 + 4x$	$6a^2b - 2ab^2$
$8ax - 56a$	$x^3 - 2x^2$	$3x^2 - 12x$
$x^2 + 12x + 36$	$x^2 - 18x + 8$	$96x^3 - 84x^2 + 112x - 98$

1. In the case study above, four different math teachers assign homework tasks for the Unit "Methods of factorisation: Common factor grouping"
2. Discuss in your group:

- *what purpose do they serve?*
- *what is their contribution to learning?*
- *do you believe that these tasks promote deeper learning?*

3. Can you suggest alternative tasks? Take into account the constructive homework guidelines given to you

Alternative tasks

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Constructive Homework Guidelines

Students can benefit from doing schoolwork outside of class, both in terms of achievement gains and in developing independence, responsibility, organizational and time management skills, and good study habits. To achieve a positive impact on student learning, homework assignments must be well-designed and carefully constructed.

Constructive homework:

- ✓ Is clearly related to class work (and therefore the curriculum);
- ✓ Students know the learning intention of the assignment and how it can support them in achieving the learning aims set;
- ✓ Provides clear instructions for students;
- ✓ Students are aware of the standard of quality expected;
- ✓ Can be completed successfully;
- ✓ Can be completed in a reasonable amount of time according to grade, age and ability;
- ✓ Is varied and differentiated to individual learning needs;
- ✓ Is a combination of both short-term and long-term homework;
- ✓ Provides a variety of assignments with different levels of accountability;
- ✓ Uses information and materials that are readily available;
- ✓ Reinforces and allows practice of previously taught skills;
- ✓ Is not just unfinished class work;
- ✓ Is interesting to students and lead to further exploration and study;
- ✓ Stimulates creativity and imagination in the application of skills;
- ✓ Encourages students to work independently;
- ✓ Stimulates home and class discussion;
- ✓ Gives students the sense that they are making progress;
- ✓ Is supported by the explicit teaching of the dispositions and skills associated with being able to learn independently;
- ✓ Is disassociated from any form of punishing students or a means of discipline.

Application Activities for Group B (sessions 2-5)

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity- Collecting information (B2a)

INFORMAL

FORMAL

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Application activity – Using different types of assessment techniques (B2b)

1. Below you can see 3 different learning objectives. Work in your groups to develop activities to assess each objective. For each objective the use of specific techniques is requested.

Learning Objective	Written Assessment	Oral Assessment	Performance Assessment
Solve problems involving proportions and inverse proportions, and percentages (e.g. interest, taxes, profit and loss, etc).			

Perform operations with monomials and polynomials, prove algebraically and geometrically algebraic identities			
Recognize and construct basic quadrilaterals (parallelogram, rectangle, rhombus, square, trapezium), prove and apply their properties in solving problems.			

Co-funded by the Erasmus+ Programme of the European Union

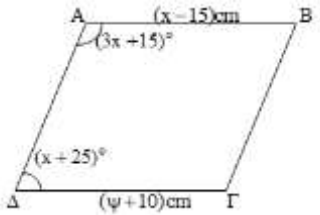
This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Using different types of assessment techniques (B2b)- Suggested answers

2. Below you can see 3 different learning objectives. Work in your groups to develop activities to assess each objective. For each objective the use of specific techniques is requested.

Learning Objective	Written Assessment	Oral Assessment	Performance Assessment
Solve problems involving proportions and inverse proportions, and percentages (e.g. interest, taxes, profit and loss, etc).	Red Cross donate €6000 to 4 refugee families. The first family was given. 30% of this amount was donated to the first of the families. The rest of the money was split to the other three families according to the number of children each family has. The first one has 5 children, the second has 3 and the third 2. What money each family got?	1. Give us the relation (algebraic – symbolic) between two proportional and two inverse proportional variables. 2. Give us an example of two proportional (inverse proportional) variables. 3. Variables x and y are in the relation $y = 3x$. Are the two variables proportional or inverse proportional? What the constant 3 stands for in the relation of x and y?	

Perform operations with monomials and polynomials, prove algebraically and geometrically algebraic identities		1. When two monomials are multiplied describe how you're dealing with their coefficient, as well as, with their variables and indices? 2. Which property is applied when a trinomial is multiplied by a monomial?	Construct appropriate quadrilaterals to prove the identity $(a-b)(a+b)=a^2-b^2$
Recognize and construct basic quadrilaterals (parallelogram, rectangle, rhombus, square, trapezium), prove and apply their properties in solving problems.	The next quadrilateral is a parallelogram. Find out the values of x and y.  		1. Use a ruler and a compass to construct a quadrilateral.

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Applying criteria for assessment (B3a)

1. Study the assessment task and the assessment criteria below

Assessment task

Peter and Sam are wage labours. Peter earns €2/h more than Sam. When Sam works for 5h and Peter 7h, Sam earns €26 less than Peter. Find the hourly wage for each one of them.

Assessment criteria

1. Correct use of an unknown variable
2. Breakdown of the problem to meaningful algebraic expressions
3. Model formulation by means of an equation representing the problem using the elicited algebraic expressions.
4. Correct solution of the algebraic equation

2. Then, work individually to apply these criteria to evaluate a sample student's response to the task

Sample Response

Let x be the hourly wage of Sam.
Then, the hourly wage of Peter is x+2
Then, $5x + 26 = 7(x + 2) \Rightarrow 5x + 26 = 7x + 14 \Rightarrow 5x - 7x = 14 - 26 \Rightarrow -2x = -12 \Rightarrow x = \frac{1}{6}$

3. Discuss in your groups:

- *Did the criteria given help you evaluate the students' response?*
- *Did you use any other criteria not mentioned?*
- *Could a student apply these criteria to evaluate his/her own work?*

NOTES

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Application activity – Applying criteria for assessment (B3a)- Suggested Answers

Sample answers:

1. The student has correctly passed success criteria 1 -3.
2. The reached answer for x is incorrect and quite unreasonable.
3. The student failed to check the validity of the answer he/she reached.
4. The student is not connecting the solution provided back to the problem and its constituents as she/he fails to answer on the hourly wages of both workers.

Additional Criteria:

1. The student is able to check that the solution is reasonable with the given information.

2. There is evidence that the student understands the meaning of the solution, what is representing and what are other values described in the problem which are connected to the answer.

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

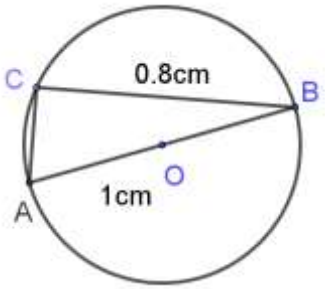
formas

Application activity – Formulating success criteria (B3b)

1. Study the assessment task below

Assessment task

Point C lies on a circle of diameter AB=1cm as in the figure below. Find the length of the chord AC.



2. Then, work individually to formulate assessment success criteria for this task

Success criteria

3. Share your criteria with the group. Have you all formulated the same criteria?

4. Are there ways to improve your criteria?

NOTES

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Designing a rubric (B4)

1. In your groups work to design a rubric for each of the two (2) objectives given to you.
2. What kind of rubric is more appropriate for each objective (i.e. holistic or analytical?)

➢ *Have in mind that rubrics refer to the learning objective and can be used to record the results of any kind of exercise assessing the particular objective.*

Learning Objective 1:

Expand the expressions:

(a) $(x-3)^2 =$

(b) $(2a-3)(2a+3) =$

Learning Objective 2:

ABCD is a parallelogram where E is the midpoint of CD and $AE \perp CD$. AE is extended towards E and intersects the extension of BC towards C at Z. Prove that the quadrilateral ACZD is a rhombus.

Rubric for Learning Objective 1

Rubric for Learning Objective 2

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Application activity – Types of feedback (B5)

1. The 6 scenarios below describe the way that six different mathematics teachers provide feedback to a student about his/her performance on a task.

Feedback Scenario A

Teacher:
- Expand the expression $(3x-2)(3x+2)$

Student:
- $(3x-2)(3x+2) = 9x^2 + 6x - 6x - 4 = 9x^2 - 4$

Teacher's feedback:
- Correct, but this is not what I was expecting from you to do

Feedback Scenario B

Teacher:
- Expand the expression $(3x-2)(3x+2)$

Student:
- $(3x-2)(3x+2) = 9x^2 + 6x - 6x - 4 = 9x^2 - 4$

Teacher's feedback:
- Wrong! You are not applying what you were taught

Feedback Scenario C

Teacher:
- Describe how to draw two perpendicular lines

Student:

- I take my "30-60" right-angle triangle' and I draw a line. Then I place the 30-60 right angle triangle in such a way as to have a right angle between the triangle and the line drawn. I draw the perpendicular line formed between the triangle and the line

Teacher:

- O.k., can you recall what is the measure of a right angle?

Student:

- Yes, 90^0.

Teacher:

- Very good, that correct. Can you explain us how you confirm that the way you placed the triangle forms an angle of exactly 90^0 between the line and one of the sides of the triangle you placed?

Teacher waits for a few seconds …..

- Is there an angle on the "30-60" right-angle triangle which is exactly 90^0? Show it to me.

Student:

- Yes, it is this one here.

Teacher:

- Show me the sides of the triangle which contain the right angle.

Student: (he/she shows the sides)

Teacher:

- Are these sides perpendicular?

Student:

- Yes.

Teacher:

- Very good. So, is there a way you can place the right-angle triangle on the line you have drawn to form a 90^0 angle on a given point on that line?

Feedback Scenario D

Teacher:

- Describe how to draw two perpendicular lines

Student:

- I take my "30-60" right angle triangle and I draw a line. Then I place the 30-60 right angle triangle in such a way as to have a right angle between the triangle and the line drawn. I draw the perpendicular line formed between the triangle and the line

Teacher:

- Wrong! Does any other student want to try?

Feedback Scenario E

Teacher:

- Expand the expression $(3x-2)(3x+2)$

Student:

- $(3x-2)(3x+2) = 9x^2 + 6x - 6x - 4 = 9x^2 - 4$

Teacher's feedback:

- Correct! However can you reach the same answer applying a special case of factorisation you were taught?

Feedback Scenario F

Teacher: (to the class)

- Take your "30-60" right-angle triangle and draw two perpendicular lines.

Teacher: (after a couple of minutes)

- Raise up your exercise book and show me your sketches.

Teacher: (very pleased. Almost all the class has drawn 'perpendicular' lines.)

2. After reading these scenarios, discuss in your group:

✓ *Do you identify differences/similarities in the ways feedback was given in the above scenarios*

✓ *If you were the student, which feedback would be more useful?*

NOTES

Application Activities for Group C (sessions 2-5)

Co-funded by the Erasmus+ Programme of the European Union

formas

Application activity – Setting ground rules for assessing peers' work (C2a)

Before introducing a peer assessment activity you need to set negotiated ground rules for assessing peers' work. For example, assessment should relate only to success criteria.

- Discuss in your group and make suggesting of other ground rules that might be needed.

Ground rules for assessing peers' work

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Application activity – Fostering culture that accepts differentiation in assessment (C2b)

1. Work in groups and suggest ways to foster a culture in a classroom that acknowledges students' diversity and accepts differentiation practices. Exchange current practices that seem to be effective but also think of new actions you can take
2. Write down each suggestion on a post-it and create a poster outlining the characteristics of a classroom culture that fosters differentiation practices

NOTES

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Application activity – Assessing Group Work (C3a)

1. Work individually to complete the table below to illustrate how you would organize a group work to assess the set objective. The table refers to the main decisions that need to be taken when assigning a task to a group.
2. Then, in your group discuss your decisions. Explain your decisions to the group and exchange feedback.
3. Based on the group discussion, would you change any of your decisions? Why?

Calculating the volume of figures

Group Composition	**Group Organization**	**Activities**	**Assessment**
Number of members: ☐	➢ role assignment by the teacher ☐ ➢ role assignment by the team ☐ ➢ no role assignment ☐	Suggestions for activities that could be used:	➢ individual ☐ ➢ team ☐
• Homogenious Ability grouping ☐ • Heterogeneous Ability Grouping ☐	➢ fixed timetable / schedule ☐ ➢ flexible timetable / schedule ☐		Assessment concerning ➢ team contribution ☐ ➢ the result ☐ ➢ The degree of cooperation ☐
➢ Only boys ☐ ➢ Only girls ☐ ➢ Both boys and girls ☐	➢ only group work ☐ ➢ combination of group / individual work ☐		Assessment technique(s): …… ……... …… …….

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Evaluating group work through a peer-assessment rubric (C3b)

1. Study the peer-assessment rubric presented below. This rubric is designed to help students evaluate their peers during group work.

2. Work in your groups to evaluate the rubric provided based on your experience and the information provided during the last 3 sessions. Look into:

- criteria included
- the level description for each criterion

Criterion	Needs improvement	Average/Acceptable	Excellent
1. Individual participation within the group	Rarely or never contributed to the group task	Contributed to the group task most of the time	Always contributed to the group task
2. Respectful behavior towards other group members	Rarely or never encouraged or supported the ideas of others	Most of the time encouraged or supported the ideas of others	Always encouraged or supported the ideas of others
3. Sharing of ideas and information	Rarely or never offered the ideas/or findings to the group	Most of the time offered the ideas/or findings to the group	Always offered the ideas/or findings to the group
4. Cooperation and helping others	Rarely or never offered to help other group members	Most of the time offered to help other group members	Always offered to help other group members
5. Organizing data and final task	Was disorganized and offered little to completing the final task	Worked in partnership with others to organize material and the final task	Leads the group in organizing the information and production of the final task

3. Would you suggest any changes/ improvements?

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – The slow pace student scenario (C4a)

Case study

After teaching a series of lessons on algebraic expressions, a teacher administers a written test consisting of 15 exercises to assess whether students have managed to achieve the learning objectives set. All students had 40 minutes to complete the test. When he later recorded the results of the tests, he noticed that a student had completed all exercises besides the last 3. The particular student had been showing a slow pace in completing activities before.

1. Study the case study above.
2. Then discuss in your groups:

- What assessment information has the teacher collected regarding the student's performance?
- How do you comment the teacher's actions during assessment administration in relation to the particular student?
- Would you suggest a different approach? Why?

NOTES

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application Activity-Responding to students' questions during assessment administration (C4b)

The 4 scenarios below describe questions/queries of 4 different students during the administration of a written exercise for formative purposes.

Student A
Is this exercise like the one we did yesterday?

Student B
I have not understood the instructions of the exercise. It is not clear to me what I am supposed to do

Student C
Do I need to find the least common factor to solve this exercise?

Student D
The answer here is 7, right?

Discuss in your groups:

- How should I respond to each student's question/query?
- If these comments are common responses of the particular students, are there any actions I need to take?

NOTES

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Recording results in ways that facilitate their formative use (C5a)

1. Study the two activities given to you. Then in your group:

✓ Identify assessment criteria for each activity

✓ Place each criterion on the specification table provided

✓ Create a record sheet to show how you would record assessment data elicited form the administration of each exercise

Activity 1

The length of the three sides of a triangle ABC are as follows:

$AB = 2 \cdot \sqrt[3]{2x} \cdot \sqrt[3]{4x^{-1}}$ cm , $B\Gamma = \dfrac{\sqrt{5x\sqrt{25}}}{\sqrt{x}}$ cm , $A\Gamma = \dfrac{\left(3^5 \cdot \sqrt{x}\right)^2}{3^9 \cdot x}$ cm

Prove that the ABC is a right-angle triangle and identify the right angle.

Assessment criteria

Activity 2

ABC is an isosceles triangle (AB=AC) where M is at the middle of BC. The sides AB and AC are extended so that BD=CE. Prove that MD=ME.

Assessment criteria

Specification Table

Objectives	KNOWLEDGE	ALGORITHMIC THINKING	PROBLEM SOLVING
1.			
2.			

Assessment Record Sheet

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Recording results in ways that facilitate their formative use (C5a) - Suggested Answers

2. Study the two activities given to you. Then in your group:
- ✓ Identify assessment criteria for each activity
- ✓ Place each criterion on the specification table provided
- ✓ Create a record sheet to show how you would record assessment data elicited form the administration of each exercise

Activity 1

The length of the three sides of a triangle ABC are as follows:

$AB = 2 \cdot \sqrt[3]{2x} \cdot \sqrt[3]{4x^{-1}}$ cm , $B\Gamma = \dfrac{\sqrt{5x\sqrt{25}}}{\sqrt{x}}$ cm , $A\Gamma = \dfrac{\left(3^5 \cdot \sqrt{x}\right)^2}{3^9 \cdot x}$ cm

Prove that the ABC is a right-angle triangle and identify the right angle.

Assessment criteria

1. Operations with indices
2. Operations with square roots
3. Application of Pythagoras theorem

Activity 2

ABC is an isosceles triangle (AB=AC) where M is at the middle of BC. The sides AB and AC are extended so that BD=CE. Prove that MD=ME.

Assessment criteria

1. Criteria of congruent triangles
2. Complementary angles – angles in a line

Specification Table

Objectives	KNOWLEDGE	ALGORITHMIC THINKING	PROBLEM SOLVING
3.			
4.			

Assessment Record Sheet

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Recording results in ways that facilitate their formative use (C5b)

1. The record sheet given to you presents the performance of 15 students (a mathematics classroom) in a specific assessment activity.
2. In your groups:

- Study the assessment activity and the results of students.
- What information does data recording give to us?
- If you were teaching in this class what would have been you next step? Why?

Assessment Record Sheet

Assessment Activity:
The solution of the equation $(x-3)(x-4)=2$ is:

A (3,4) B (5,6) C (5,2) D (5, -2)

Student ID	Record	Student ID	Record
101	**C**	**109**	**D**
102	**B**	**110**	**B**
103	**A**	**111**	**B**
104	**B**	**112**	**A**
105	**B**	**113**	**C**
106	**C**	**114**	**B**
107	**B**	**115**	**B**
108	**B**		

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application Activity-Responding to students questions during assessment administration(C5c)

The 4 scenarios below (discussed already in session 4) describe questions/queries of 4 different students during the administration of a written assessment for formative purposes.

Student A
Is exercise 2 like the one we did yesterday?

Student B
I have not understood the instructions of exercise 3. It is not clear to me what I am supposed to do

Student C
Do I need to find the least common factor to solve exercise 4?

Student D
The answer here is 7, right?

NOTES

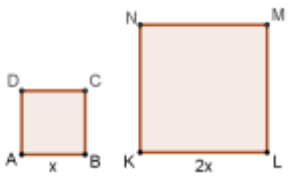
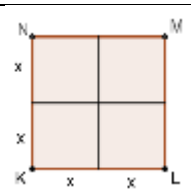
Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Recording assessment and differentiation (C5d)

Below you can see the records kept for the performance of students A, B and C on 3 assessment tasks administered during a mathematics lesson. The aim of the tasks was to assess whether students were able to express one quantity as a percentage of another

Learning Objective	Assessment task 1	Assessment task 2	Assessment task 3
Students learn how to express one quantity as a percentage of another in different settings.	Express 340g as a percentage of 2kg	Find the percentage increase of the volume of a square when its side is doubled 	Anna went shopping. She spent €70 of her money on a dress and 20% of the remainder on a shirt. She still had $\frac{2}{3}$ of her money left. How much did she have before began spending?
Student A	$\frac{350}{2000} = \frac{x}{100} \Rightarrow$ $x = \frac{350 \cdot 100}{2000} \Rightarrow$ $x = 17.5\%$	 $\frac{3}{1} = \frac{a}{100} \Rightarrow a = 300\%$	…..
Student B	$x = \frac{350}{2000} \cdot 100\%$ $= 17.5\%$	…..	…..
Student C	$x = \frac{350}{2000} \cdot 100\%$ $= 17.5\%$	$\frac{4x^2 - x^2}{x^2} \cdot 100\%$ $= 300\%$	…..

Note: ….. means the student did not manage to solve the exercise correctly

1. Discuss in your groups:

- What assessment information has the teacher collected regarding each student's performance? How do you interpret these results?

Now, study below the profiles of the three students:

Student A is an immigrant. She came in the country 2 months ago and does not speak the language. She is very competent in calculations involving mathematics.	**Student B** is a student who struggles with maths. She finds it difficult to put new knowledge into context. She tries reciting formulas and other material taught in class, but she can't reach a strategy to apply them effectively to solve exercises or problems. She is frustrated and afraid of disappointing her parents' expectations on her.	**Student C** is a student with learning difficulties. He finds it difficult to comprehend written instructions/content but is very competent in problem solving when the instructions are given orally

2. Do you believe that students' profiles provide any additional information which can help us interpret their performance on the three tasks?

Student A Student B Student C

3. How would adjust your instruction to address the needs of each student?

Student A

Student B

Student C

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Application activity – Recording assessment and differentiation (C5d) - Suggested Answers

Suggested Answers:

1. All students were able to solve correctly the first task but for different reasons.
   a) For the first student: The task is stated in mathematics symbolic form which is very easy for a foreigner, who is good in mathematics but don't know the language, to combat it recalling methods taught in his/her native school.
   b) For the second student: The task is a straight application of similar tasks introduced by the teacher during the lesson.
   c) For the third student: The task's directions are simple and are embedded in the symbolic representation of the task. No comprehension difficulties.
2. The second task was feasible for the first student as he/she could elicit the necessary information from the graph provided and not the wording of the task. The same stands for the third student since the wording of the task is simple. The second student failed on this task as she/he is not able to transfer and use her/his knowledge in unknown contexts.
3. The third task involves extending wording. The first student failed due to language deficiencies. The second one failed because the task involves a problem-solving strategy. The third student was unable to follow the instructions described in the extended wording of the problem.

Appendix B: Action Plans

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Action Plan for Improvement – Group A

Name:	**School Year:** **2019-2020**	**Area of actions:** **FOCUS AREA A**

Objective(s):

1. Create a culture that can foster formative assessment
2. Ensure the representativeness of written assessment
3. Improve the content validity of assessment by creating a specification table
4. Improve the internal validity of assessment by developing different types of assessment items: the internal validity
5. Assess homework for formative purposes

LIST OF SUGGESTED ACTIONS

O1. Create a culture that can foster formative assessment

- I acknowledge effort, progress, interest not just correct answers
- I recognize mistakes and difficulties as opportunities for learning
- I emphasize the importance and create opportunities for students to ask questions/ clarifications in relation to content taught
- I emphasize the role of assessment in learning, to help them move away from the negative meaning of assessment (assessment=ranking, high stakes tests, grades)
- I make sure that students can identify the learning objectives of each lesson (e.g. share them in writing or orally at the beginning/end of the lesson, ask them to identify them themselves etc.)
- I ask students to identify the learning objective addressed in each activity/set of activities
- I give both written and oral feedback
- I give immediate feedback when possible giving students the opportunity for corrective actions
- My feedback includes specific steps the student can take to improve
- My feedback addresses the behavior not the person
- I do not make comparisons between students
- I allow time for therapeutic work after assessment
- Other?

O2. Ensure the representativeness of written assessment

- I set quality intended learning outcomes (ILOs) in each lesson (no more than 3 in each lesson)

- I share learning objectives with my students
- Although my ILOs are planned in advance, I take account of pupils' learning within the lesson and adjust accordingly
- I align assessment tasks to learning objectives set
- In each lesson, I introduce a short assessment activity for each learning objective.
- I use the results of assessments to adjust my teaching
- I create my own assessment tasks. If this is not possible, I adjust ready-made tasks to my teaching and my students
- Other?

O3. Improve the content validity of assessment by creating a specification table

- I create a specification table for all planned assessments of a series of lessons/ a unit.
- I write down notes regarding the emphasis given to each objective during instruction and make use of it when planning assessment
- If possible, I try to address different levels of knowledge in each assessment (i.e. knowledge, use of algorithms, problem solving)
- I try to have at least 2 items evaluating the same level of an objective (i.e. at least 2 items in each cell used)
- Other?

O4. Improve the internal validity of assessment by developing different types of assessment items: the internal validity

- When designing or selecting an assessment task I consider the quality criteria of the specific type of task (i.e. item construction guidelines).
- I try to use different types of assessment items when I assess students
- I make sure that my assessment tasks are not related to each other (i.e. results from one exercise are needed to solve a subsequent exercise)
- I include activities that assess both the outcome of a task and the process used to reach the outcome.
- I take into consideration students' common misconceptions when designing assessment tasks
- I adjust the level of difficulty of assessment tasks to my students' needs.
- I use appropriate vocabulary and language
- I give specific and comprehendible instructions
- I consider the results of assessments to judge the quality of the questions / activities I have used
- Other?

O5. Assess homework for formative purposes

- I discuss with students why homework is important and what it is designed to do in order to help students be more motivated to complete it
- I have a specific purpose in mind for each student/group of students when assigning homework tasks
- I align instruction with assessment tasks (in terms of content and level of attainment)
- I systematically evaluate homework given
- I provide feedback for homework tasks
- I demonstrate how a task is done if the task is new and unfamiliar
- I make sure that all students are aware of the homework tasks assigned
- I assign tasks that students can complete independently without help and without resources that might not be available at home

- I adjust homework workload
- Other?

Time-frame	**Resources**

Reflection/Self-Assessment

I keep a reflective journal and/or portfolio in which I record comments/observations/samples regarding:

- *the culture of the classroom,*
- *the process of creating a specification table,*
- *copies of specification tables created,*
- *the quality of the questions / activities I have constructed,*
- *the item writing experience and difficulties I might have faced,*
- *my consistency in assessing of homework*
- *homework tasks assigned,*
- *comments of students on homework tasks*

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Action Plan for Improvement – Group B

Name:	**School Year:** **2019-2020**	**Area of actions:** **FOCUS AREA B**

Objective(s):

4. Use different types of assessment techniques in an efficient and systematic way (i.e. written/ oral/ performance) and keeping records
5. Formulate assessment success criteria and designing assessment checklists/rubrics
6. Involve students in the process of assessment
7. Provide constructive feedback to students

LIST OF SUGGESTED ACTIONS

O1. Use different types of assessment techniques in an efficient and systematic way (i.e. written/ oral/ performance) and keep records

- I check and take notes on which objectives can be evaluated with more than one technique during the planning/construction phase of assessment.
- When possible, I use more than one technique to evaluate my objectives
- I consider the following criteria when I have to decide which is/are the most appropriate technique(s) to be used:
  - ✓ The learning objectives
  - ✓ The type of assessment (individual/group)
  - ✓ My students' learning needs
  - ✓ The type of information I want to collect
- I compare results from different techniques to reach conclusions on my students' learning needs
- I try to record results for all assessment techniques used (not all tasks)
- I choose an appropriate type of recording for each technique
- Other?

Oral assessment

- I identify which of my objectives can be examined through oral assessment
- I include oral assessment tasks in my instruction
- I use both planned oral assessment (not only informal)
- I construct tasks appropriate for oral assessment

- I use both process and product questions
- My questions are clear, specific and with an appropriate level of difficulty
- I use clarifying questions to support learning
- I give feedback to students' oral responses (either correct or not) or invite other students to do so
- Other?

Performance assessment

- I identify which of my objectives can be examined through performance assessment
- I include performance assessment tasks in my instruction
- I use performance tasks to assess both the outcome of task and the process used to reach the outcome.
- I identify assessment criteria for performance assessment tasks (alone or with students)
- I systematically observe how students deliver a performance task
- Other?

O2. Formulate assessment success criteria and design assessment checklists/rubrics

- I generate assessment criteria for my assessment tasks (alone or with the help of students)
- I share assessment criteria with students before the task
- My criteria are measurable
- My criteria are clear descriptions of the learning performance that students will evidence when they have met the objective
- I develop criteria for both product and process(es) to be used
- I evaluate the quality of criteria based on how effectively students apply them
- I make use of checklists/rubrics when possible
- Other?

O3. Involve students in the process of assessment

- I present students the process that I follow to assess a task
- I share assessment criteria with my students
- I involve student in the formulation of assessment criteria
- I present completed activities/exemplars of differentiated quality and ask students to evaluated them based on specific criteria
- I display activities at different stages to help students identify how an activity is evolving
- I use activities' samples from previous years, or I create your own based on the criteria you want them to apply.
- I ask student to use assessment criteria to identify which steps they need to take to improve their learning
- Other?

O4. Provide constructive feedback to students

- I explain students the purpose of my feedback (to help them learn)
- I emphasize the importance and create opportunities for students to ask questions/ clarifications in relation to content taught
- I give feedback to all student responses not just the mistaken ones
- I connect feedback with the learning objectives of the lesson
- My feedback includes suggestion/steps that the student can take to improve
- I give both written and oral feedback
- I give immediate feedback when possible giving students the opportunity for corrective actions

- My feedback addresses the behavior not the person
- I express feedback in ways that students can comprehend it
- I use precise mathematical language to provide feedback
- I allow multiple solutions when appropriate
- Other?

Time-frame	**Resources**

Reflection/Self-Assessment

I keep a reflective journal and/or portfolio in which I record comments/observations/samples regarding:

- the ways used to provide feedback to students
- examples of constructive feedback provided
- students' responses to feedback
- the use of the various evaluation techniques
- the alignment of results from different techniques,
- the quality of the questions / activities I have used,
- the item writing experience and difficulties I might have faced,
- examples of assessment criteria formulated
- examples of exemplars used
- how student apply the assessment criteria formulated etc.
- examples of checklists/rubrics developed/used

Co-funded by the Erasmus+ Programme of the European Union

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

formas

Action Plan for Improvement – Group C

Name:	School Year: 2019-2020	Area of actions: FOCUS AREA C

Objective(s):

8. Introduce peer and self- assessment – Using different types of self-assessment activities
9. Differentiate assessment
10. Assess group work
11. Record results in ways that facilitate their formative use

LIST OF SUGGESTED ACTIONS

O1. **Introduce peer and self- assessment –Using different types of self-assessment activities**

- I make sure that my students feel safe to make mistakes and acknowledge difficulties
- I explain students the purpose of peer and self-assessment
- I introduce peer assessment opportunities before asking students to self-assess
- I set specific assessment criteria (with students)
- I provide assessment checklists/rubrics to support peer /self -assessment
- I set ground rules for peer/self -assessment (with students)
- I start by applying the easier criteria and then I gradually move to the more difficult ones
- I create opportunities for students to improve based on their peers' feedback
- Other?

O2. Differentiate assessment

- When constructing an assessment, I take into account the abilities of my students and differentiated when needed in regard to:
  - ✓ objectives
  - ✓ assessment technique used
  - ✓ type of assessment tasks (e.g. by giving into consideration their language skills)
  - ✓ content of assessment tasks
  - ✓ difficulty level of assessment tasks
  - ✓ number of assessment tasks
- I adjust assessment administration in relation to:

- ✓ The duration (e.g. More time for students who work too slow or have learning disabilities.
- ✓ The instructions (e.g. Depending on the student, the instructions may be oral or in a simpler form).

- When I report results to students/other stakeholders the results of an assessment I use language that they can comprehend and give them the opportunity to express their views about the results
- I expand the focus of my records by recording extra information relevant to specific students/groups of students
- When necessary I use records to monitor a student's progress in other aspects (besides the ILOs taught) that may hinder student learning
- I check for any source of bias in my assessment regarding specific groups of students (e.g. gender, SES, ethnicity)

O3. Assess group work

- I define specific goals that I want to evaluate through group work.
- I create assessment tasks that are appropriate for group work
- I take decisions about group formation before assigning a group task.
- I form different groups based on the objectives set (e.g. ability grouping Vs mixed ability grouping)
- I define specific and measurable criteria on which teamwork will be judged.
- I evaluate the contribution of each student to the group and the procedures followed by each member of the group
- I put emphasis on the procedures followed in a group task
- I hold individual members accountable
- I observe while the group is working and provide constructive feedback on both the performance in relation to the task and how the group operates
- I use assessment rubrics when possible. If a rubric is used, I shared it with students beforehand
- I use peer assessment when possible
- **Other?**

O4. Record results in ways that facilitate their formative use

- Through recording I collect information on:
  - ✓ the extent to which the objective set have been achieved (per student / class as a whole)
  - ✓ the appropriateness of the objectives set
  - ✓ the suitability of the exercises / activities used
  - ✓ the suitability of the tool used
  - ✓ specific weaknesses that emerged (per pupil / class)
  - ✓ the progress made by each student in relation to past assessments
  - ✓ the agreement or inconsistency of results with results obtained from other assessment techniques.
- My records clearly present all the objectives assessed
- I record the results for each student per objective
- My records are in the form of specific comments about weaknesses that have been identified.
- The format of my record keeping is designed in a way that can be easily completed
- The format of my record keeping is designed in a way that can be easily used for reporting purposes
- I address missing data when necessary

- I try to record results for all assessment techniques used (not all tasks)
- I choose an appropriate type of recording for each technique
- I try to use holistic and/or analytic rubrics to assess some of my objectives
- Other?

Time-frame	**Resources**

Reflection/Self-Assessment

I keep a reflective journal and/or portfolio in which I record comments/observations/samples regarding:

- record sheets I created
- how results were recorded,
- how the results were used to help students' learning,
- rubrics or checklists I created or adjusted,
- peer or self- assessment activities
- group assessment tasks,
- group formation
- records of group assessment
- aspects of differentiation
- reactions to my attempts to differentiate

References

Anderson, L. (2003). *Classroom assessment: Enhancing the quality of teacher decision making.* Mahwah, NJ: Erlbaum.

Antoniou, P., & Kyriakides, L. (2011). The impact of a dynamic approach to professional development on teacher instruction and student learning: Results from an experimental study. *School Effectiveness and School Improvement, 22*(3), 291–311.

Antoniou, P., & Kyriakides, L. (2013). A Dynamic Integrated Approach to Teacher Professional Development: Impact and Sustainability of the Effects on Improving Teacher Behavior and Student Outcomes. *Teaching and Teacher Education, 29*(1), 1-12.

Bennett, R.E. (2011). Formative assessment: a critical review. *Assessment in Education: Principles, Policy & Practice, 18*(1), 5-25.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: principles, policy & practice, 5*(1), 7-74.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational researcher*, *33*(8), 3-15.

Brookhart, S.M. (2003). Developing measurement theory for classroom assessment purposes and uses. *Educational Measurement: Issues and Practice, 22*(4), 5–12.

Brookhart, S.M. (2011). Educational assessment knowledge and skills for teachers. *Educational Measurement: Issues and Practice*, *30*(1), 3–12.

Brown, G. T. (2004). Teachers' conceptions of assessment: Implications for policy and professional development. *Assessment in Education: Principles, Policy & Practice*, *11*(3), 301-318.

Christoforidou, M., Kyriakides, L., Antoniou, P., & Creemers. B.P.M. (2014). Searching for stages of teacher skills in assessment. *Studies in Educational Evaluation,* 40, 1-11.

Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review*, *24*(2), 205-249.

Creemers, B., & Kyriakides, L. (2008). *The dynamics of educational effectiveness: A contribution to policy, practice and theory in contemporary schools*. London and New York: Routledge.

Creemers, B.P.M., Kyriakides, L., & Antoniou, P. (2013). *Teacher professional development for improving quality of teaching*. Dordrecht, The Netherlands: Springer.

DeLuca, C., & Klinger, D.A. (2010). Assessment literacy development: identifying gaps in teacher candidates' learning. *Assessment in Education: Principles, Policy & Practice, 17*(4), 419-438.

DES/WO (1988) *National Curriculum Task Group on Assessment and Testing—a report.* London: DES.

Desimone, L. M. (2009). Improving impact studies of teacher's professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181-199.

Garet, M.S., Porter, A.C., Desimone, L., Birman, B.F., & Yoon, K.S. (2001). What Makes Professional Development Effective? Results from a National Sample of Teachers. *American Educational Research Journal, 38*(4), 915-945.

Gipps, C. (1994). *Beyond testing*. London: Routledge Falmer.

Green, S.K., & Mantz, M. (2002, April). Classroom assessment practices: Examining impact on student learning. *Paper presented at the Annual Meeting of the American Educational Research Association*. New Orleans, LA.

Harlen, W., Gipps, C., Broadfoot, P., & Nutall, D. (1992). Assessment and the improvement of education. *The Curriculum Journal, 3*(3), 215-230.

Harlen, W., & James, M.J. (1997). Assessment and learning: differences and relationship between formative and summative assessment. *Assessment in Education, 4*(3), 365-380.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81–112.

Herman, J.L., Osmundson, E., Ayala, C., Schneider, S., & Timms, M. (2006). The Nature and Impact of Teachers' Formative Assessment Practices. National Center for Research on Evaluation, Standards, and Student Testing (CRESST), Center for the Study of Evaluation Technical Report 703, University of California, Los Angeles, CA http://www.cse.ucla.edu/products/reports/R703.pdf.

James, M., & Pedder, D. (2006). Professional learning as a condition for assessment for learning. In J. Gardner (Ed.), *Assessment and learning* (pp. 27–44). London: Sage.

Kennedy, M. M. (2016). How does professional development improve teaching? *Review of educational research, 86*(4), 945-980.

Kyriakides, L., & Campbell, R.J. (2003). Teacher Evaluation in Cyprus: Some conceptual and methodological issues arising from Teacher and School Effectiveness Research. *Journal of Personnel Evaluation in Education, 17*(1), 21-40.

Kyriakides, L., Demetriou, D., & Charalambous, C. (2006). Generating criteria for evaluating teachers through teacher effectiveness research. *Educational Research, 48*(1), 1-20.

McMillan, J. H. (2000). *Basic assessment concepts for teachers and administrators.* Thousand Oaks, CA: Corwin Press.

Mok, M.M.C. (2010). *Self-directed Learning Oriented Assessment: Assessment that Informs Learning & Empowers The Learner*. Hong Kong: Pace Publications Ltd.

Pellegrino, J. W., Chudowsky, N., & Glaser, R. (2001). *Knowing what students know: The science and design of educational assessment.* Washington, DC: National Academy Press.

Popham, W.J. (2006). All about accountability: Those [fill-in-the-blank] tests! *Educational Leadership*, *63*(8), 85–86.

Sach, E. (2012). Teachers and testing: an investigation into teachers' perceptions of formative assessment. *Educational Studi*es, 38(2), 261-276.

Sadler, D.R. (1989). Formative assessment and the design of instructional systems. *Instructional Science*, *18*(1), 119-144.

Shepard, L.A. (2000). The role of assessment in a learning culture. *Educational Researcher, 29*(7), 4–14.

Shepard, L.A. (2007). Formative assessment: Caveat emptor. In C.A. Dwyer (Ed.), *The future of assessment: Shaping teaching and learning* (pp. 279–303). Mahwah, NJ: Erlbaum.

Stiggins, R., & Chappuis, S. (2005). Putting testing in perspective: It's for learning. *Principal Leadership (High School Ed.*), *6*(2), 16-20.

Stiggins, R.J., & Chappuis, J. (2008). Enhancing student learning. *District Administration*, *44*(1), 42-44.

Stiggins, R., Arter, J., Chappuis, J., & Chappuis, S. (2006). *Classroom assessment for student learning: Doing it right—using it well.* Merrill Education/ETS college textbook series. Upper Saddle River, NJ: Pearson Education, Inc.

Torrance, H., & Pryor, J. (1998). *Investigating formative assessment: teaching, learning and assessment in the classroom.* Buckingham, UK: Open University Press.

Villegas – Reimers, E., (2003). Teacher professional development: an international review of literature. Paris: International Institute for Educational Planning. http://www.cndwebzine.hcp.ma/cnd_sii/IMG/pdf/HTTP__~4.PDF

Wiliam, D., Lee, C., Harrison, C., & Black, P.J. (2004). Teachers developing assessment for learning: Impact on student achievement. *Assessment in Education: Principles Policy and Practice, 11*(1), 49–65.