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Teacher Handbook

A guide to a self- development training course in student assessment

of the project

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

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formas

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AIMS AND OUTLINE OF THE HANDBOOK

Student assessment and particularly formative assessment has been recognized as one of the factors that can have a positive impact on student learning outcomes. One of the main aims of the Erasmus+KA3 project entitled *"Promoting Formative Assessment: From Theory to Policy and Practice (FORMAS)"* was to support teachers to conduct assessment for formative reasons and become more effective in terms of promoting students' cognitive and metacognitive learning outcomes. This handbook is **addressed to teachers interested in improving their skills in student assessment**. Specifically, it aims to support teachers to engage in a self-study process focused on improving teachers' skills in assessment and through that on promoting student learning outcomes. The process and material presented in this handbook are based on a training course designed under the FORMAS project which was implemented in four European countries (i.e., Belgium, Cyprus, Greece, and the Netherlands. Even though the FORMAS Teacher Professional Development course (TPD) was designed to be implemented through physical presence, we believe that the material created can also be helpful to other teachers interested in engaging in activities that can improve their everyday assessment practice.

The handbook includes three parts. Part A asks you to complete the Teacher Assessment Skills Questionnaire to help you identify your own improvement priorities in relation to student assessment and identify the training path you should follow. Part B presents the rationale and main assumptions of the approach used to design the TPD course. Important information about the structure and implementation of the course are also provided. Part C presents a step by step guide for the practical implementation of the TPD with references to material, sources and supporting mechanisms. We hope that teachers will find the handbook useful for designing and implementing their own improvement strategies and action plans aiming to promote formative assessment in their classroom practices.

PART A

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 student learning outcomes (cognitive, affective, psychomotor and meta-cognitive). In addition, this TPD acknowledges that as students, teachers also have differentiated improvement priorities. Given these differentiated

needs, this TPD will not be in the typical form of all teachers having the same training. Specifically, three different training paths are provided (i.e. Focus Group A, B and C).

Therefore, a first measurement (i.e. through completing a questionnaire) is necessary to identify these priorities. The questionnaire asks you to provide information about your current practices as you are considered as the most appropriate sources of data to provide this information. It provides a simple, quick, and effective way to understand how well you currently perform in relation to these skills and identify your training focus area. It is important to bear in mind that a SELF assessment tool is (and should be) used as a developmental activity. This kind of exploration of your current practice in relation to specific assessment skills is effective if you are completely honest, even if that means accepting that there are some parts of your practice that require attention and further support/training is needed. Therefore, it is especially important that you complete the questionnaire based on your current assessment practice and not on what it is best in theory. Please bear in mind that the purpose of this questionnaire is to identify individual professional improvement priorities and being honest is important for the training to be as useful to you as possible.

To identify your focus group, please complete the teacher assessment skills questionnaire which you can find in Appendix A.

When the questionnaire is completed please send it to formas@ucy.ac.cy. Members of our research team will analyse the information and produce a report which you will receive via email. The report refers to your teacher professional needs and the training path to be followed.

PART B

Part B presents the theoretical background, the rationale and main assumptions of the approach used to design the program. Important information about the structure and implementation of the course are also provided. It aims to support you as a teacher in implementing this 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 you 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 rationale of this TPD and the main assumptions of the approach employed are discussed. Finally, the training paths offered are outlined.

1. Introduction

Student assessment is considered an integral part of the teaching process and as teachers we spend a large amount of our time in assessment related activities. Sometimes it is even difficult to to distinguish teaching from assessment. Assessment is an integral part of teaching and should not be addressed as an independent process which could or could not be used in a lesson. For example, questions used during teaching and the interactions that follow between teacher and student(s) and between students; can also be considered as assessment activities since they provide important information about students' learning. It is almost impossible to have a whole lesson without any assessment elements unless you are just providing a lecture without taking into consideration your students' needs and responses. However, our assessment practices are not always supportive of students' learning. Implementing learning-oriented assessment requires changes in our professional practice in relation to the classroom culture, the assessment techniques, tools and tasks employed, and the feedback and support provided.

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). 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.

It is important 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. This TPD focuses on formative assessment since research suggests that teachers who use assessment for formative rather than summative purposes are more effective in promoting student learning outcomes (see Creemers & Kyriakides, 2008; Hattie & Temperley, 2007; Herman, Osmundson, Ayala, Schneider, & Timms, 2006; Wiliam, Lee, Harrison, & Black, 2004; Kyriakides et al., 2021).

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 you 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 but can be used for comparing the performance of a group of students.

Our aim is not just to train you in using specific formative oriented strategies. Our focus is on supporting you in developing the knowledge and skills needed to perform the assessment-related aspects of your work in a competent and professional manner to achieve the formative purpose of assessment. This will be accomplished by helping you become able to distinguish when and how to use each assessment skill to serve the formative purpose of assessment. The framework used to identify the skill involved in student assessment is presented next.

2. A framework to examine teacher assessment skills

Under the FORMAS project a framework to examine teacher assessment practice 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. The framework examines assessment looking at three main aspects (see Figure 1).

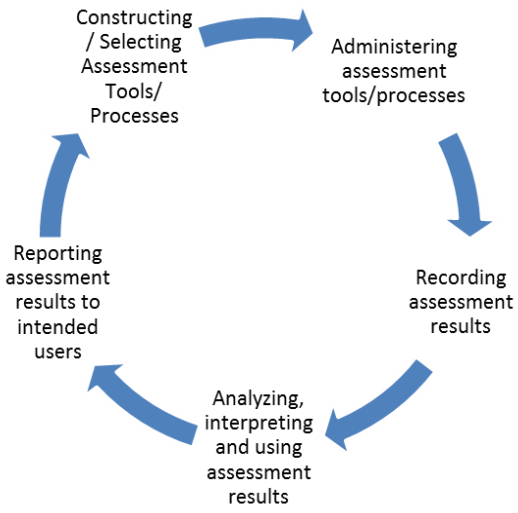

Figure 1. A framework for measuring teacher assessment skills

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).

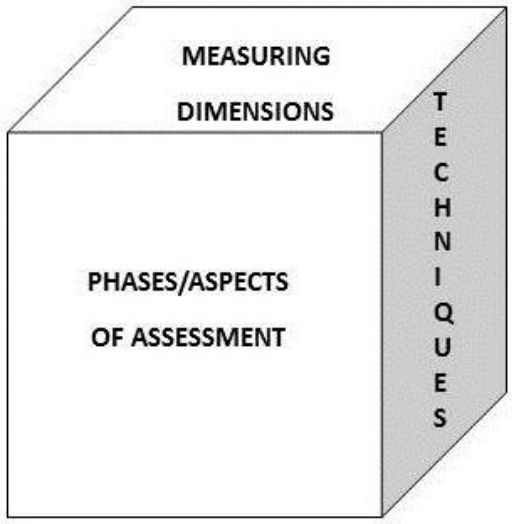

Figure 2. The main phases of the assessment process

These phases are based on the assumption that effective teachers should make sure that: (i) appropriate assessment instruments are used to collect valid and reliable data; (ii) appropriate procedures in administering these instruments are followed; (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. 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. 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. 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. The division of the assessment process into phases is only done to make sure that each aspect of assessment practice is considered when addressing 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 student 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). For example, during this phase you are expected to decide and design how the intended learning outcomes of the teaching provided can better be evaluated. First, you must decide whether the assessment will serve the formative or the summative purpose. Based on this decision, you will move on to decide which assessment technique(s) will be employed (i.e. written, oral, performance assessment), what the role of students will be during assessment (e.g. self-assessment, peer-assessment, teacher assessment), the type and content of the assessment activities (e.g. short questions, multiple choice items, problem solving items etc.) and how these will be implemented (e.g. timing, open books etc.). This phase is particularly important since it guides the decision you will make in the next 4 phases.

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). Therefore, during this phase you are expected to decide how an assessment will be practically implemented. For example, you are expected to decide how much support you will provide during assessment administration. Will you provide clarifications to instructions if asked? What will you do if a student needs more time that scheduled to complete the assessment? If a student straggles to understand a task, will you provide prompts to help him/her identify what is expected? These dilemmas are quite common in everyday practice and many times teachers find it difficult to decide if and how much support should be provided while students complete an assessment task. These dilemmas can partly be attributed to the fact that teachers are not clear that assessment is expected to serve the formative rather than the summative purpose.

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 et al., 1992; Stiggins & Chappuis, 2005). For example, during this phase you are expected to decide which recording tools better address the purpose of your assessment. If you are assessing to identify possible misconceptions, then the way you record assessment information should enable you to identify them. Or, if you are assessing more complex learning outcomes, such as problem solving, then you should consider using a recording tool (e.g. analytic rubric) that allows you to break down the elements of the problem solving objective into specific parts/elements. In this way, you will be able to itemize and define exactly what aspects are strong, and which ones need improvement and provide more specific feedback during the next phase (i.e. Phase 5: *Analyzing, interpreting and using assessment results).*

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, to influence student learning (Stiggins & Chappuis, 2008). For example, during this phase you are expected to examine assessment information and identify possible trends in students' performance. If a great majority of students failed to meet a certain intended learning outcome, then perhaps you should consider providing addition teaching time and/or implementing different teaching approach to address this. On the other hand, if you identify that certain student behaviours reoccur (e.g. difficulty in understanding written instructions) then you could consider spending some time in addressing this.

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. 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. For example, in this phase, you should decide how to use data recorded to provide constructive feedback to intended stakeholders (i.e. students, parents/guardians, school). Is your feedback intended to redirect students or

reinforce a positive behavior? Is your feedback tailored to the intended audience in the aspects of timing, detail and format? It is also possible to have to deal with a lack of interest on behalf of students in taking actions to improve their learning based on information provided. Using assessment information for improvement is a metacognitive skill and not all students have managed to develop it regardless of their age. Therefore, it is important for you to find ways to explain to students why assessment information is valuable for their learning and teach them how they can use assessment information for their benefit.

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). Therefore, it is expected that you 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. For example, several mathematical skills (e.g. use of compass, model design) cannot be adequately assessed through written assessment and require the use of performance assessment tasks. Moreover, oral assessment is necessary to evaluate appropriate use of mathematical language during classroom communication. 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. You are expected to choose and effectively implement a combination of techniques to assess student learning based on the appropriateness for a given situation. Using a combination of assessment techniques to assess students' learning provides more meaningful, valid, and reliable insights into students' learning. Therefore, you are expected to use a variety of assessment techniques to provide students with multiple opportunities to show what they know and can do.

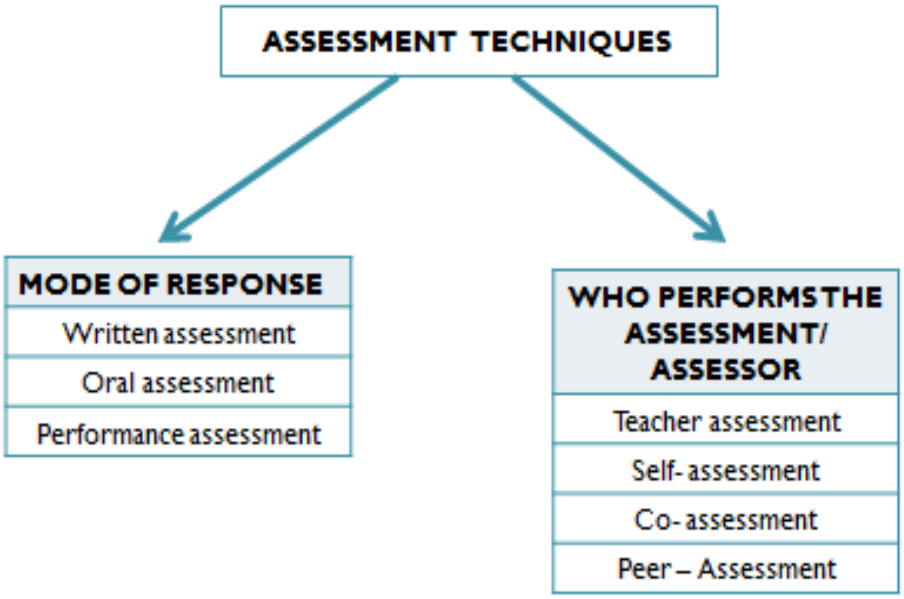

Figure 3. Assessment techniques

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 takes 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 respond to each task; 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. ***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 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 often 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 your skills 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, you 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 you do not rely on the use of a single technique to assess student learning. Especially in the case of self- and peer assessment, it is important to recognize their role in the development of students' metacognitive skills. Metacognitive or learning to learn skills are considered as one of the key competencies today and their transversal nature makes them essential in terms of adapting to change and integration. Student self- and peer assessment are expected to help students own and self-regulate their learning and exercise metacognitive monitoring of their work and processes against standards, expectations, targets, or goals (Brown & Harris, 2013; Kyriakides, Anthimou, & Panayiotou, 2020).

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 (see Kyriakides et al., 2021). 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 teaching/learning is taking place and address possible learning obstacles of a group of students. 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 can have 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 assessment skills allows us to develop comprehensive strategies for improving assessment practice since the feedback given to each teacher could refer not only to quantitative, but also to qualitative characteristics of your assessment practice. In addition, it allows us to design targeted interventions that can have a positive impact both on your skills and on student learning outcomes.

This framework was used to make decisions in relation to the design of the TPD presented in this handbook. First it was used to design the questionnaire you have complete in Part A and which examines teachers' skills in assessment. This self-reported questionnaire also enables the identification of specific

areas of improvement. As students, teachers also have differentiated improvement priorities. Therefore, a measurement (i.e. assessment skills questionnaire) conducted prior to the implementation of a series of training sessions helps us to identify the priorities/improvement needs of each teacher or group of teachers and adjust the training accordingly.

3. Teacher professional development approach and rationale

3.1. The Dynamic Approach to Teacher Professional Development

Recognizing the role of teacher professional development efforts in the improvement of teachers' teaching and assessment practices the FORMAS project used the *Dynamic Approach (DA)* to TPD (Creemers, Kyriakides, & Antoniou, 2013) for the design and delivery of this 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; Antoniou & Kyriakides, 2013; Kyriakides et al., 2021). In addition, the DA is aligned with the project's basic principles and assumptions. The main features of the DA are presented below.

a) *Emphasis on developing skills that have a positive impact on student learning:* 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). Professional development in assessment can be designed to cover a variety of areas. This TPD was designed with a focus on specific skills that have been empirically related to improve learning outcomes.

b) *Duration of the TPD:* It is acknowledged that the duration of a TPD, both in terms of span of time over which the TPD is spread and in terms of the number of hours spent in the TPD, has an impact on the change the program has on teacher knowledge and skills. Therefore, the TPD presented in this handbook is not just an on–off professional development workshop but a series of 5 sessions, ideally spread over the period of one school year (i.e. September to May). This allows you to use the time-lapse in-between sessions to implement actions for improvement, reflect on your practice, and adjust your actions accordingly. It is also encouraged that you engage in the TPD for more than one year, since previous research suggests that involvement

in professional development initiatives following the DA for a longer period resulted in bigger effects on improving teaching skills (Kyriakides, Christoforidou, Panayiotou, & Creemers, 2017). Continuing the TPD for more than one year will thus provide you more time to further develop your action plans and address new improvement areas.

c) *Emphasis on both competence and development and critical reflection:* The DA suggests that for TPD to be effective it needs to focus both on the development of competence but also on the engagement in critical reflection. This TPD was designed in such a way that both competence development and guided critical reflection are highlighted. You are provided with supporting material in order to develop specific assessment knowledge and skills that are necessary to effectively implement student assessment; while at the same time encouraging you to take ownership over and critically reflecting on your learning through the development and revision of your action plans.

d) *Differentiated development paths according to teachers' needs:* The DA acknowledges that teachers have differentiated professional needs. This is the reason, an initial evaluation of your assessment skills (i.e. assessment skills questionnaire) was asked before engaging in this TPD. The results can highlight specific areas of improvement that you should focus on, thus accommodating your personal professional needs.

e) *Focus on establishing partnership among researchers and practitioners (Advisory and Research Team, A&RTeam):* The DA acknowledges that whereas each teacher is responsible to develop and implement his/her own strategies and action plans for improvement, supportive mechanisms to enable and facilitate this process of self- improvement are necessary. Specifically, an Advisory and Research Team (A&RTeam) has been established to provide technical expertise and the available knowledgebase to support improvement efforts. Each party (teachers and A&RTeam) has a specific role and expertise that they bring to each improvement effort, thus collaboration between the A&R Team and teachers interested in implementing this TPD course is seen as an essential condition. Therefore, you are not left alone to study the material, design and implement your strategies and actions, but on the contrary you are encouraged to make use of the A&RTeam throughout the implementation of the TPD (see Part

C for details). The A&RTeam will provide support for the teacher assessment skills questionnaire (i.e. completion, analysis, feedback on results), the identification of your training path, the development and revision of your personal action plan, the implementation of training sessions (e.g. supportive literature, clarifications on content) and will be available for feedback and support throughout the whole process of implementation.

3.2. The rationale of the TPD

This TPD also acknowledges that some common misconceptions regarding effective assessment practice need to be addressed/clarified. It is possible, that you 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 of the main possible misconceptions that are discussed below.

a) 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 usually provided for summative reasons. Therefore, our aim is not just to train you in using specific formative oriented strategies. Our focus is on developing the knowledge and skills you need to perform the assessment-related aspects of your work in a competent and professional manner (Brookhart, 2011) to achieve the formative purpose of assessment. This will be achieved by helping you become able to distinguish when and how to use each assessment skill to serve the formative purpose of assessment.

b) 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 and help students improve them. 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 is 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 your 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.

c) 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 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.

d) 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 your skills in using quality formative assessment based on the available knowledge-base of educational assessment.

4. Teacher professional development training paths

As mentioned above, this TPD rests on the assumption that teachers have differentiated professional needs when it comes to student assessment. This implies that a common training to all teachers, as is usually the case, is not an appropriate solution. Therefore, this TPD is organized to accommodate these differentiated needs, by providing three different training paths. These paths were formed based on previous research indicating that when teachers' skills in assessment are examined, teachers' improvement priorities can be grouped to address similar needs. Organizing the training based on these needs allows us to provide more targeted and focused training. It is strongly advised that you follow the training path indicated by your evaluation results to achieve maximum benefit out of this TPD. Part C provides more details on the steps to be followed and available support during the implementation of this TPD.

PART C

1. Introduction

As teachers, we usually 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 our everyday teaching practice without major changes in our routines, it gives us more freedom on when and how it will be implemented and is better aligned with our role in the promotion of learning. However, acknowledging formative assessment as a significant element of teaching is not enough for changes in practice to take place. If you have not yet developed the necessary knowledge and skills involved in the implementation of formative assessment, you will most probably fail to effectively implement it in your everyday practice. The TPD presented in this handbook acknowledges that for changes in our practice to occur we need support in developing the knowledge and skills required for implementing effective formative assessment practice. This third part of the handbook presents a step by step guide for the practical implementation of the TPD with references to material, sources and supporting mechanisms.

2. The FORMAS teacher professional development

This self-paced professional development course will help you advance not only your knowledge but also your skills in student assessment. First, through a self-assessment questionnaire you will identify your strengths and needs in relation to student assessment (See Part A). Then, based on the results of this self-assessment you will create a personal action plan to help you monitor your progress to achieve the goals set. The training sessions provided will support this effort, through instruction, new knowledge application activities and guided self-reflection. At the same time, you are urged to contact our research team (formas@ucy.ac.cy) for support in implementing this TPD (i.e. assessment skills questionnaire analysis and feedback on results, creating a training plan adjusted to your needs, feedback on action plan and its implementation).

2.1. Aims and objectives of the TPD

This TPD aims to help you 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 your learning. Specifically, this TPD aims at:

- Supporting you in identifying your strengths and needs in relation to student assessment.
- Engaging you in critical guided reflection around your assessment practice.
- Supporting you in developing the skills to design and use assessment in ways that support student learning and enhance your effectiveness.
- Familiarizing you with formative oriented assessment practices.
- Helping you structure learning environments that encourage the implementation of formative assessment.

2.2. Intended learning outcomes (ILOs)

By the end of the training program you are expected to be able to:

- ✓ Create a classroom culture to foster formative assessment practices.
- ✓ Design and implement high quality formative assessment.
- ✓ Select, analyze, and modify your practices in all phases of the assessment process to better address students' learning needs.
- ✓ Support students' involvement in the assessment process.

2.3. Duration

This is a self-paced course and can be completed according to your own schedule**.** It is considered better to start the TPD at the beginning of a school year. In this way, it is easier for you to establish both a positive assessment culture in your classroom, as well as introduce new assessment practices and routines. The TPD includes five (5) training sessions. Our recommendation is to complete the sessions over seven to ten months, with one to two hours of time spent working through the material each time. The suggested timeframe allows time in between sessions for you to practice/test new knowledge presented in each session. Of course, the TPD course can also be implemented following a different

time frame than the one suggested, based on your own personal needs and schedule. For example, you may decide to start your TPD course in the middle of the school year and not in the beginning as suggested. However, it is important to ensure the distance between sessions to allow sufficient time for you to implement the actions/tasks included in your action plan. Distance between sessions is also important since it provides the necessary time for reflection to identify possible shortcomings in your attempts to improve your practice, as well as ways to overcome them.

It is also important to note that this TPD course can be implemented for more than one school 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 your assessment skills conducted at the end of the TPD can provide valuable information on how your training can continue. For example, the final measurement might help you identify new areas for improvement and suggest you continue your training following a different training path during the next school year. The table below presents a suggested timeframe for the implementation of the TPD (see Table 1).

Table 1. Suggested timeframe for the TPD implementation

Training Sessions	Timeline
1st meeting – Introductory session & Initial Assessment skills self- assessment (i.e. assessment skills questionnaire)	September
Analysis of Assessment skills self- assessment (i.e. assessment skills questionnaire*) and identification of focus area (with the support of the* A&RTeam*)*	
2nd meeting- Study of new material- Personal Action Plan-first draft	November
Implementation of actions included in the action plan, adjustment, and revision (with the support of the A&RTeam*)*	
3rd meeting - Study of new material- Personal Action Plan revision	January
Implementation of actions included in the action plan, adjustment, and revision (with the support of the A&RTeam*)*	

4th meeting - Study of new material- Personal Action Plan revision	March

Implementation of actions included in the action plan, adjustment, and revision (with the support of the A&RTeam*)*

5th meeting - Study of new material- Personal Action Plan revision	May /June

Implementation of actions included in the action plan, adjustment, and revision (with the support of the A&RTeam)

Final assessment skills self- assessment (i.e. assessment skills questionnaire)	June

Analysis of Assessment skills self- assessment (i.e. assessment skills questionnaire*) and feedback on results. Suggestions on how to proceed for next year (with the support of the* A&RTeam*)*

3. Supportive mechanisms- The role of the FORMAS advisory and research team

This is a self-study course that requires you to take personal responsibility for your own learning and development through the practice of self- assessment, reflection, and action. However, our Advisory and Research Team (A&RTeam) is available to provide you with the support and tools needed for your development. Our aim is for you to take on your development in a supportive, guided environment. Particularly, our A&RTeam can provide information, support and feedback in relation to:

- ✓ The FORMAS project and its implementation
- ✓ The theoretical framework used to examine teachers' skills in assessment
- ✓ The teacher assessment skills questionnaire (i.e. completion, analysis, feedback on results)
- ✓ Identification of training path
- ✓ Development and revision of personal action plan
- ✓ Implementation of training sessions (e.g. supportive literature, clarifications on content)
- ✓ Feedback and support throughout the whole process of implementation
- ✓ Establishment of professional networks with other teachers
- ✓ Evaluation of the impact of the TPD on your skills
- ✓ Identification of future improvement efforts in relation to your assessment skills evaluation results

4. Establishment of learning networks

Creating a learning community with one or more colleagues is also recommended. Collaborating with people who understand your journey and can offer support, guidance, and encouragement is crucial to any path of improvement. Taking advantage of opportunities to connect with fellow colleagues who have similar improvement priorities can help you gain new information, reconsider previous knowledge and beliefs, and build on your own and others' ideas and experiences in order to improve your assessment practice. Our research team is happy to support you in establishing such a network by providing information about other teachers (from your country and/or other countries) who are implementing the TPD course and belong to the same focus group as the one that you will be found to be situated.

5. Developing your personal action plan

We expect each one of you to develop your own action plan by considering your own needs and context in which you are is expected to teach mathematics to secondary school students. A sample action plan for each focus group is provided in Appendix B. The sample action plans provided include a list of suggested activities/actions per objective. However, you are expected to adapt the sample action plans to match your own situation. You are encouraged to choose or adapt some of these activities to your context or create/develop your own. A feasible number of tasks is suggested. Of course, you are free to create the action plan following a different format, however you need to make sure that the necessary aspects of an action plan are addressed (i.e. objectives, tasks/actions, timeframe, resources, ways for evaluating the actions implemented). The emphasis here is on each one of you taking action to improve your practice and not on how detailed the action plan is developed. Our research team is happy to collaborate with you and provide support and feedback in your attempt to develop and implement your action plan.

6. Steps for implementing the teacher professional development course

Follow the instructions provided below to start implementing this self- development course to advance your skills in student assessment.

Step 1: Complete the teacher assessment skills questionnaire

The first step for implementing this TPD is to complete the assessment skills questionnaire (see Appendix A). You were already asked to do so in Part A of the Handbook. If for any reason you have not yet completed the questionnaire, please go back to Part A and do so now.

Step 2: Identify your training path

If you are ready to move to step 2, it means that the A&RTeam has analyzed your questionnaire and has allocated you in the group that better addresses your improvement priorities. Please follow the training path suggested by your initial skills assessment (i.e. assessment skills questionnaire). This way you will engage in more specific and targeted training according to your identified professional needs. We remind you that this TPD offers three different training paths (i.e. focus groups). Each focus group (i.e. Group A, Group B and Group C) has different content customized to address different assessment skills.

Step 3: Start you TPD course

Below, the description of the sessions of each focus group is provided. Links to the relevant material of each session are also available to facilitate your access to the material. Before beginning you training please have in mind the following:

- ✓ Start by studying the material of Session 1 of your group. Remember that adequate time between sessions should be available to allow you time to introduce changes in your current practice based on the objectives covered in each session. Avoid studying the material of next sessions or other groups, as this might create confusion as to what you are trying to achieve.
- ✓ Throughout the sessions you should place emphasis to the application activities suggested in each session. The purpose of these application activities is to provide you with opportunities to practice the skills under focus and therefore should be completed. When necessary, sample answers, common misconceptions or points for discussion are available.

Please contact our research team (formas@ucy.ac.cy) for support and feedback regarding the application activities. You can also email the completed activities and we will provide feedback.

- ✓ Bear in mind, that by the end of session 2 you are expected to develop your action plan. After you have created your first action plan you will be asked to revise it in each session by considering the new material covered, as well as your experiences in implementing the actions you included in your plan. For this reason, each session (3-5) begins with an activity that encourages you to reflect about the implementation of your action plan. It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Distance between sessions is provided to allow you the necessary time for reflection.

Please contact our research team for support and feedback through this process (formas@ucy.ac.cy). Our team who is acting as your advisory team can provide clarifications on the sample actions plans, suggest appropriate actions according to your needs, discuss possible shortcomings in implementation and provide suggestions for improvement. Actions plans can also be discussed within your learning network. Exchanging ideas and experiences of your implementation attempts can be a valuable tool for improving your practice.

At this point please go to the material relevant to your focus group.

FOCUS GROUP A

Welcome to Focus Group A! This group focuses on improving skills in relation to promoting a learning culture that can foster formative assessment. These skills are considered important since 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. This group also focuses on improving skills in relation to the construction of representative and valid assessment tasks/instruments. As teachers, 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. Finally, emphasis is also given to the use of homework in ways that support student learning. 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. Therefore, it is important to be able to extend learning through good quality homework activities that evaluate in a valid way our students' learning.

Below you can find tables presenting the outline and short description of each session as well as the training material in the respective appendices. Use these table to guide you throughout the sessions.

Group A- Session 1

Study the material of session 1 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group A- Session 1 Outline		
Slides 1-16	***The FORMAS project***	The first part of the session presents some basic information about the FORMAS project under which the training was developed and gives more information on the rationale and design of the training.
Slides 17-27	***The basics of formative assessment***	The second part of the session aims at setting a common ground for discussing formative assessment so that possible misconceptions are addressed before continuing with the next sessions. It is possible, that you 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.

Group A- Session 2

Study the material of session 2 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group A- Session 2 Outline		
Slides 1-7	***Presentation of focus area***	The first part of the session presents the focus areas/skills to be addressed throughout the sessions of Group A. The focus of todays' session is also presented as well as and what you 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)**	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 you to critically reflect on their current practices. Through this reflection, you are expected to identify possible shortcomings in your current practice and at the same time suggest actions you can take to improve it.
Slides 9-12	**Creating a culture that can foster formative assessment**	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.
Slides 13-17	**Application activity – Developing a "Growth Mindset" in your Students -A2b**	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. *Possible responses on the questions are provided in the* **Application activity – Developing a "Growth Mindset" in your Students -A2b *Suggested Answers*** file in Appendix C

Slide 18	**Designing your action plan**	*The action plan is a tool that will help you be more focused and punctual to your improvement efforts. You will create your own based on your 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. Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan* To develop your first draft, you can study the sample action plan for your group available in Appendix B. For now, read the suggested actions under the ***O1. Create a culture that can foster formative assessment*** heading only.
Slides 19-20	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our project team is available for your support

Group A- Session 3

Study the material of session 3 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group A- Session 3 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
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 **Application activity – Setting ILOs (A3a)**

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 you acknowledge the importance of good quality ILOs for assessment and improve your skills in setting them.

When completing this application activity have in mind 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)
- Remember that an ILO can be examined using a variety of different activities/tasks and not just a single activity.

Slides 9-11 **Quality Assessment: representativeness**

These slides provide some details on the characteristics of good quality ILOs. They should be used to help you evaluate and revise the ILOs you suggested in application activity A3a.

The example (slide 11) helps you 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.
Slides 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. 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.
Slides 14-16	**Application activity – Specification Table (A3b)**	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 you to practice these two skills. The test to be reviewed is available in Appendix C The correct classification is presented in the document *Application activity – Specification Table- A3b-Completed table (see Appendix C)*
Slides 17-20	**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.

Slides21-22	**Revising your action plan**	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. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 23-24	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support. So please get in touch with us via email (formas@ucy.ac.cy) to provide any support that you may need in developing and implementing your action plans.

Group A- Session 4

Study the material of session 4 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group A- Session 4 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).

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.
Slide 8-13	**Application activity – Evaluating the quality of assessment items (A4a)**	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 you in developing your item construction skills. Comments on the quality of the items are available in the ***Application activity – Evaluating the quality of assessment items (A4a)- Suggested Answer*s file** (see Appendix C).
Slide 14	**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.
Slide 15	**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 16-17	**Assessment items- using multi-dimensional approach to student understanding**	Study the examples presented. 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.
Slides 18-22	**Application activity - Multi-dimensional assessment of student achievement (A4b)**	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 you 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. Comments on the items are available in the ***Application activity - Multi-dimensional assessment of student achievement (A4b)- Suggested Answer*s** file (see Appendix C).
Slides 23-24	**Revising your action plan**	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. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 25-26	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support. Don't forget to get in touch with us (via email formas@ucy.ac.cy) for any support you may need.

Group A- Session 5

Study the material of session 5 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group A- Session 5 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6	**The importance of homework**	Discuss the questions presented in slide 6 with a colleague at work or a person in your learning network Slides 7-8 provided information on the importance of homework and how homework tasks should be chosen.
Slides 7- 8	**Selecting homework tasks**	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 9-11	**Application activity – Assessing Homework (A5)**	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 you develop the skills to distinguish between good quality and bad quality homework and to design homework activities that can be used for formative purposes. Review also the "Constructive Homework Guidelines" handout available in Appendix …
Slide 12	**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 13-15	**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.
Slides 16-17	**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.
Slides 18-19	**Revising your action plan**	study the suggested actions under the ***O5.* Assess homework for formative purposes** heading in the template action plan. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 20-22	**Closing slides**	This is the final session of the TPD course. However, you are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Please complete the Assessment Skills Questionnaire and send it by email to our research team (formas@ucy.ac.cy). Members of our team will analyze the data, inform you of your final evaluation results and provide suggestions on how your learning can continue.

FOCUS GROUP B

Welcome to Focus Group B! This group focuses on improving skills in relation to formulating appropriate learning goals and criteria for success. Valid assessment requires the formulation of good quality assessment criteria based on which students' learning will be assessed. Teachers are expected to be able to formulate good quality assessment criteria/ success criteria that will later act as the basis for constructive feedback to be provided. This group also focuses on developing skills in relation to recording assessment information from various assessment techniques and utilizing recording instruments such as checklists and rubrics. Documenting and using data on the knowledge, skills, attitudes, and beliefs of students to improve student learning is essential for formative assessment. Using a combination of assessment techniques to assess students' learning provides more meaningful, valid, and reliable insights into students' learning. In addition, the design and use of checklists and rubrics is a valuable way for recording assessment information in ways that enable its 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. Thus, this group also addresses skills related to the provision of constructive feedback. Constructive feedback is an essential element of formative assessment and teachers are expected to be able to provide students with feedback that can be used to move their learning forward. Finally, in this group, skills related to involving students in the process of assessment are also addressed. 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. Therefore, teachers are expected to manage the learning culture of the classroom to maximise students' motivation to engage keenly with assessment.

Below you can find tables presenting the outline and short description of each session as well as the training material in the respective appendices. Use these table to guide you throughout the sessions.

Group B- Session 1

Study the material of session 1 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group B- Session 1 Outline		
Slides 1-16	***The FORMAS project***	The first part of the session presents some basic information about the FORMAS project under which the training was developed and gives more information on the rationale and design of the training.
Slides 17-27	***The basics of formative assessment***	The second part of the session aims at setting a common ground for discussing formative assessment so that possible misconceptions are addressed before continuing with the next sessions. It is possible, that you 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.

Group B- Session 2

Study the material of session 2 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group B- Session 2 Outline		
Slides 1-7	***Presentation of focus area***	The first part of the session presents the focus areas/skills to be addressed throughout the sessions of Group B. The focus of todays' session is also presented as well as and what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 8	**Application activity- Collecting information (B2a)**	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 you reflect on your current practice and identify how you usually collect information about students' learning. *NOTE 1: Remember 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).

Slides 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 the question presented with a colleague at work or a person in your learning network. 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?*
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.

Slide 17-18

Using different types of assessment techniques

Discuss the question presented with a colleague at work or a person in your learning network. Consider the following:

- *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*

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

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 20-23

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

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 you 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.

The *Application activity – Using different types of assessment techniques (B2b)- Suggested answers file (see Appendix D)* provides examples of assessment tasks that can be used to assess each objective with the requested techniques.

Slide 24-25

Designing your action plan

The action plan is a tool that will help you be more focused and punctual to your improvement efforts. You will create your own based on your 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. Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan

To develop your first draft, you can study the sample action plan for your group available in Appendix B. For now, 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.
Slides 26-27	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team (formas@ucy.ac.cy) is available for your support. Don't forget to send us an email and we will provide any material and support you may need for developing and implementing your action plan.

Group B- Session 3

Study the material of session 3 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group B- Session 3 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6-9	**Application activity – Applying criteria for assessment (B3a)**	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 you identify the properties of good quality assessment criteria. You 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. When completing the activity 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 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. Comments on the activity are available in the **Application activity – Applying criteria for assessment (B3a)- Suggested Answers** file in Appendix D
Slide 10	**Formulating assessment criteria**	The term 'success criteria' is synonymous with 'assessment criteria' but, it focuses (much more positively) on students' ability to succeed.
Slide 11-12	**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?"
Slides 12-15	**Formulating assessment criteria**	Success criteria provide the basis for feedback and reduce discrepancies between current student understanding and intended learning 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 16-18	**Application activity – Formulating success criteria(B3b)**	Effective teachers are expected to be able to formulate good quality assessment criteria. This application activity aims to help you develop this skill by involving you in the process of criteria formulation When evaluating the criteria you formulated, consider 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 19	**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 20

Involving students in the process of assessment

Discuss with a colleague at work or a person in your learning network your experience so far in involving students in the process of assessment.

Slides 21-25

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.

Slides 26-27

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.
Slides 28-29	**Revising your action plan**	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. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 30-31	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Don't forget that our research team is always available for providing any support you may need.

Group B- Session 4

Study the material of session 4 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group B- Session 4 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6	**Recording assessment results from different assessment techniques**	Discuss the questions presented with a colleague at work or a person in your learning network.
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 you 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 you do it in a more effective way.

Slide 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.

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.

Slides 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*).

Slide 14-17	**Designing checklists/rubrics**	Study the example provided in slides 14 and 15 and identify why this rubric is holistic. You 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. Evaluate the sample answers using the levels presented in the holistic rubric example presented above. The justification on level classification is presented in slide 17.
Slide 18-19	**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 you 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. Study the example provided and identify why this rubric is analytic. ➢ 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 Now evaluate the sample answer in slide 21 using the rubric. ✓ "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
Slides 23-25	**Application activity – Designing an assessment rubric (B4)**	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 you 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).
Slides 26-27	**Revising your action plan**	Study the suggested actions under the **O2. Formulate assessment success criteria and design assessment checklists/rubrics** heading in the template action plan. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 28-29	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support so please get in touch with us via email at

formas@ucy.ac.cy for any support you may need.

Group B- Session 5

Study the material of session 5 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group B- Session 5 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6	**Providing constructive feedback to students**	Discuss the questions presented with a colleague at work or a person in your learning network.
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 9-14	**Application activity – Types of feedback (B5)**	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 you identify the qualities of constructive feedback. *A discussion on the feedback scenarios is provided in the* **Application activity – Types of feedback (B5a) - Suggested Answers** *file in Appendix D*
Slides 15-17	**Providing constructive feedback to students**	➢ 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 your 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 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*).
Slide 18-22	**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.
Slide 23	**Providing constructive feedback to students**	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 24-25	**Revising your action plan**	Study the suggested actions under the ***O4. Provide constructive feedback to students*** heading in the template action plan. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.

Slides 26-29	**Closing slides**	This is the final session of the TPD course. However, you are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Please complete the Assessment Skills Questionnaire and send it to our research team (formas@ucy.ac.cy). Members of our team will analyze the data, inform you of your final evaluation results and provide suggestions on how your learning can continue.

FOCUS GROUP C

Welcome to Focus Group C! This group focuses on improving skills in relation to introducing peer and self-assessment. Peer and self- assessment are considered as valuable tools for formative assessment since they help students own and self-regulate their learning and exercise metacognitive monitoring of their work and processes against standards, expectations, targets, or goals. In addition, this group focuses on skills related to the assessment of group work. Group work is important because, if planned appropriately, it enhances student-student interactions and therefore can lead to positive impact on learning. However, assessing group work has added challenges and teachers are expected to be able to organize, implement and assess group work in ways that benefit learning. This group also focuses on skills related to the recording of assessment information in ways that facilitate their formative use. Recording makes assessment information available for future use. When assessment is done in order to serve the formative purpose, recording assessment information in ways that enables its use to support learning is essential. Teachers are expected to record assessment information in ways that provide a valid description of a student's learning in relation to each objective set but also how to better support learning. Finally, this group addresses skills related to the introduction of differentiation aspects in assessment practice. Students vary in many ways and teachers must be aware of these varieties as they plan teaching and assessment. When looking specifically at assessment, differentiation can occur across and within all phases of the assessment process. Teachers are expected to modify and match assessment tasks 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.

Below you can find tables presenting the outline and short description of each session as well as the training material in the respective appendices. Use these table to guide you throughout the sessions.

Group C- Session 1

Study the material of session 1 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group C- Session 1 Outline		
Slides 1-16	***The FORMAS project***	The first part of the session presents some basic information about the FORMAS project under which the training was developed and gives more information on the rationale and design of the training.
Slides 17-27	***The basics of formative assessment***	The second part of the session aims at setting a common ground for discussing formative assessment so that possible misconceptions are addressed before continuing with the next sessions. It is possible, that you 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.

Group C- Session 2

Study the material of session 2 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group C- Session 2 Outline		
Slides 1-6	***Presentation of focus area***	The first part of the session presents the focus areas/skills to be addressed throughout the sessions of Group B. The focus of todays' session is also presented as well as and what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 7	**Implementation of peer/self – assessment**	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.
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.

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

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 you identify some ground rules that can guide the effective involvement of students in the process of peer-assessment.

Slides 12-15	**Differentiation and assessment**	➢ 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)
Slide 16	**Application activity – Fostering culture that accepts differentiation in assessment (C2b)**	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 you to critically reflect on your current practices in relation to fostering a culture that acknowledges students' diversity and accepts differentiation practices in assessment. Through this reflection, you are expected to identify possible shortcomings in your current practice and at the same time suggest actions you can take to improve it.
Slide 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.
Slide 19	**Designing your action plan**	*The action plan is a tool that will help you be more focused and punctual to your improvement efforts. You will create your own based on your 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. Action plans will be frequently revised! In each session there will be allocated time for them to revise and adjust their action plan* To develop your first draft, you can study the sample action plan for your group available in Appendix B. For now, 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.
Slides 22-23	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support

Group C- Session 3

Study the material of session 3 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group C- Session 3 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6	**Different types of self-assessment activities**	Discuss the questions presented with a colleague at work or a person in your learning network.
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. 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: *Remember 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.*
Slides 15	**Different types of self-assessment activities**	Discuss the questions presented with a colleague at work or a person in your learning network.
Slide 16	**Assessing group work**	Discuss the questions presented with a colleague at work or a person in your learning network. Have in mind the following:

- 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**	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 19-20	**Application activity – Assessing Group Work (C3a)**	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 you identify the main decisions that need to be made when organizing a group activity. *Note: Decisions 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.*
Slides 21-22	**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 23-24	**Application activity – Evaluating group work through a peer-assessment rubric (C3b)**	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 you identify aspects of group work that can be included in its assessment. *Note: 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.*
Slide 25-26	**Revising your action plan**	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. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 27-28	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support so please get in touch with us via email at any point that you may need support.

Group C- Session 4

Study the material of session 4 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group C- Session 4 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
Slide 6	**Challenges of differentiation**	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 7-8	**Application activity – The slow pace student scenario (C4a)**	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 you 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. 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 you 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?*

Slide 9-11

Application activity– Responding to students' questions during assessment administration (C4b)

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 you identify how the process of administration can be differentiated to better support different students' needs.

NOTE: The second application activity also addresses the challenge of differentiation in relation to assessment administration. The different scenarios are expected to help you 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.

Slide 12

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 you 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 13-16 **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, you 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 you must design/choose good quality homework tasks (see slide 11 for good homework tasks characteristics) that are appropriate for achieving the purpose decided.

Finally, you 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.

Slide 17 **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.

Have in mind the following:

- 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.

Slide 18-19	**Revising your action plan**	Study the suggested actions under the **O2. Differentiate assessment** heading in the template action plan. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 20-21	**Closing slides**	It is important to stress that this training can have positive impact only if you are actively involved in improving your practice. Our research team is available for your support.

Group C- Session 5

Study the material of session 5 by going through the slides (see http://www.ucy.ac.cy/formas/en/resources).

Group C- Session 5 Outline		
Slides 1-2	**Introductory slides**	
Slide 3	**Reflection Activity**	You are asked to reflect on your attempts to implement actions from your personal action plan. Implementation efforts in-between sessions are necessary for improvement in your assessment practice to be achieved. In case you have not yet actively engaged with your action try to identify why and suggest ways to overcome possible barriers.
Slides 4	**Session outline**	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	**Intended Learning Outcomes**	Presentation of what you are expected to be able to do by the end of the session (intended learning outcomes).
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 7-11	**Application activity – Recording results in ways that facilitate their formative use (C5a)**	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 you develop your assessment recording skills. You 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. Possible responses to the questions are provided in the **Application activity – Recording results in ways that facilitate their formative use (C5a)- Suggested Answers** file (see Appendix E).
Slide 12	**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.
Slides 13-15	**Application activity – Recording results in ways that facilitate their formative use (C5b)**	Data recorded should provide a valid description of a student's learning in relation to the ILO's. This application activity aims to help you 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

Slide 16-18	**Application activity – Responding to students' questions during assessment administration(C5c)**	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 you acknowledge other sources of assessment information (i.e. students' behaviour during assessment administration) and adapt the recording process to include such information. Remember 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. We discussed that: ➢ *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.* Now, study the scenarios again but this time having in mind that these students have similar reactions every time they are assigned an assessment.
Slide 19	**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 20-25	**Application activity – Recording assessment and differentiation (C5d)**	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 you 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).

		Information to guide the discussion is available in the **Application activity – Recording assessment and differentiation (C5d)-Suggested answers** file (see Appendix E).
Slides 26-27	**Revising your action plan**	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. Work on you action plan and revise your actions based on your reflection of what you have tried so far and on the new material that was presented in this session.
Slides 28-30	**Closing slides**	This is the final session of the TPD course. However, you are expected to continue working on improving their practice based on the aspects discussed throughout the five sessions. Please complete the Assessment Skills Questionnaire and send it to our research team (formas@ucy.ac.cy). Our team will analyze the data, inform you of your final evaluation results and provide suggestions on how your learning can continue.

CONCLUDING COMMENTS

This handbook is addressed to teachers interested in improving their skills in student assessment. Specifically, it aims to support you to engage in a self- development process focused in effective student assessment. The process and material presented in this handbook are based on a training course designed under the FORMAS project. This guide has been designed to enable you to think through how you can develop your assessment practice by identifying strengths or areas for development within your practice, while at the same time providing you with support to help you achieve improvement. We remind you that our research team is available to provide you with the support and tools needed for your development and you should feel free to contact us (at any time you like) in order to assist you (formas@ucy.ac.cy). Our aim is for you to take on your development in a supportive, guided environment. We hope that you find this handbook helpful for your professional development journey!

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Appendix A: The Teacher Assessment Skills Questionnaire

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Teacher Questionnaire

The aim of this research is to gather information about the professional development needs of secondary education mathematics teachers. The statements relate to the assessment of students in mathematics and refer to teacher actions/practices during the five main phases of the assessment process: *a) constructing/selecting assessment tools/processes, b) administering assessment tools/processes, c) recording assessment results, d) analysing, interpreting and using assessment results and e) reporting assessment results to intended users.* Data elicited by this study will be used to design a professional development programme that matches the needs of participating teachers. You are reassured that all information collected by means of this questionnaire will be used strictly confidentially. You are kindly requested to answer all questions in all honesty.

Written Assessment	Any assessment task that requires students to respond in a written form
Oral Assessment	Any assessment task that requires an oral response
Performance Assessment	Any assessment task that requires students to demonstrate a skill. It requires observation

PART A

Tick (√) the appropriate box or complete:

1) **Gender:** Male ☐ Female ☐

2) **Position:** Teacher ☐ Deputy head teacher ☐ Head teacher ☐

3) Years of Teaching Experience: …….
(Consider the current year as a full year)

4) Rank the following **assessment purposes** by using numbers 1 to 3, so that number 1 refers to the most important purpose for which you assess your students in mathematics, number 2 refers to a less important purpose and where number 3 refers to the least important assessment purpose.

1 means 'most important' and 3 means 'least important'

In mathematics I assess my students in order to:

A. Evaluate the results of my teaching ☐

B. To rank my students by giving them a grade ☐

C. Identify the needs of my students and plan my teaching accordingly ☐

PART B: <u>WRITTEN ASSESSMENT</u> IN MATHEMATICS

Tick (√) the appropriate box:

1) When I assess my students in mathematics, I use written assessment activities (e.g. tests, quizzes, exercises):

A. Never ☐

B. Once a semester ☐

C. Once in a month ☐

D. At the end of each unit/a series of lessons/chapter ☐

E. More than once during a unit unit/a series of lessons/chapter ☐

F. Once or more during a lesson ☐

2) I give feedback to students about the results of a written test:

A. Immediately (e.g. online quizzes) ☐

B. Less than a week after the administration of the test ☐

C. One week after the administration of the test ☐

D. Two weeks after administration of the test ☐

E. More than two weeks after the administration of the test ☐

F. Never ☐

If you ticked 'Never', for question 1 do not answer questions 3-17 of Part B and proceed to Part C. If you ticked any other option, then please answer all questions of Part B.

The statements 3-17 of Part B refer to the use of written tests in mathematics. Circle a number, from a scale of 1-5, to show to what extent, the following statements reflect what occurs during mathematics assessment in your classroom. Number 1 refers to facts that occur very rarely or never, whereas number 5 refers to facts that occur very often *(e.g., at least once during a unit//a series of lessons/chapter).*

1 means 'Never' and 5 means 'Always'

3) I use items/exercises/questions that require students to explain the procedure they used in order to respond/answer.	1	2	3	4	5
4) I provide help to a student when I realize that she/he is having some difficulties during a written assessment.	1	2	3	4	5
5) All students are asked to answer exactly the same questions/complete the same activities in every written test.	1	2	3	4	5
6) During written assessments, a great number of students asks clarifications about the instructions for the exercises.	1	2	3	4	5
7) In my written tests, results from one exercise are used in order to solve a subsequent exercise *(e.g. students are required to do operations and then create a graph based on their answers)*	1	2	3	4	5
8) The written tests I use include:					
A. Multiple Choice Questions	1	2	3	4	5
B. True / False questions	1	2	3	4	5
C. Fill-in exercises	1	2	3	4	5
D. Matching exercises	1	2	3	4	5
E. Short Answers	1	2	3	4	5

F. Open-ended questions (can be answered using multiple problem solving procedures/strategies)	1	2	3	4	5
9) Before designing a test, I identify the learning objectives I want to assess and indicate which items/exercises/questions of the test correspond to each objective.	1	2	3	4	5
10) I construct items/exercises/questions for a written test taking into account my students' abilities *(e.g. in a class of lower-ability students I use easier exercises).*	1	2	3	4	5
11) I share learning objectives, in terms of what students will be able to do at the end of the lesson, with my students	1	2	3	4	5
12) Once I realize that a student has difficulties in comprehending an exercise, I provide clarifications to that student.	1	2	3	4	5
13) All students have the same amount of time for completing a written test.	1	2	3	4	5
14) I construct items/exercises/questions for a written test taking into account the content covered during my teaching	1	2	3	4	5
15) Before students begin to complete a written assessment *(e.g., a test, quiz, assignment):*					
A. I provide a detailed explanation on the instructions for each question /activity.	1	2	3	4	5
B. I provide general instructions for how to complete the assessment.	1	2	3	4	5
C. I do not provide any instructions and expect students to begin immediately	1	2	3	4	5
16) When I realize that a number of students have not fully comprehended an item/exercise/question, I interrupt and provide further clarifications for the whole class.	1	2	3	4	5
17) I indicate success criteria for assessment tasks	1	2	3	4	5

PART C: <u>ORAL ASSESSMENT</u> IN MATHEMATICS

Tick (√) the appropriate box:

1) When I assess my students, I use oral assessment:

A. Never ☐

B. Once a semester ☐

C. Once in a month ☐

D. At the end of each unit/a series of lessons/chapter ☐

E. More than once during a unit/a series of lessons/chapter ☐

F. Once or more during a lesson ☐

With regard to the previous question, if you ticked 'Never', do not answer questions 2-9 of Part C and proceed to Part D. If you ticked another choice, then please answer all questions of Part C.

To answer the questions of Part C, circle a number, from scale 1-5, in order to show to what extent, the following statements reflect what occurs during mathematics assessment in your classroom.

1 means 'Never' and 5 means 'Always'

2) I orally assess my students in mathematics:

A. during classroom discussions (without selecting in advance which students will be assessed)	1	2	3	4	5
B. after I have planned to do this and when students are aware of the assessment (formal oral test)	1	2	3	4	5
C. after I have planned to do this , but students are not aware of the assessment (informal oral assessment)	1	2	3	4	5
3) I know in advance which students I am going to assess orally and which question(s) I am going to ask each student.	1	2	3	4	5
4) I orally assess students to check to what extent the results correspond to the results of the written test.	1	2	3	4	5
5) I take into account students' language proficiency when I ask questions.	1	2	3	4	5

6) All students have the same time to answer oral questions	1	2	3	4	5
7) I take into account students' abilities when I ask questions *(e.g. I adapt the level of difficulty of a question)*	1	2	3	4	5
8) When a student has difficulties in answering an oral question, then:					
A. I rephrase the question	1	2	3	4	5
B. I provide further clues	1	2	3	4	5
C. I ask other students to answer the same question	1	2	3	4	5
9) I orally assess students to evaluate the extent to which they are able to communicate their mathematical knowledge and understanding	1	2	3	4	5

PART D: <u>PERFORMANCE</u> ASSESSMENT

Tick (√) the appropriate box:

1) I use performance assessment *(e.g. their ability to use the compass)* to assess my students in mathematics:

A. Never ☐

B. Once a semester ☐

C. Once a month ☐

D. At the end of a unit /a series of lessons/chapter ☐

E. More than once during a unit /a series of lessons/chapter ☐

F. Once or more during a lesson ☐

At the previous question, if you ticked 'Never', do not answer questions 2-9 of Part D and proceed to Part E. If you ticked another choice, then please answer <u>all</u> questions of Part D.

To answer questions 2-9 of Part D, circle a number, from a scale 1-5, in order to show to what extent, the following statements reflect what occurs during mathematics assessment in your classroom.

1 means 'Never' and 5 means 'Always'

2) I randomly observe my students for assessment purposes (without planning in advance who I will observe and how)	1	2	3	4	5
3) Before I administer a performance test, I decide which students I am going to evaluate	1	2	3	4	5
4)When students work in groups, I evaluate the extent to which each student cooperates well with others (in case you do not use group work activities, do not answer this question)	1	2	3	4	5
5) I assess how a student performs an activity to check her/his skills *(e.g. if s/he knows how to use the compass)*	1	2	3	4	5
6) During a performance test I evaluate the procedure a student follows to solve a problem.	1	2	3	4	5
7) When I use observation to assess group work, I focus on identifying each student's contribution to the team.	1	2	3	4	5
8) Before proceeding to a performance assessment, I decide the objectives I want to assess and the activities to be used.	1	2	3	4	5
9) When students work in groups, I evaluate only the final outcome of the whole group.	1	2	3	4	5

PART E: <u>SELF AND PEER</u> ASSESSMENT

Tick (√) the appropriate box:

1) When I assess my students in mathematics, I use self-assessment activities:

A. Never

B. Once a semester ☐

C. Once a month ☐

D. At the end of each unit/a series of lessons/chapter ☐

E. More than once during a unit/a series of lessons/chapter ☐

F. Once or more during a lesson ☐

If you ticked 'Never' in the previous question 1, then please do not answer questions 2 – 14 of Part E and proceed to question 15. If you ticked another choice, then continue answering all questions.

1 means 'Never' and 5 means 'Always'

2) Students are asked to generate criteria for self-assessment	1	2	3	4	5
3) Students are free to self-reflect on any aspect of their performance/work they consider important	1	2	3	4	5
4) Student are expected to share their self-assessment records with other students	1	2	3	4	5
5) I give feedback to students about the accuracy of their self-assessment	1	2	3	4	5
6) Student self-assessment is also used as part of their grading	1	2	3	4	5
7) I keep records of how accurately each student self-assesses his/her performance	1	2	3	4	5
8) I provide students with specific evaluation criteria to be applied for self-assessment	1	2	3	4	5
9) I provide rubrics/scripts for self-assessment	1	2	3	4	5

10) When students are asked to use a process in an exercise/activity I ask students to:

A. Evaluate the appropriateness of the process they have followed	1	2	3	4	5
B. Identify strengths / weakness of the process followed	1	2	3	4	5
C. Predict whether they can identify the appropriate process before they apply it	1	2	3	4	5
11) I ask students to keep a record of their learning *(e.g. reflective diary)*	1	2	3	4	5
12) Students are expected to share their self-assessment records with me	1	2	3	4	5
13) I introduce peer assessment activities before introducing self-assessment activities	1	2	3	4	5
14) When students are asked to find a solution to an exercise/activity I ask students to:					
A. Predict whether they will be able to solve the exercise correctly	1	2	3	4	5
B. Evaluate the final outcome of their assessment task *(e.g., a project or the final solution for a problem)*	1	2	3	4	5

15) When I assess my students in mathematics, I use peer assessment activities:

A. Never ☐
B. Once a semester ☐
C. Once a month ☐
D. At the end of each unit/a series of lessons/chapter ☐
E. More than once during a unit/a series of lessons/chapter ☐
F. Once or more during a lesson ☐

If you ticked 'Never' in question 15, then please do not answer questions 16- 20 of Part E and proceed to Part F. If you ticked another choice, then continue answering all questions.

1 means ‘Never’ and 5 means ‘Always’

16) Students are asked to generate criteria for peer assessment	1	2	3	4	5
17) I inform students about the accuracy of their peer assessment	1	2	3	4	5
18) Students are expected to share their peer assessment records with other classmates	1	2	3	4	5
19) Students are expected to share their peer assessment records with me	1	2	3	4	5
20) I provide rubrics/scripts for peer assessment	1	2	3	4	5

PART F: RECORDING AND REPORTING RESULTS

Part F refers to statements concerning the recording and reporting of assessment results. Circle a number, from a scale 1-5, to show to what extent, the following statements reflect what occurs during mathematics assessment in your classroom.

1 means 'Never' and 5 means 'Always'

1) I keep a record of the results that emerged from:					
A. Written Assessment	1	2	3	4	5
B. Oral Assessment	1	2	3	4	5
C. Performance Assessment	1	2	3	4	5
D. Self-assessment	1	2	3	4	5
E. Peer-assessment	1	2	3	4	5
F. Home Work	1	2	3	4	5
2) The results of written assessments are given back to students in the form of:					
A. numeric rating scale *(e.g. 0- 10/0-20/0-100)*	1	2	3	4	5
B. a letter and symbol rating scale *(e.g. A, B)*	1	2	3	4	5
C. a general comment *(e.g. 'Very Good', 'You need to study harder')*	1	2	3	4	5
D. a specific comment in relation to weaknesses identified	1	2	3	4	5

3) The assessment records I keep are about:

A. each student's performance for each item/exercise/question	1	2	3	4	5
B. the student's general performance	1	2	3	4	5
C. the classroom's overall performance	1	2	3	4	5
D. the student's performance per objective	1	2	3	4	5
E. the student's ability to apply criteria for self/peer assessment	1	2	3	4	5
F. the student's ability to cooperate with other students	1	2	3	4	5
G. the classroom's overall performance regarding specific the teaching / learning objectives for the unit/a series of lessons/chapter taught	1	2	3	4	5
4) When students work in groups, I record comments regarding:					
A. each team's overall performance	1	2	3	4	5
B. the contribution of each student to the team	1	2	3	4	5
C. each student's performance compared with the other members of the team.	1	2	3	4	5
5) When I record the results of an assessment I use:					
A. a numeric rating scale *(e.g. 0-10/0-20/0-100)*	1	2	3	4	5
B. a letter and symbol rating scale *(e.g. A, B)*	1	2	3	4	5
C. comments regarding the specific needs of different groups of students based on their abilities	1	2	3	4	5
D. comments regarding the specific needs of each student	1	2	3	4	5
E. general comments regarding a student's performance	1	2	3	4	5
F. general comments regarding a student's progress	1	2	3	4	5
6) I evaluate all homework assigned and provide feedback to students.	1	2	3	4	5
7) I ask my students to make corrections/additions to their work based on the feedback given	1	2	3	4	5
8) I discuss each student's assessments results individually.	1	2	3	4	5

9) When I inform students about their assessment results, I point out which actions they can take to improve themselves.	1	2	3	4	5

10) I inform students regarding the results that emerged from administering:

A. Written assessments	1	2	3	4	5
B. Oral assessments	1	2	3	4	5
C. Performance assessments	1	2	3	4	5
D. Homework	1	2	3	4	5
E. Self-assessments	1	2	3	4	5
F. Peer assessments	1	2	3	4	5

11) Please share any additional comments/remarks regarding student assessment in the space given below.

Additional Comments:

Thank you for your time

Appendix B: Action Plans

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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*

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Action Plan for Improvement – Group B

Name:	**School Year:** **2019-2020**	**Area of actions:** **FOCUS AREA B**

Objective(s):

1. Use different types of assessment techniques in an efficient and systematic way (i.e. written/ oral/ performance) and keeping records
2. Formulate assessment success criteria and designing assessment checklists/rubrics
3. Involve students in the process of assessment
4. 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

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Action Plan for Improvement – Group C

Name:	School Year: 2019-2020	Area of actions: FOCUS AREA C

Objective(s):

1. Introduce peer and self- assessment – Using different types of self-assessment activities
2. Differentiate assessment
3. Assess group work
4. 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

Appendix C: Application Activities for Group A (sessions 2-5)

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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. Based on the above 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

Suggestions

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

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*

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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 slides 9 and 10 to evaluate your ILOs and make revisions if necessary

ILO 1

ILO 2

COMMENTS/REVISIONS

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Application activity – Specification Table (A3b)

1. Study the written test given to you.
2. Based on the test 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, reflect on 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				

A) Do you consider that the distribution of the exercises fulfills the objectives adequately?

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B) Would you remove any exercises to improve the test? If so, which ones and why?

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C) Would you add any exercises to improve the test? If so, such changes would be in relation to which concepts / activities / dimensions?

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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 EZHΘ and its rectangle frame ΑΒΓΔ. The length EZ of the painting is (3χ + 2) cm and its width ZH 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.

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Application activity – Specification Table (A3b)- Suggested Answers

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**

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

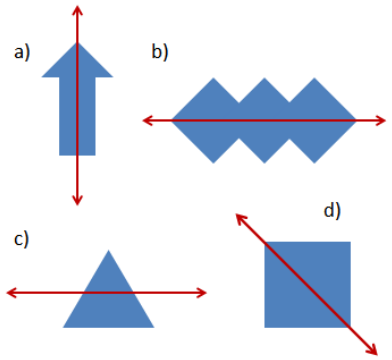
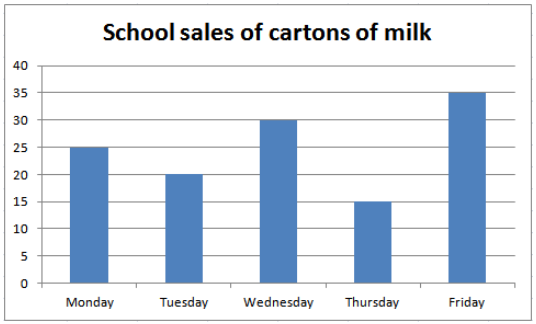
1. Study the item development guidelines given to you. These guidelines provide some "rules of thump" regarding the construction of each type of item.
2. Then, evaluate the assessment items given to you based on the guidelines
3. Are there items that can be improved? If yes, make suggestions

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		

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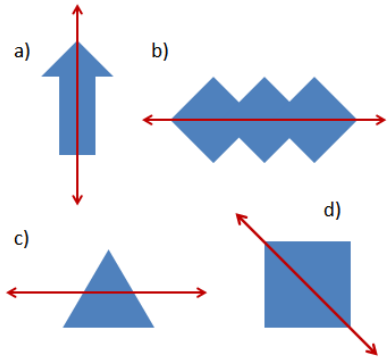
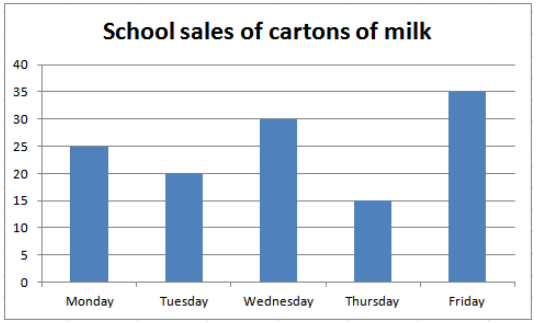
Application activity –Evaluating the quality of assessment items (A4a)- Suggested Answers

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)*	

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 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.	*Consecutive inter-related questions.* *Not clear objective of assessment*	

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.  How many cartons of milk did the school sell that week? a) 115 b) 125 c) 25 d) None of the above	*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.*	

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.*	

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

1. Evaluate the six (6) assessment activities presented below. 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) $\Longrightarrow -2x = -16$ (Step 2) $\Longrightarrow x = 8$ 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

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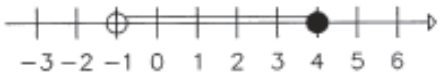
Application activity - Multi-dimensional assessment of student achievement (A4b)- Suggested Answers

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) $\Longrightarrow x = 8$	The activity assesses: i. Skills in mathematical procedures involved in the solution of linear equations. ii. Understanding of properties of equities	

iii. Is George's answer correct? iv. Which properties has George applied in each step of the solution?		
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	

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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. Reflect on the following:

- *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 provided.

Alternative tasks

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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.

Appendix D: Application Activities for Group B (sessions 2-5)

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Application activity- Collecting information (B2a)

INFORMAL

FORMAL

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

1. Below you can see 3 different learning objectives. Work 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.			

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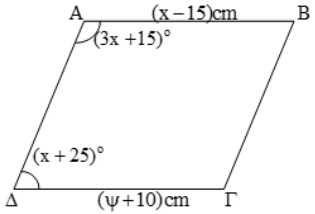
Application activity – Using different types of assessment techniques (B2b)- Suggested answers

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.

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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, 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. Now, consider the following:

- *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?*

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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.

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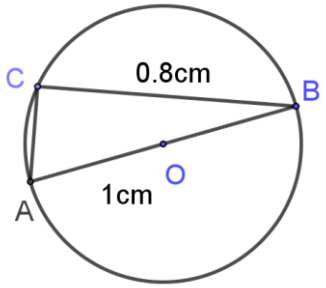
Application activity – Formulating success criteria (B3b)

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 to formulate assessment success criteria for this task.

Success criteria

3. Are there ways to improve your criteria? When doing so, consider 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?*

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Application activity – Designing a rubric (B4)

1. Design a rubric for each of the two (2) learning tasks provided below.
2. What kind of rubric is more appropriate for each task (i.e. holistic or analytical?) based on the objective evaluated?

➢ *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 Task 1
Expand the expressions:

- $x-32=$
- $2a-32a+3=$

Learning Task 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 Task 1

Rubric for Task 2

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Application activity – Types of feedback (B5)

1. The six (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, consider the folloing:

✓ *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?*

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Application activity – Types of feedback (B5)- Suggested Answers

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 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.

Appendix E: Application Activities for Group C (sessions 2-5)

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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.

- Write down any other ground rules that you consider necessary before introducing a peer-assessment activity.

Ground rules for assessing peers' work

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

1. Suggest ways to foster a culture in a classroom that acknowledges students' diversity and accepts differentiation practices. Think of 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. You can share this with a colleague of person in your learning network for feedback.

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Application activity – Assessing Group Work (C3a)

1. Complete the table presented below. The table refers to the main decisions that need to be taken when assigning a task to a group.
2. Discuss your decisions with a colleague or a person in your learning network. Explain your decisions and exchange feedback.
3. Based on this 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): ……. …….. …….. ……..

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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. 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. Do you agree with the criteria set? Would you add/remove/change any of them? Do you suggest any changes/ improvements?

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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. Now, consider the following:

- 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?

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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?

Consider the following:

- 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?

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

1. Study the two activities presented below. Then:

✓ 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 , $B\Gamma = \frac{\sqrt{5x\sqrt{25}}}{\sqrt{x}}$ cm , $A\Gamma = \frac{\left(3^5 \cdot \sqrt{x}\right)^2}{3^9 \cdot x}$ 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

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

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 , $B\Gamma = \frac{\sqrt{5x\sqrt{25}}}{\sqrt{x}}$ cm , $A\Gamma = \frac{\left(3^5 \cdot \sqrt{x}\right)^2}{3^9 \cdot x}$ 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

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Application activity – Recording results in ways that facilitate their formative use (C5b)

1. The record sheet below presents the performance of 15 students (a mathematics classroom) in a specific assessment activity.
2. 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**		

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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?

Taking into account that the particular students have similar reactions every time they are assigned an assessment, consider how you could adapt the recording of assessment to address the difficulties they appear to face?

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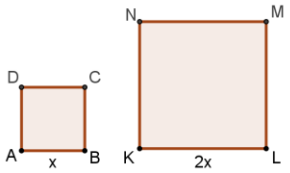
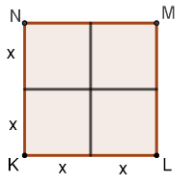
Application activity – Recording assessment and differentiation (C5d)

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. Consider the following:

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

2. 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

3. 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

4. How would adjust your instruction to address the needs of each student?

Student A

Student B

Student C

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Application activity – Recording assessment and differentiation (C5d) - Suggested Answers

Discussion:

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.