OBPWO 21.02 - Begeleiding van leraren(teams): ontwikkeling van een model en instrumentarium om effectiviteit in kaart te brengen

Onderzoeksrapport 2: De ontwikkeling van een instrumentarium
Bijlage 1: Inventaris van instrumenten

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Inhoud

BIJLAGE DEEL 1. Inventaris van instrumenten uit literatuurstudie

In dit deel geven we meer informatie over de diverse instrumenten die we vonden na de systematische literatuurstudie. We hebben de instrumenten alfabetisch op naam van de auteurs geordend. Alle instrumenten peilen onder meer naar effecten van begeleidingsinterventies of professionaliseringsinitiatieven. We hebben de informatie overgenomen uit artikels. Soms wordt het volledig instrument beschreven en zijn alle items beschikbaar. Soms worden wel de onderdelen van het instrument beschreven en worden slechts enkele voorbeelditems gegeven.

Bautista & Wong (2019)

The survey, which is fully available as an Appendix in Bautista, Toh, & Wong (2016), was structured in **four sections**:

1. Demographics.
2. Understanding of professional development (PD), motivations with regards to music-specific PD, and awareness of music-specific PD available in Singapore.
3. Prior experiences in music-specific PD: features of most and least helpful PD.
4. Teachers' PD needs, priorities and preferences, self-reported learning, and levels of satisfaction.

The survey included multiple types of questions (e.g., open-ended, yes/no, check-all-that-apply, quantitative sliders). This study focuses on Section 3, which begun by asking teachers to "Think of the PD experience that helped you THE MOST in improving your practice as a music teacher." We asked them 10 questions (relating to Desimone's features) about that particular PD experience. Subsequently, teachers were asked the very same questions in relation to THE LEAST helpful PD experience. By asking exactly the same set of questions, our aim was to analyze the extent to which teachers' subjective perceptions of the usefulness of two "extreme" PD initiatives (i.e., the most and the least helpful) were associated to the core and structural features of these specific initiatives.

The **survey was piloted** in individual interviews with 12 teachers, who were recruited via a snowball sampling procedure. We asked them to think out loud while reading the items, while a member of the research team (on-site) asked questions to better understand how the items or key terms were being interpreted. After each interview, we introduced modifications to enhance the survey's legibility (e.g., improved word choices when the meaning was unclear), its content validity (e.g., added new response choices based on teachers' own responses), as well as its flow (e.g., modified the order of the items to smooth the transitions between different topics).

Appendix: Full survey used in our exploratory study

1. Gender: - Male/ - Female

2. Age: ___

3. What is your designation in school? If you have several roles, please choose only the highest:
- Teacher
- Music Coordinator
- Senior Teacher / Lead Teacher
- Subject Head / Acting Subject Head
- Head of Department / Acting Head of Department

4. Total years of teaching experience (including contract teaching, if applicable): ___

5. Years of experience teaching Music: ___

6. What levels do you currently teach for Music? (Tick all that apply)
- Primary 1
- Primary 2
- Primary 3
- Primary 4
- Primary 5
- Primary 6

7. Music is your…
- Curriculum Specialization 1 or 2 [Major]
- Curriculum Specialization 3 [Minor]
- None or the above [Generalist]

8. Approximately, how many hours per week have you taught Music this academic year?: ___

9. Tick the ones you have completed:
- Graded Examinations for Theory (at least Grade 5)
- Graded Examinations for Practical (at least Grade 5)
- Level Music
- Music Elective Programme
- A Level Music
- Diploma in Education (with Music specialization)
- BA or BMus
- Post Graduate Diploma in Education (with Music specialization)
- Advanced Diploma in Primary Music Education
- Masters in Music
- Masters Music Education
- Masters in Education (with a Music strand)
- PhD in Music
- PhD in Music Education
- Others

10. Write one or two short sentences that describe what you understand by Teacher Professional Development (PD). What is PD for you? Please write down the first thing that comes to mind: _____

11. How motivated are you in participating in PD activities in Music Education?

12. To what extent does your school inform you about the available PD opportunities for Singapore Music teachers?
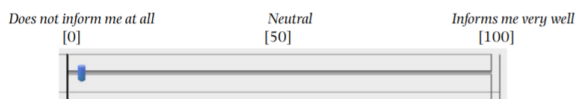
13. How encouraging is your school about having you participate in Music-specific PD activities?

Not encouraging at all | Neutral | Extremely encouraging
[0] | [50] | [100]
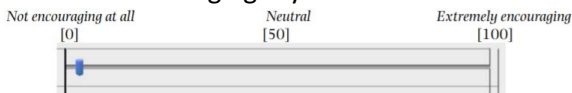
14. Do you think the information given to teachers in the advertisements of Music PD activities is sufficient to help them decide whether the activities will be suitable for them?

    No, it is not   Neutral   Yes, it is
    [0]   [50]   [100]

15. Do you consider activities where you do NOT receive official recognition and/or certificates as PD?

    No, that is not PD   Neutral   Yes, that is also PD
    [0]   [50]   [100]

16. Do you think informal forms of PD are sufficiently valued and/or recognized in your school? (participating in Music-related activities, such as bands or choirs, or discussing teaching approaches with other Music teachers)

    Absolutely no   Neutral   Absolutely yes
    [0]   [50]   [100]

17. Have you participated in any Music Education PD activities IN THE PAST 3 YEARS? (e.g., seminars, workshops, talks, conferences, meetings with other Music teachers, observations of other teachers' Music lessons, cluster meetings, etc.)

    - Yes
    - No

If No was selected, the participant would skip to Item 42

18. When I engage in Music PD activities, I generally do it because I want to… (*)
    • enhance my pupils' musical learning
    • look good on my CV to develop future career prospects
    • fulfill my school's required hours of training
    • become a better Music teacher
    • improve appraisal performance for promotion
    • enhance my Music content knowledge
    • keep abreast of MOE policies and syllabus changes
    • gain confidence and feel more competent as a Music teacher
    • interact with other Music teachers
    • I do it because I have to, not because I want to

(*) The following slider was presented for each of the statements.

    Not motivated at all   Neutral   Extremely motivated
    [0]   [50]   [100]

19. Think of the PD in Music Education you have done in the PAST 3 YEARS. Indicate the number of times you have participated in the following activities.
    • Seminars, lectures, and/or talks: ___
    • Hands-on workshops: ___
    • Online courses: ___
    • Conferences, symposiums or convention: ___
    • Courses or diplomas from NIE or STAR: ___
    • Courses or diplomas from other institutions (ABRSM, WSQ): ___
    • School meetings with teachers from other disciplines: ___

• Meetings with other Music teachers at school or cluster meetings: ___
• Mentoring amongst teachers (e.g. observe other teachers' classes): ___

20. Overall, the PD activities in which I have participated… (*)
- had a positive impact on my pupils' learning
- were relevant to my work as a Music teacher
- made me aware of pupils' musical preferences, interests and intuitive ideas
- improved my knowledge of musical concepts and theories
- improved my playing of musical instruments
- improved my singing skills
- improved my improvisation skills
- improved my composition skills
- expanded my knowledge on World Music
- expanded my knowledge on Local Music
- expanded my knowledge on Pop Music
- expanded my knowledge on Music technology
- expanded my knowledge on Music pedagogies (Dalcroze, Kodaly)
- helped me become a better Music teacher
- helped me better design and implement Music activities
- prepared me to better teach diverse populations of pupils
- prepared me to better respond to pupils' musical thinking
- helped me better assess my pupils' knowledge
- promoted peer learning amongst teachers
- provided me with a network of Music teachers with whom I actively share ideas
- fostered a sense of belonging to the fraternity of Singapore Music teachers

(*) The following slider was presented for each of the statements.

No, not really	Neutral	Yes, totally
[0]	[50]	[100]

21. Overall, how would you rate the QUALITY of the PD activities in which you participated with regards to their IMPACT ON… (*)
- your own teaching?
- your pupils' learning?

(*) The following slider was presented for each of the questions.

Poor impact	Neutral	High impact
[0]	[50]	[100]

22. Think of the PD experience that helped you THE MOST in improving your practice as a Music teacher. How would you rate the overall quality of that PD experience?

Poor quality	Neutral	High quality
[0]	[50]	[100]

23. What was the format of that PD experience?(Tick the one/s the apply)
○ Short duration event (2-3 hours), such as a seminar, lecture, or workshop
○ Formal course or diploma from NIE, STAR, ABRSM, or WSQ
○ Professional conference, symposium, or convention
○ Reading of teaching-related journals
○ Meeting with other teachers
○ Mentoring
○ Learning in informal settings
○ Others

24. Approximately, how many hours of contact with the PD providers did that experience entail? (both face-to-face and online): ___

25. How many hours of work outside of class did that PD experience entail? (assignments, homework, etc.): ___

26. Which of the following describes the content addressed in that PD? (Tick all that apply)
- Music concepts or theories
- Music analysis (structures, harmony)
- Instrumental skills
- Singing skills
- Composition
- Improvisation
- World Music
- Local Music
- Pop Music
- Music technology
- Classroom management
- Assessment
- General theories on teaching and learning (not specific to Music)
- Pedagogies specific to Music Education (Kodaly, Dalcroze, Orff)
- Design and implementation of Music learning activities
- Analyzing your own or other teachers' classroom practices
- Pupils' musical interests, preferences, and intuitive ideas
- Others

27. Did that PD experience promote group work and/or discussion amongst participating teachers?

No, not really	Neutral	Yes, totally
[0]	[50]	[100]

28. Do you think the duration of that PD experience was sufficient to achieve YOUR OWN learning goals?

No, not really	Neutral	Yes, totally
[0]	[50]	[100]

29. Do you think that the PD setting was a safe and non-judgmental environment, where teachers could express their own views, ideas and concerns freely?

No, not really	Neutral	Yes, totally
[0]	[50]	[100]

30. Did the PD providers have a procedure in place to follow-up on your learning after course completion?
- Yes
- No

31. What do you think about the follow-up support given to teachers after completion of that PD?

Poor quality	Neutral	High quality
[0]	[50]	[100]

32. Now, think of the PD experience that helped you THE LEAST in improving your practice as a Music teacher…[Items 32–41 were the same as 22–31, referred to the least helpful PD experience]

42. What are your preferred time slots to participate in Music Education PD? (Tick all that apply)
- During school hours
- After school hours
- During the first week of holidays
- During the last week of holidays

- Weekends
- Online courses would allow more flexibility

43. To better achieve the overall aims of Music education in Singapore, to what extent do YOU (not other teachers!)need further training in the following areas? (*)
- Music concepts / theories
- Music analysis
- Instrumental skills
- Singing skills
- Composition
- Improvisation
- World Music
- Pop Music
- Local Music
- Music technology
- Classroom management
- Assessment
- General theories on teaching and learning (non-specific to Music)
- Design and implementation of Music learning activities
- Pedagogies specific to Music Education (Kodaly, Dalcroze, Orff)
- Analysing and reflecting on your own or others' classroom practices
- Pupils' musical interests, preferences and intuitive ideas

(*) The following slider was presented for each of the questions.

No need for further training at all	Neutral	Extreme need for further training
[0]	[50]	[100]

44. Are there any other areas in which you feel that you need further training?: _____

45. To improve your knowledge and skills as a Music teacher, to what extent would you be interested in learning from the following groups? (*)
- Other Music teachers within my school
- Other Music teachers within my cluster
- PD providers (STAR, NIE, WSQ)
- Curriculum designers from MOE
- Music Vendors (Town4Kids, Music Factory, MasteReign)
- Professors from tertiary Music institutions
- Expert Musicians
- Music Practitioners
- Seasoned Music educators and pedagogues
- International researchers in Music Education

(*) The following slider was presented for each of the questions.

Not interested at all	Neutral	Extremely interested
[0]	[50]	[100]

46. In the future, I would like to participate in PD activities that have the following format. (*)
- Short duration events (2-3 hours) such as seminars, lectures or workshops
- Formal courses or diplomas from NIE, STAR, ABRSM or WSQ
- Conferences, symposiums or conventions
- Short on-line courses (2-3 hours)
- Long on-line courses (more than 10 hours)
- Meetings with other Music teachers (at school, cluster meetings)
- Mentoring amongst Music teachers (e.g., observing other teachers' classes)

- Learning in informal settings such as hallway discussions or over lunch
- Attending more concerts and other Music-related events

Not interested at all	Neutral	Extremely interested
[0]	[50]	[100]

47. What other formats of PD activities are you interested in participating?: _____

48. Feel free to add any other thoughts that you would like to share with us about Music Education PD (suggestions for improvement, how PD could better respond to your needs, etc.): ____

Borg (2018)

Voorbeeldvragen:

Trainerkwaliteit:

	Poor	Average	Good	Excellent
Knowledge of the subject matter				
Preparation for the course				
Presentation skills				
Held the attention of the class				
Encouraged class participation				

Wijzigingen in de praktijk:

The teacher	Inadequate	Adequate	Good	Excellent	Not Applicable
1. Defines clear learning objectives					
2. Selects activities appropriate to the objectives					
3. Uses a variety of interaction patterns					
4. Gives clear instructions in English					

High – It led to significant changes in the teaching of my mentees.	☐
Moderate – It led to some changes in the teaching of my mentees.	☐
Low – It led to a few changes in the teaching of my mentees.	☐
None – It did not lead to any changes in the teaching of my mentees.	☐

Leereffect deelnemers

Think about **your own spoken English** and complete this self assessment by ticking ONE box for each statement.	I cannot do this	I can do this but not well	I can do this just adequately	I can do this quite well	I can do this very well
Speaking Skills					
1. ask and answer questions on very familiar topics					
2. take an active part in a discussion on a familiar topic					
3. express and justify an opinion during a professional discussion					

Time (Minutes)	The teacher is							
	Giving Instructions	Asking questions	Managing pupils	Explaining language	Giving feedback	Reading aloud	Writing on board	Modelling Pronunciation
1								
2								
3								

Uitkomsten leerlingen:

As a result of the training course …	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Pupils speak more English in class	☐	☐	☐	☐	☐
2. My pupils are more motivated to learn English	☐	☐	☐	☐	☐
3. Pupils enjoy English lessons less than they used to	☐	☐	☐	☐	☐
4. Pupils are learning faster than before	☐	☐	☐	☐	☐
5. Pupils' test scores have improved	☐	☐	☐	☐	☐
6. Pupils are more autonomous language learners	☐	☐	☐	☐	☐
7. Pupils talk to each other more in English	☐	☐	☐	☐	☐
8. Pupils find English lessons more difficult than before	☐	☐	☐	☐	☐

Celestin & Yunfei (2018)

Table 1: LTSI pre-training constructs definitions extracted from Chang and Chiang (2013)

N	Pre-training constructs	Definition	Item example	Questions	Cronbach α
1	Learner readiness (LR)	The extent to which individuals are prepared to enter and participate in training	Before the training I had a good understanding of how it would fit my job-related development	1,8,9	$\alpha = 0.818$
2	Motivation to Transfer (MT)	The direction, intensity and persistence of effort towards utilizing in a work setting skills and knowledge learned	I get excited when I think about trying to use my new learning on my job.	2,3,4	$\alpha = 0.879$
3	Performance self-efficacy (PSE)	An individual's general belief that he is able to change his performance when he wants to	I am confident in my ability to use newly learned skills on the job	45,46,47	$\alpha = 0.818$
4	Perceived content validity (CV)	The extent to which trainee's judge training content to reflect job requirements accurately	What is taught in training closely matches my job requirements	27,28,29,	$\alpha = 0.868$
5	Personal capacity for transfer (PCT)	The extent to which individuals have time, Energy and mental space in their work lives to make changes required to transfer learning on the job	My workload allows me time to try new things I have learned	10,11,14,17	$\alpha = 0.701$
6	Transfer effort performance expectations (TEPE)	The expectation that effort devoted to transferring learning will lead to changes in job performance	My job performance Improves when I use new skills that I have learned.	34,35,38,36	$\alpha = 0.863$

In het artikel vonden we enkel voorbeelditems. De schaal werd opgevraagd bij Emeritus Professor Reid Bates. Hij verwees ons door naar een website waarop we de LTSI-scale konden aankopen. Deze schaal hebben we aangekocht, maar mag niet verspreid worden in het Engels.

Dunst & Raab (2010)

Evaluation Scale

A 24-item investigator-developed measure was used to have the participants evaluate the training they received. The measure included 12 practices for assessing the self-reported usefulness of the training and 12 practices for assessing self-reported changes in practitioner abilities. The scale items are indicators of the core practices of the preschool classroom model (Table 1). The practices included (1) classroom goals and objectives, (2) parent–practitioner partnerships, (3) practitioner supervision, (4) classroom organization, (5) developmentally appropriate activities, (6) personnel assignments to classroom activities and routines, (7) transitions between activities, (8) functional assessment and intervention, (9) instruction within classroom activities and routines, (10) responsive teaching, (11) positive behavioral supports, and (12) process and outcome evaluation.

Usefulness was assessed by asking participants to indicate the extent to which they found the training useful in their work with young children. Ability was assessed by asking participants to indicate the extent to which the training changed or improved their preschool classroom practices. Each of the usefulness and ability items was assessed on a 5-point Likert-type scale ranging from 1 (not at all) to 5 (very much) in terms of the respondents' self-evaluations. Similar types of measures have been used for evaluating the effects of in-service training on early intervention practitioners' knowledge and skills (e.g., Bailey, Buysse, & Palsha, 1990; Dunst, Trivette, & Deal, in press). We used a self-report measure because respondents resided in 26 different states. A principal component factor analysis of the 12 usefulness item responses produced a second-order single-factor solution ($\alpha = .95$) accounting for 74% of the variance. A factor analysis of the ability item responses also produced a second-order single-factor solution ($\alpha = .95$) accounting for 71% of the variance. A single second-order factor solution indicates that the factor structure is such that a total scale score is justified (Spector, 1992). Summated scores were therefore used as the dependent measures in the analysis described next.

Dit instrument werd opgevraagd bij Professor Carl Dunst, we kregen volgend antwoord terug:

> *Our Institute closed 7 years ago and we have been unable to read the hard drive with that survey. I spent some time yesterday looking in my own files but was not able to locate the survey. Sorry.*
>
> *Carl*

Gaumer Erickson et al. (2017)

Table 1. Percentage of HQPD Checklist items observed.

Preparation

1. Provides a description of the training with learning objectives prior to training

2. Provides readings, activities and/or questions to think about prior to the training

3. Provides an agenda (i.e. schedule of topics to be presented and times) before or beginning of training

4. Quickly establishes or builds on previously established rapport with participants

Introduction

5. Connects content to participants' context (e.g. community, school, district)

6. Includes the empirical research foundation of the content (e.g. citations, key researchers)

7. Content builds on or relates to participants' previous professional development

8. Aligns with school/district/state standards or goals

9. Emphasizes impact of content on student learning outcomes

Demonstration

10. Builds shared vocabulary required to implement and sustain the practice

11. Provides examples of the content/practice in use (e.g. case study, vignette)

12. Illustrates the applicability of the material, knowledge or practice to the participants' context

Engagement

13. Includes opportunities for participants to practice and/or rehearse new skills

14. Includes opportunities for participants to express personal perspectives (e.g. experience, thoughts)

15. Includes opportunities for participants to interact with each other related to training content

16. Adheres to agenda and time constraints

Evaluation

17. Includes opportunities for participants to reflect on learning

18. Includes discussion of specific indicators – related to the knowledge, material or skills

19. Engages participants in assessment of their acquisition of knowledge and skills

Mastery

20. Details follow-up activities that require participants to apply their learning in a new setting or context

21. Offers opportunities for continued learning through technical assistance and resources

22. Describes opportunities for coaching to improve fidelity of implementation

Hunzicker (2011)

Table 1. Effective professional development for teachers: a checklist.

	Yes	Partly	No
Supportive • Does it combine the needs of individuals with school/district goals? • Does it engage teachers, paraprofessionals and administrators? • Does it address the learning needs of specific schools, classrooms, grade levels and/or teachers? • Does it accommodate varying teaching assignments, career stages and teacher responses to educational innovation? • Does it accommodate individual learning styles and preferences? • Does it integrate teacher input and allow teachers to make choices?			
Job-embedded • Does it connect to teachers' daily responsibilities? • Does it include follow-up activities that require teachers to apply their learning? • Does it require teachers to reflect in writing?			
Instructional-focus • Does it emphasize improving student learning outcomes? • Does it address subject area content *and* how to teach it? • Does it help teachers to anticipate student misconceptions? • Does it equip teachers with a wide range of instructional strategies?			
Collaborative • Does it engage teachers physically, cognitively, and emotionally? • Does it engage teachers socially in working together toward common goals? • Does it require teachers to give and receive peer feedback?			
Ongoing • Does it require a high number of contact hours over several months' time? • Does it provide teachers with many opportunities over time to interact with ideas and procedures or practice new skills? • Does it 'build' on or relate to other professional development experiences in which teachers are required to engage?			

Note: Checklist previously registered on the ERIC database as ED510366 (Hunzicker 2010).

Ingvarson et al. (2005)

Knowledge. Teachers were asked to indicate the extent to which their participation in the professional development program had led to increased knowledge of: the content they teach, teaching and learning strategies appropriate to the content they teach, how students learn the content, individual differences amongst students and how to cater for their needs, how to link assessment into the teaching and learning cycle, classroom organisation and management. Teachers reported their responses to the individual items on a four-point scale from strongly agree to strongly disagree. The same scale applied to all four impact measures (Cronbach Alpha = 0.92).

Practice. Teachers were asked whether, as a result of their participation in the professional development program, they now:
- make clearer links between their teaching goals and classroom activities;
- manage classroom structures and activities more effectively;
- use more effective teaching and learning strategies appropriate to the content that they teach;
- use more effective teaching and learning strategies appropriate to the classroom context;
- use teaching and learning strategies that are more challenging and engaging;
- are better able to meet the individual learning needs of their students;
- link assessment into the teaching and learning cycle more effectively;
- provide more effective feedback to their students to support their learning;
- engage students in higher order thinking;
- access and use materials and resources more effectively. (Cronbach Alpha = 0.93)

Student learning outcomes. For example, teachers are asked whether, as a result of the PD program, their students now:
- have fewer difficulties in understanding what they are being taught;
- are learning more purposefully;
- are more actively engaged in learning activities;
- demonstrate enhanced learning outcomes;
- access and use materials and resources more effectively. (Cronbach Alpha = 0.95)

(Precise wording of these items varied slightly from program to program to match specific goals)

Teacher efficacy. Teachers are asked about the extent to which they agree or disagree with the following statements as a result of the PD program:
- My ability to meet the learning needs of my students has expanded
- My confidence in teaching [subject] has increased. (Cronbach Alpha = 0.85)

Factor analyses confirmed that the four impact measures had strong scale characteristics and were sensitive to differences across programs. Details about the psychometric properties of the impact variables can be provided on request.

Johnson et al. (2017)

23. Please indicate the number of times you have participated in each of the following activities **during this school year**. (Darken one oval on each line.)	0	1-2	3-4	5-6	7 or more
a. Participated in an LSC academic year "kit club"/study group/discussion group.	①	②	③	④	⑤
b. Was "coached" on my teaching by an LSC teacher leader/staff person based on a classroom observation.	①	②	③	④	⑤
c. Received assistance from an LSC "teacher leader" in my school.	①	②	③	④	⑤
d. Received assistance from an LSC staff person in my district.	①	②	③	④	⑤
e. Received assistance from an LSC-designated scientist/science educator from a college/university/museum/industry.	①	②	③	④	⑤
f. Read messages in a Listserv discussion sponsored by the LSC.	①	②	③	④	⑤
g. Posted messages to a Listserv discussion sponsored by the LSC.	①	②	③	④	⑤

24. How would you rate the overall quality of the LSC professional development? (Darken one oval.)	Very Poor	Poor	Fair	Good	Very Good	Excellent
	○	○	○	○	○	○

25. To what extent has participation in LSC science-related professional development increased your: (Darken one oval on	Not at all				To a great extent
a. Science content knowledge.	①	②	③	④	⑤
b. Understanding of how children think about/learn science.	①	②	③	④	⑤
c. Ability to implement high-quality science instructional materials.	①	②	③	④	⑤

Enkel de vragen relevant voor dit onderzoek werden geselecteerd om hier weer te geven, de volledige vragenlijst is terug te vinden via volgende link:
http://www.horizon-research.com/horizonresearchwp/wp-content/uploads/2013/04/teacher_questionnaire_s6121.pdf

Kartal et al. (2019)

Data collection tools and data analysis methods

In this study, data were collected and analysed based on the *"five level evaluation model"*. These levels are learning (teachers' learning about content), beliefs (whether the professional development program makes a difference in teachers' beliefs about teaching and learning content), transfer (whether the professional development program make a difference in teachers' classroom practice), results (student learning outcomes), and reaction (teachers' reactions to the professional development program). Data collection tools and data analysis methods used in the study are discussed below.

Teachers' learning about NOS

Teachers' learning about the NOS was assessed through pre-post semi-structured interviews using *"Views on Nature of Science Questionnaire, Form C (VNOS-C)"* developed by Abd-El-Khalick (1998). Analyses of the interviews were carried out in several steps. First, interviews were transcribed. Second, these transcripts were transferred to the qualitative data analysis program. Third, teachers' statements were grouped regarding NOS themes (the empirical NOS, the tentative NOS, inference and theoretical entities in science, the subjective and theory-laden NOS, and imagination and creativity in science). Before classifying all teacher statements about related themes, inter-rater reliability was also checked. Two participant transcripts were given to two raters who independently classified them. Inter-rater reliability was found to be 82%. Differences were reconciled through discussion between the raters; then, all the teacher statements were classified. At the end of the analysis, teacher statements about related themes were classified as "naive," "eclectic," and "informed." The naive category means having insufficient views on the NOS theme. The eclectic category means having inconsistent and often conflicting views on the concerned NOS theme. The informed category means

having consistent views with current approaches to the concerned NOS theme. For aiding the classifying procedure, the rubric developed by Irez (2004) was used, defining each of these categories for each theme (Appendix 1).

Teachers' beliefs about learning and teaching NOS
Teachers' beliefs about teaching and learning NOS were measured by using two Likerttype scales for the pre-post tests, Self-Efficacy Beliefs Toward Teaching Nature of Science Scale and the Science Education and Teaching Belief Scale (BARSTL). The Self-Efficacy Beliefs toward Teaching Nature of Science Scale was used for assessing teachers' self-efficacy beliefs as pre-post test. We developed this scale by adapting the Elementary Science Teaching Efficacy Belief Instrument developed by Enochs and Rings (1990). To investigate validity and reliability, an initial form was piloted with 328 pre-service science teachers. Exploratory factor analysis was performed to explore the internal structure of the self-efficacy scale. Because of the interval nature of the instrument, polychoric correlations were produced for factor analysis instead of Pearson product moment correlations. Polychoric correlations were used for both determining the number of factors and extracting factors. In order to accomplish that, firstly, the diagonal values of the correlation matrix were replaced by squared multiple correlations in order to approximate the communality estimates. Secondly, parallel analysis was conducted to determine number of factors. The Cronbach alpha coefficient of the full scale was found as .84. (Erdas Kartal, Dogan, Irez, Cakmakci & Yalaki, in-press).

The scale consists of 18 items (11 positive, 7 negative items) distributed under four dimensions: (1) willingness to teach NOS (4 items); (2) personal understanding of NOS (five items); (3) pedagogical content knowledge for teaching NOS (four items); and (4) assessment of learning (five items). The responses to the items are recorded on a four-point Likert-type frequency response scale. In scoring, each item response is allocated 1 (Strongly disagree), 2 (Disagree), 3 (Agree), and 4 (Strongly agree) points for each of the response categories.
Negative items are scored in reverse and, during analysis, are adjusted accordingly. Possible scores ranged from 18 to 72 points. A higher score indicates higher self-efficacy in teaching the NOS and a lower score represents lower self-efficacy in teaching the NOS. A total test score for each participant teacher was calculated as pre-post test. Pre-test and post-test averages of the teachers were compared at the $p < 0.05$ significance level using the Wilcoxon test. In order to compare the pre-test and post-test averages from the factors of the scale, four Wilcoxon tests were performed, in which case the p value was set to 0.05 / 4 = 0.125 (Bonferonni adjustments) so as not to raise the second type of error rate due to multiplicity.

The Beliefs About Reformed Science Teaching and Learning (BARSTL) Scale developed by Sampson and Benton (2006) was used as pre-post test for assessing teachers' beliefs about reform approaches. The BARSTL Scale includes 16 items that reflect a constructivist science education strategy, and 16 items that reflect a traditional science education strategy. Teachers indicated the degree to which they agreed or disagreed with each of these items using a Likert-type response scale. The items that represent a reformed perspective of science education are scored as 0, 1, 2, 3, respectively, for the responses: Strongly disagree (SD), Disagree (D), Agree (A), and Strongly agree (SA), while the items that represent a traditional perspective are scored in reverse. Possible scores ranged from 0 to 96 points, with higher scores reflecting beliefs about the teaching and learning of science that are more consistent with the current reform movement in science education (as described in AAAS, 1993; National Research Council [NRC], 1996). A total test score for each participant teacher was calculated as pre-post test. At the end, Wilcoxon signed ranks test (2-tailed) was used to compare the results.

Teachers' classroom practices in NOS
Improvement of teachers' practices in the NOS was assessed by video recording during their classroom practices. Thirty-nine video records were obtained and analysed using content analysis. The Nature of Science Classroom Observation and Artifact Protocol (NOS-COP) (Herman, Clough & Olson, 2012) was

translated into Turkish and was adapted to analyse the data, using ratings "naive", "eclectic" and "informed".

Student outcomes in NOS Students' (613 students) NOS views were measured by using the Views on Nature of Science Questionnaire, Form D (VNOS-D) (Lederman & Khishfe, 2002) as post-tests. In data analysis, five themes of the NOS (empirical NOS, tentative NOS, inference and theoretical entities in science, subjective and theory-laden NOS, imagination and creativity in science) were chosen to assess changes in the views of students. The data was classified as "naive-1", "eclectic-2", or "informed-3". To assess the student responses and to make the relevant coding, the researchers relied on the rubric developed by Lederman and Holliday (2011). Wilcoxon signed ranks test (2-tailed) was used to compare the results.

Teachers' reactions to the NOS-CPD program

Teachers' reactions to the CPD program were collected through interviews at the end of the study by using five open-ended questions. The first question concerned contributions of the professional development programs to teaching as a profession. The second question inquired whether the professional development programs had changed teachers' classroom practices or their perspectives upon teaching. The third question asked about differences between the professional development program and other programs they may have attended. The fourth question sought to identify strengths of the professional development program. The last question sought information on aspects that were lacking or could be improved. Data were analysed by using content analysis in six dimensions (the program's impact on teachers' knowledge about the NOS; impact on teachers' beliefs about teaching and learning the NOS; impact on teachers' classroom practices; program comparison; strengths of the program; and weaknesses of the program).

Het oorspronkelijke instrument werd opgevraagd bij dr. Eda Erdas Kartal:

Dear Dr. Aster Van Mieghem

First of all, I'm sorry for the delay in my response, your mail went into the spam box. The article you mentioned is a product of my doctoral thesis. I am sending you my doctoral thesis as an attachment. The questionnaires are available in the appendix of my thesis. You can find the English versions of VNOS-C, VNOS-D and BARSTL on the internet, I used their Turkish version in my thesis. We developed the self-efficacy scale ourselves, unfortunately, there is no English version of it. I hope the document I sent helps you for your purpose. With my best wishes.

Eda,

Een zoektocht op het wereldwijde web leidde tot volgende vragenlijsten:

Table 2. VNOS-D items and coding rubric

VNOS-D question	Coding rubric
What is science?	Inadequate: Science is everything Adequate: Science is exploring and studying topics, such as chemistry, insects, batteries, etc. Informed: Science is a way of knowing about the world
What other subjects are you learning? How is science different from other subjects? (Empirical NOS)	Inadequate: Science is in everything, science follows one method Adequate: Science investigates things Informed: Science uses data to make claims and create ideas
Scientists are always trying to learn about our world. Do you think what scientists know might change in the future? (Science is tentative)	Inadequate: Science does not change Adequate: As we learn more or have new technology science changes Informed: Science changes as we learn more or as scientists reinterpret existing data
How do scientists know that dinosaurs really existed? (observation and inference) How certain are scientists about the way dinosaurs looked? (tentative NOS; creative NOS)	Inadequate: Scientists saw dinosaurs. Scientists read about dinosaurs. They are sure Adequate: Scientists have collected evidence of dinosaurs (bones, fossils, etc.). They are pretty sure Informed: Scientists have made observations of evidence (bones, fossils, etc.) and inferred that dinosaurs must have existed. They are pretty sure, but could change their minds with new evidence, or looking at the existing evidence in a different way to create an idea of what dinosaurs must have looked like
A long time ago all the dinosaurs died. Scientists have different ideas about how and why they died. If scientists all have the same facts about dinosaurs, why do you think they disagree about this? (Subjective NOS)	Inadequate: If they had more information they would all agree Adequate: Scientists have different interpretations of the facts Informed: Scientists have different interpretations of the facts because of their background knowledge and experiences
TV weather people show pictures of how they think the weather will be for the next day. They use lots of scientific facts to help them make these pictures. How certain do you think the weather people are about these pictures? Why? (Tentative NOS, Observation and Inference)	Inadequate: They are certain because they have the data Adequate: They are not certain; they might get new data to interpret through inferences Informed: They are not certain; they might get new information or reinterpret the existing data that would change their prediction
Do you think scientists use their imaginations when they do their work? **Yes/No** If **No**, explain why? If **Yes**, then when do you think they use their imaginations? (Creativity)	Inadequate: No, they can't imagine things because it wouldn't be real Adequate: Yes, they use their imaginations to design investigations Informed: Yes, they use their imaginations to design investigations, interpret their data, and create explanations

Lederman, N. G., Abd-El-Khalick, F., Bell, R. L., & Schwartz, R. S. (2002). Views of nature of science questionnaire: Toward valid and meaningful assessment of learners' conceptions of nature of science. *Journal of research in science teaching*, *39*(6), 497-521.

Appendix: The BARSTL Questionnaire

How People Learn About Science

The statements below describe different viewpoints concerning the ways students learn about science. Based on your beliefs about how people learn, indicate if you agree or disagree with each of the statements below using the following scale:

SD: Strongly Disagree   D: Disagree   A: Agree   SA: Strongly Agree

1. Students develop many ideas about how the world works before they ever study about science in school.	SD	D	A	SA
2. Students learn in a disorderly fashion; they create their own knowledge by modifying their existing ideas in an effort to make sense of new and past experiences.	SD	D	A	SA
3. People are either talented at science or they are not, therefore student achievement in science is a reflection of their natural abilities.	SD	D	A	SA
4. Students are more likely to understand a scientific concept if the teacher explains the concept in a way that is clear and easy to understand.	SD	D	A	SA
5. Frequently, students have difficulty learning scientific concepts in school because their ideas about how the world works are often resistant to change.	SD	D	A	SA
6. Learning science is an orderly process; students learn by gradually accumulating more information about a topic over time.	SD	D	A	SA
7. Students know very little about science before they learn it in school.	SD	D	A	SA
8. Students learn the most when they are able to test, discuss, and debate many possible answers during activities that involve social interaction.	SD	D	A	SA

Lesson Design and Implementation

The statements below describe different ways science lessons can be designed and taught in school. Based on your opinion of how science should be taught, indicate if you agree or disagree with each of the statements below using the following scale:

SD: Strongly Disagree   D: Disagree   A: Agree   SA: Strongly Agree

9. During a lesson, students should explore and conduct their own experiments with hands-on materials before the teacher discusses any scientific concepts with them.	SD	D	A	SA
10. During a lesson, teachers should spend more time asking questions that trigger divergent ways of thinking than they do explaining the concept to students.	SD	D	A	SA
11. Whenever students conduct an experiment during a science lesson, the teacher should give step-by-step instructions for the students to follow in order to prevent confusion and to make sure students get the correct results.	SD	D	A	SA
12. Experiments should be included in lessons as a way to reinforce the scientific concepts students have already learned in class.	SD	D	A	SA
13. Lessons should be designed in a way that allows students to learn new concepts through inquiry instead of through a lecture, a reading, or a demonstration.	SD	D	A	SA
14. During a lesson, students need to be given opportunities to test, debate, and challenge ideas with their peers.	SD	D	A	SA
15. During a lesson, all of the students in the class should be encouraged to use the same approach for conducting an experiment or solving a problem.	SD	D	A	SA
16. Assessments in science classes should only be given after instruction is completed; that way, the teacher can determine if the students have learned the material covered in class.	SD	D	A	SA

Characteristics of Teachers and the Learning Environment

The statements below describe different characteristics of teachers and classroom learning environments. Based on your opinion of what a good science teacher is like and what a classroom should be like, indicate if you agree or disagree with each of the statements below using the following scale:

SD: Strongly Disagree   D: Disagree   A: Agree   SA: Strongly Agree

17. Students should do most of the talking in science classrooms.	SD	D	A	SA
18. Students should work independently as much as possible so they do not learn to rely on other students to do their work for them.	SD	D	A	SA
19. In science classrooms, students should be encouraged to challenge ideas while maintaining a climate of respect for what others have to say.	SD	D	A	SA
20. Teachers should allow students to help determine the direction and the focus of a lesson.	SD	D	A	SA
21. Students should be willing to accept the scientific ideas and theories presented to them during science class without question.	SD	D	A	SA
22. An excellent science teacher is someone who is really good at explaining complicated concepts clearly and simply so that everyone understands.	SD	D	A	SA
23. The teacher should motivate students to finish their work as quickly as possible.	SD	D	A	SA
24. Science teachers should primarily act as a resource person, working to support and enhance student investigations rather than explaining how things work.	SD	D	A	SA

The Nature of the Science Curriculum

The following statements describe different things that students can learn about in science while in school. Based on your opinion of what students should learn about during their science classes, indicate if you agree or disagree with each of the statements below using the following scale:

SD: Strongly Disagree   D: Disagree   A: Agree   SA: Strongly Agree

25. A good science curriculum should focus on only a few scientific concepts a year, but in great detail.	SD	D	A	SA
26. The science curriculum should focus on the basic facts and skills of science that students will need to know later.	SD	D	A	SA
27. Students should know that scientific knowledge is discovered using the scientific method.	SD	D	A	SA
28. The science curriculum should encourage students to learn and value alternative modes of investigation or problem solving.	SD	D	A	SA
29. In order to prepare students for future classes, college, or a career in science, the science curriculum should cover as many different topics as possible over the course of a school year.	SD	D	A	SA
30. The science curriculum should help students develop the reasoning skills and habits of mind necessary to do science.	SD	D	A	SA
31. Students should learn that all science is based on a single scientific method—a step-by-step procedure that begins with "define the problem" and ends with "reporting the results."	SD	D	A	SA
32. A good science curriculum should focus on the history and nature of science and how science affects people and societies.	SD	D	A	SA

Sampson, V., Enderle, P., & Grooms, J. (2013). Development and initial validation of the beliefs about reformed science teaching and learning (BARSTL) questionnaire. *School science and mathematics*, *113*(1), 3-15.

Beide vragenlijsten zijn zodanig specifiek, dat ze onbruikbaar zijn voor voorliggend onderzoek.

Klieger & Yakobovitch (2012)

Tools
The research tool is a questionnaire that was constructed for this research and contains 21 closed and four open questions. A preliminary questionnaire was evaluated by several teachers and two experts in the field of questionnaire construction. The questionnaire included three parts. The first two parts were closed questions about their background and details about the PD and instruction and the third part included open questions on their perception of the contribution of PD and instruction to implementing science standards.

Deze vragenlijst werd opgevraagd bij Professor Aviva Klieger:

Assimilation of standards in science and technology
We would like to look at the processes of assimilating standards among science and technology teachers in schools, the difficulties and successes that have been in the process of implementing standards. The questionnaire is anonymous, and thank you very much for answering all the questions listed below.

Dr. Aviva Klieger and Anat Jakubowicz

1. Do you think that the standards promote teaching-learning processes in your class? Yes=1/ No=0
2. So, explain how:_____
3. How much do you think standards promote teaching-learning processes in your class?
     0=Not at all --- very little --- to a moderately --- --- largely --- to a very large extent=5
4. Other than not, explain: _____
5. Have you participated in training to implement standards: Yes= 1/ No= 0
6. How many trainings have you participated in? _____
   in what years please detail the timing of all _____
7. How much of the trainings **can be included** in hours (several hours of reward) _____
8. Where the trainings took place: City _____
9. Do you receive school or other guidance on implementing the standards? Yes= 1/ No= 0
10. If you've received multiple types of guidance, you'll all be:_____
11. What years did you get the_____
12. How often _____
13. Training model: individual-personal training=1 /group-teams=2 / both=3
14. Give an example of a training task_____
15. Here are the standards for content in science and technology in elementary school.

What do you think is the degree of assimilation of each standard in the sects in which you teach:
1. Students will recognize and experience individuals and teamwork in thinking and learning skills in the fields of science and technology: the process of research and problem solving
2. Students will recognize and understand material properties, changes in materials, material use, and the impact of their exploitation with society and the environment.
3. Students will recognize and understand scientific concepts and principles related to energy, know the use of energy, and understand its effect on humans, society and the environment.
4. The students will know the characteristics of life and the complexity of the world of creatures. They will know the diversity of the species and develop awareness of its importance.
5. The students will be familiar with systems, organs, processes and adaptations in plants and animals.
6. Students will know structures in the human body, understand principles related to the functioning of the human body, and develop awareness of the need to maintain and promote health and quality of life.
7. The students will know systems on Earth and the universe and understand phenomena that occur in them, and they will understand the effect of man's involvement on earth's systems.

8. Students will recognize environmental components, understand processes in the environment and interact with its components, and students will understand a person's place in the environment and his involvement in it and develop awareness of the need for sustainable development.

9. Students will understand the essence of technology as a problem-solving occupation in response to human-social needs, will be familiar with the high school process and the characterization of a technological system. Understand the interplay between science and technology and develop awareness of the effects of science and technology on society and the environment.

10. Students will understand the centrality of information and communication in individual and social life and will know ways to handle information.

	Not at all	To a slight extent	Medium	To a large extent	To a very large extent
First grader	1	2	3	4	5
2th grade	1	2	3	4	5
3th grade	1	2	3	4	5
4th grader	1	2	3	4	5
5th grade	1	2	3	4	5
6th grade	1	2	3	4	5

Some teachers have difficulties in the process of implementing standards.

16. Of the top 10 standards, these standards were the easiest to implement:_____

17. Explain what was easy and why: _____

18. To what extent has school guidance helped make these standards easier?
    0=Not at all --- very little --- to a moderately --- --- largely --- to a very large extent=5

19. To what extent have the training helped make implementing these standards easy?
    0=Not at all --- very little --- to a moderately --- --- largely --- to a very large extent=5

20. Of the 10 standards from which the standards you had were most difficult to implement:_____

21. Explain what was difficult and why: _____

22. How you dealt with the difficulty:_____

23. To what extent have the training helped to cope with these difficulties?
    0=Not at all --- very little --- to a moderately --- --- largely --- to a very large extent=5

24. To what extent has the school's guidance helped to cope with these difficulties?
    0=Not at all --- very little --- to a moderately --- --- largely --- to a very large extent=5

25. Explain how:_____

Finally, let's face it for responding to some background information:
1. Gender:___
2. Nation:___
3. The school belongs to: State/ State Religious Sector / Independent school
4. Region:_____
5. The settlement where you teach urban / rural periphery / center place
6. Education:
   Senior teacher in the _____ from the _____ institution from _____
   BA in _____ from the _____
   Master's degree in _____ from the _____
   Third degree in _____ from_____
   Other / Additional : _____
7. Years of teaching seniority _____
8. The sects in which you teach science____

Thank you for your cooperation.

Table 2. Teacher participant reactions to school workshops, 2003/4 (n = 274)

Participant reaction (% of all responses)	Likert scale[a]					No response
	1	2	3	4	5	
I found the effectiveness of the INSET to be …	55	36	5	1	0	1
The interest of the INSET was …	59	33	7	1	0	0
The relevance of the INSET was …	55	35	9	1	0	0
The value of the INSET to me was …	53	35	8	3	0	0

Note: [a]1 = high, 5 = low.

Table 3. Self-reported participant learning, 2003/4 (n = 274)

Self-reported participant learning (% of all responses)	Likert scale[a]					Not applicable	No response
	1	2	3	4	5		
The workshop has improved my confidence in teaching earth science	33	43	17	2	0	1	4
The workshop has improved my earth science knowledge and understanding	34	29	8	2	0	0	26
The workshop has given me new ideas for ways of teaching earth science	38	26	5	0	0	1	30
The workshop will increase the amount of earth science practical work I teach	46	38	10	1	0	1	3
The workshop will increase the amount of earth science investigational work I teach	26	34	28	5	1	1	5
The workshop will increase the total amount of earth science I teach	12	27	35	8	6	5	7

Note: [a]1 = strongly agree, 5 = strongly disagree.

Participants' use of new knowledge and skills
A postal survey of changes in classroom practice, conducted a year after workshops had taken place, comprised the most significant component of the evaluation programme and was subjected to a greater degree of analysis than other components. Following a successful pilot survey conducted in 2003/4, a questionnaire was mailed to every secondary school that had received an in-school workshop between September 2003 and August 2004. Questionnaires were distributed approximately one year after the workshop(s) had taken place. This time interval was chosen to allow schools the opportunity to introduce changes to their teaching, regardless of when they taught earth science topics within the school year. An accompanying letter offered a free CD-ROM of teaching resources as an incentive to respond to the questionnaire. The questionnaire was addressed to the teacher who had booked the workshop (often the school's Head of Science). It first asked:
- Have changes been made to your school's Scheme of Work as a result of the session? *Open response*
- Do you have any general comments about how the INSET session you received has affected earth science teaching in your school? *Open response*

The activities for the relevant workshop(s) were then listed and the respondent asked to answer four questions for each activity:

● Before the workshop, how many of your teachers already used this activity in the classroom? *Options given: none, some (<50%), most (>50%), all Can a short CPD workshop cause change?*

● After the workshop, how many of your teachers have used, or plan to use, this activity in the classroom this year? *Options given: none, some (<50%), most (>50%), all*

● If no-one has used or no-one intends to use this activity, is there a reason for this? (For example, extra resources needed, messiness, time limitations, relevance to NC). *Open response*

● Has this activity been added to your school's Scheme of Work as a result of the workshop? *Open response*

Main & Pendergast (2015; 2017)

Table 1. Core features and related questions in the instrument.

Core features of effective CPD	Items as specific questions listed for comment on a 5-point Likert scale
Duration (D1-D6) Duration refers to need for PD to be of sufficient duration to enable engagement leading to possible intellectual and pedagogical change.	1. I believe the PD session was long enough for me to engage with the ideas. 2. I think there would be benefit from spreading the PD over a number of days/sessions. 3. I think a refresher course is needed to remind me of the details of the PD. 4. I would have preferred more time. 5. I will need to do more training in this area in the future. 6. I would like this PD to include follow-up sessions over time.
Collective participation (CP1-CP6) Collective participation refers to the opportunity for participants to undertake the PD with others from the same school/department/group which sets up the potential for interaction and discourse, which can be a powerful form of learning.	1. Peer support will help me apply learnings from this PD experience. 2. I was able to develop a common understanding of the knowledge or skill with my colleagues. 3. It is important for all teachers to participate in this activity for me to improve my practice. 4. I did not do any planning on my own or with colleagues. 5. I was able to discuss concepts and skills with colleagues with whom I work closely. 6. I believe there is a real benefit if several members of a school attend this PD together.
Coherence (C1-C8) Coherence refers to the connection between the professional development activity and the reality of your day-to-day work experiences within your classroom.	1. I was not able to address any problems with which I have experience. 2. I will be able to put what I learned today in to practice. 3. Putting what I have learned today into practice can improve student outcomes. 4. I cannot see this topic linking to other professional development activities. 5. I already know enough about this topic. 6. Learning about this topic will improve my work environment. 7. I have not done any training in this area before. 8. I believe there is a direct link between this PD an my day-to-day practice.
Content focus (CF1-CF7) Knowledge and skills refers to the knowledge and skills necessary for you to carry out your day-to-day work within your classroom.	1. I gained new knowledge or skills that are related to my profession. 2. I would not be able to integrate this PD into my day-to-day practice. 3. The PD will enhance my teaching strategies. 4. I can see areas related to today's topic where I can improve or learn more. 5. The PD topic is important because it links directly to state or national goals. 6. The PD will not help me meet the needs of more students. 7. The PD activity takes into account the learning needs of all the teachers in attendance. 8. This Pd did not meet my learning goals. 9. I believe my knowledge and skills are enhanced through this PD.
Active learning (AL1-AL9) Refers to opportunities to be actively engaged in meaningful discussion, planning, and practice during the professional development activity and the reality of your day-to-day work within your classroom.	1. I was given opportunities to practice new skills within the activity. 2. I was able to observe others modeling good practice (around the PD topic). 3. I was able to solve a problem I had or suggest a solution to a problem someone else had. 4. No one was able to take the lead in any part of the activity other than the facilitator. 5. I was able to give feedback on the ideas of others. 6. Teachers were encouraged to share best practice during the PD. 7. I would not be able to explain what I have learned to others who did not attend. 8. I believe that I will be able to apply what I have learned. 9. I was able to practice skills under simulated conditions and was given feedback.

Masters et al. (2010)

Table 2. Number of Items and Sample Teacher Survey Items

Subject	Number of items on the pre- and post-surveys	Reliability (Cronbach's α)	Sample item
Vocabulary-Knowledge	8	Pre-test: 0.82 Post-test: 0.86	For the following passage, identify two Tier 2 and two Tier 3 words. Explain why you chose these words.
Reading Comprehension-Knowledge	7	Pre-test: 0.66 Post-test: 0.72	List the seven comprehension strategies that improve students' comprehension. Choose one of the seven comprehension strategies. Explain what the strategy is, how it helps comprehension, and when to use it.
Writing-Knowledge	6	Pre-test: 0.51 Post-test: 0.50	List the stages of the writing process. Select one of the stages of the writing process listed above and explain what is involved in this stage.
ELA Combined-Knowledge	21	Pre-test: 0.81 Post-test: 0.83	
Vocabulary-Practice	16	Pre-test: 0.89 Post-test: 0.90	When reading in the classroom, my students and I discuss vocabulary words in small groups. a. Always b. Frequently c. Sometimes d. Rarely
Reading Comprehension-Practice	16	Pre-test: 0.88 Post-test: 0.88	When teaching reading comprehension for narrative texts, I help students relate the story to their own personal experiences. a. Always b. Frequently c. Sometimes d. Rarely
Writing-Practice	14	Pre-test: 0.91 Post-test: 0.92	I teach my students how to select a structure or organization that will match a writing prompt. a. Always b. Frequently c. Sometimes d. Rarely

In de studie werden enkel sample-items opgenomen. Het volledige instrument werd opgevraagd, maar er werd geen antwoord verkregen.

McChesney & Aldridge (2018, 2019)

Table 4. The Impact of Teacher Professional Development (ITPD) Questionnaire

	Item	Scale
1	I have positive memories of this professional development.	Teacher reaction
2	I enjoyed this professional development very much.	
3	This professional development has been very beneficial to my teaching.	
4	Participating in this kind of professional development is very useful for my teaching.	
5	As a result of this professional development, I know substantially more than I did before.	Teacher learning
6	I have learned a lot of new things from this professional development.	
7	In my daily classroom practice, I often apply what I learned from this professional development.	Outcomes
8	I successfully apply the content of this professional development in my daily classroom practice.	
9	As a result of this professional development, my students' learning has improved.	
10	My students have benefited from me receiving this professional development.	
11	Overall, the culture and procedures in my school have improved due to this professional development.	Organisational response
12	My school encouraged and supported teachers in my implementing what they learned from this professional development.	

Notes: All items are measured using a 5-point response scale: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly Agree.

Nicolaidou & Petridou (2011)

Level 1 Guskey: Level 1a: participants' expectations and satisfaction
The ''expectations'' scale included 14 short statements for which respondents showed their level of agreement utilising a 3-point Likert-type scale (where 1=disagree, 2=neither disagree nor agree, 3=agree).

Table 2. Expectation scale items.
I expect the National In-service Training Programmes for School Leaders to:
    1. Create effective school leaders.
    2. Cover my basic training needs.
    3. Combine theories on effective leadership with my everyday practice.
    4. Be based on adult learning principles.
    5. Offer the opportunity to school leaders to use their leadership skills in practice.
    6. Have a professional/practice-orientated nature and not be an academic/theory-based course.
    7. Be well organised covering training needs for the present and the future.
    8. Build on international trends and advances on educational leadership and management.
    9. Contribute to the development of capable and skillful school leaders.
    10. Reinforce participants' knowledge of school leadership and management.

11. Support participants in developing practical skills on leadership and management.
12. Support participants to develop collaborative networks.
13. Contribute to my professional development.
14. Contribute to my personal development.

Table 4 presents the items that were employed to measure participants' satisfaction. Respondents were asked to show their agreement or disagreement with these statements again on a 3-point Likert scale (where 1=disagree, 2=neither agree not disagree, 3=agree).

Table 4. Satisfaction scale items.

Item	Item name	Item content
1	Prog1	The programme has generally been useful.
2	Prog2	In general the programme has been satisfying in terms of teaching methods used.
3	Prog3	The material and handouts were relevant to educational leadership and management.
4	Prog4	The material used was useful.
5	Prog5	The knowledge gained as a result of the programme was useful.
6	Prog6	The constructs central to the programme were communicated thoroughly.
7	Prog7	The programme in general was satisfying in terms of the teaching tools used.
8	Prog8	The content of the programme was suitable.
9	Prog9	The content of the programme reflected the training needs of Cypriotic educational leaders.
10	Prog10	The time spent on each subject area was satisfactory.
11	Prog11	He way new ideas were presented was appropriate.
12	Prog12	Our time attending the programme was effectively spent.
13	Prog13	The skills acquired during the programme have been useful.
14	Prog14	The aims of the programme have been met.
15	Instr1	The instructors knew their subject area very well.
16	Instr2	The instructors created a pleasant environment.
17	Instr3	The instructors were up to date with contemporary issues and developments in their field.
18	Instr4	The instructors made use of updated literature in the field.
19	Instr5	The instructors made effective links between established and new knowledge and experiences.
20	Instr6	The instructors informed us of the aims, objectives, and expected results of each subject area.
21	Instr7	The instructors were well prepared.
22	Instr8	The instructors made good use of their teaching time.
23	Instr9	The instructors created the necessary conditions for participants' active involvement during lectures.
24	Instr10	The instructors created opportunities for the participants to exchange views, knowledge, and experiences.
25	Instr11	The instructors provided time for participants-instructors interaction in class.
26	Instr12	The instructors supported the development of the participants' critical thinking.
27	Instr13	The instructors provided individualized support.
28	Instr14	We had the opportunity to participate in finalizing the content of the training in each subject area.

Nordengren (2020)

Instrument

The Perceptions and Practices Survey is a 23-item measure consisting of four hypothesised constructs:

- The *attitudes* participants have towards professional learning and its value.
- Participants' *knowledge* in assessment use and assessment literacy.
- The *beliefs* participants have about assessments and assessment use.
- The *skills* participants regularly use in classroom instruction related to assessment use and assessment literacy.

These constructs derive from Guskey's (2000) framework and were adapted to the specific topics addressed in professional learning. In general, *knowledge* relates to participants' learning, *attitudes* and *beliefs* relate to participants' reactions to professional learning, and *skills* relates to participants' use of new knowledge and skills from professional learning on a regular basis (i.e., over the last month). Items on *attitudes* and *beliefs* may also provide insights into organisational support and change to the extent they represent the outcomes of appropriate or insufficient organisational support for implementing a new initiative (in this case, a new assessment). By monitoring changes in these constructs over multiple administrations, the survey provides a measure of changes in knowledge, skills, attitudes and beliefs that correlate with professional learning participation.

Here, I separate *attitudes* and *beliefs* deliberately to better understand the relationship between two separate ideas: beliefs about assessment and attitudes towards this specific set of professional learning experiences. Unlike attitudes, participants' beliefs about assessment are pre-formed: they come from knowledge and experiences with all kinds of assessments throughout their personal and professional lives. Professional learning seeks to change these beliefs as part of an overall effort to change instructional practice. The attitudes described here are instead feelings about the professional learning they received during the year; they are an indicator of the potential willingness of participants to engage in more professional learning in the future. While addressed in similar ways by Guskey, this study looks to understand the extent to which these constructs can be measured separately from one another.

The survey as administered is provided in Appendix A.

Appendix A. Perceptions and practices survey

In the past month, how often have you used data from MAP Growth assessments to (response options: none of the time/ occasionally/sometimes/often):

(1) Understand the skills students are ready to learn
(2) Place students into instructional groups
(3) Understand students' performance relative to each other
(4) Make informed decisions about instructional next steps
(5) Set goals for individual students
(6) Set goals for your class
(7) Set goals with your teaching team

How confident are you that you can (response options: not at all confident/a little confident/somewhat confident/very confident):

(1) Review and understand information about an individual student's performance on MAP Growth assessments
(2) Relate results on MAP Growth to what a student knows and can do
(3) Use MAP Growth assessment data to place students in instructional groups
(4) Use MAP Growth assessment data to set actionable goals for individual students
(5) Use MAP Growth assessment data to understand what a particular student is ready to learn next
(6) Use MAP Growth assessment data to understand where you should focus whole-group instruction

To what extent do you agree or disagree with the following? (response options: strongly disagree/disagree/agree/ strongly agree)
(1) NWEA Professional Learning has helped me use MAP Growth data more in my practice.
(2) NWEA Professional Learning has helped me better explain MAP Growth results to parents.
(3) NWEA Professional Learning has helped me better understand how to adjust my instruction or professional practice for the culture, climate, and sensitivities of my district, school, classroom, and students.
(4) NWEA Professional Learning has helped me better use formative assessment techniques to supplement data from MAP Growth.
(5) NWEA Professional Learning has helped me better reflect on my professional practice.

To what extent do you agree or disagree with the following?
(1) MAP Growth provides information I can use in the classroom.
(2) MAP Growth shows how students have grown across academic years.
(3) MAP Growth is worth the time our school spends administering it each year.
(4) I have personally witnessed how MAP Growth can help students grow.
(5) I can help every one of my students achieve academic growth.

BIJLAGE DEEL 2.

Inventaris van aangereikte instrumenten vanuit onderwijskoepels

Tabel 1. Achtergrond van de instrumenten aangereikt door PBD

	Koepel + naam instrument	Opzet	Open, gesloten, gemixt of observatie-leidraad	Eerder generiek/ specifiek	Evidentie voor de psychometrische kwaliteit
1	**99 inspirerende vragen (Katholiek Onderwijs Vlaanderen)**	Een lijst met 99 inspirerende vragen voor evaluatie van een begeleidingstraject	Open	Generiek	Er werd een model opgesteld met algemene concepten waaronder de vragen onderverdeeld worden. Dit model vertrekt vanuit de vier evaluatieniveaus van het model van Kirkpatrick: Kirkpatrick, D. (1994). Evaluating Training Programs. San Francisco, CA: Berrett-Koehler Publishers.
2	**Bevraging effecten van begeleiding (Katholiek Onderwijs Vlaanderen)**	Bevraging effecten van begeleiding	Gemixt	Generiek	Voor het in kaart brengen van conceptuele effecten en instrumentele effecten baseerden we ons op een gevalideerde vragenlijst vanuit onderzoek naar de effectiviteit van schooldoorlichtingen*. De nodige aanpassingen om de vragenlijst bruikbaar te maken in de context van begeleidingswerk werden aangebracht en besproken met de Coördinatie Pedagogische Begeleiding. * Penninckx, M. (2015). Inspecting School Inspections. Universiteit Antwerpen.
3	**Effectmeting van langdurige trajecten (OVSG)**	Een instrument waarmee alle interventies die bestaan uit meer dan drie samenkomsten, met een vaste groep deelnemers, waarbij inhouden vooropgesteld werden, het doel is om te leren van elkaar en er een terugkoppeling is naar een actie uit het actieplan, geëvalueerd worden.	Gesloten	Algemeen én specifiek	Gebaseerd op Guskey.
4	**Evaluatie dienstverlening ZOKA (Katholiek Onderwijs Vlaanderen)**	Effectmeting dienstverlening zorg- en kansen.	Gemixt	Eerder specifiek	Geen verdere info beschikbaar
5	**Evaluatie directiecongres (Katholiek Onderwijs Vlaanderen)**	Evaluatie directiecongres	Gemixt	Generiek en specifiek	Geen verdere info beschikbaar
6	**Evaluatie individuele sessie van een directiecongres (Katholiek Onderwijs Vlaanderen)**	Evaluatie individuele sessie van een directiecongres	Gesloten, met ruimte voor algemene feedback	Specifiek	Geen verdere info beschikbaar
7	**Evaluatie Leerpaden modernisering SO**	Evaluatie Leerpaden modernisering SO	Gemixt	Specifiek	Geen verdere info beschikbaar

	(Katholiek Onderwijs Vlaanderen)				
8	**Evaluatie Leerplantoelichting (Katholiek Onderwijs Vlaanderen)**	Evaluatie Leerplantoelichting	Gemixt	Specifiek	Geen verdere info beschikbaar
9	**Evaluatie module in leerplaninitiatie (Katholiek Onderwijs Vlaanderen)**	Evaluatie module in leerplaninitiatie	Gemixt	Generiek	Geen verdere info beschikbaar
10	**Evaluatie online aanbod ProfS (directie-opleiding basisonderwijs) (Katholiek Onderwijs Vlaanderen)**	Evaluatie online aanbod ProfS (directie-opleiding basisonderwijs)	Gemixt	Specifiek	Geen verdere info beschikbaar
11	**Evaluatie professionele leergemeenschap (PLG) (POV)**	Evaluatie van PLG's in het algemeen.	Gemixt	Specifiek	Geen verdere info beschikbaar
12	**Evaluatie project taalbegeleiding (Katholiek Onderwijs Vlaanderen)**	Evaluatie van het project taalbegeleiding via formatieve evaluatie door de taalbegeleiders.	Open (reflectie op ervaring/situatie in een jaarlijkse evaluatie)	Specifiek	Reflectie op basis van de STARR-methode: Situatie, Taak, Actie, Resultaat, Reflectie. Ook gebaseerd op de reflectiecirkel van Korthagen.
13	**Evaluatie sessies gemeenschappelijk funderend leerplan (Katholiek Onderwijs Vlaanderen)**	Evaluatie sessies gemeenschappelijk funderend leerplan	Gesloten, met ruimte voor algemene feedback	Generiek en specifiek	Geen verdere info beschikbaar
14	**Exit ticket (Katholiek Onderwijs Vlaanderen)**	Bevraging rond interventie gericht op het voeren van vragenlijst-onderzoek in de school.	Gemixt	Specifiek	Geen verdere info beschikbaar
15	**IAC-trajecten (Katholiek Onderwijs Vlaanderen)**	Steekproefgewijze evaluatie van begeleiding en verloop IAC-trajecten.	Open (telefonische interviews)	Specifiek	Geen verdere info beschikbaar
16	**Kwaliteitskwartet (OVSG)**	Anonieme bevraging over 6 thema's waarop de PBD van OVSG inzet.	Gemixt	Specifiek	Geen verdere info beschikbaar
17	**Leesproject (LIST) – aanvankelijk lezen (GO!)**	Lessen observeren van leraren over de tijd heen ifv hun leesonderwijs.	Observatie-leidraad	Specifiek	Project is gebaseerd op wetenschappelijke literatuur: Houtveen, A. A. M., Brokamp, S. K., & Kunst, J. J. (2019). Doelgericht werken aan opbrengsten. Systematisch werken aan verbetering van het onderwijs bij aanvankelijk en voortgezet lezen. University of Applied Sciences Utrecht.
18	**Leesproject (LIST) – schoolniveau (GO!)**	Lessen observeren van leraren over de tijd heen ifv hun leesonderwijs.	Observatie-leidraad	Specifiek	Zie evidentie bij 1.
19	**Leesproject (LIST) – vloeiend lezen (GO!)**	Lessen observeren van leraren over de tijd heen ifv hun leesonderwijs.	Observatie-leidraad	Specifiek	Zie evidentie bij 1.
20	**Ontwikkelingsgerichte evaluatie lerende netwerken inzake kwaliteitsontwikkeling**	Ontwikkelingsgerichte evaluatie lerende netwerken inzake kwaliteits-ontwikkeling.	Open (telefonische interviews)	Generiek	Gebaseerd op Kirkpatrick of Guskey.

	(Katholiek Onderwijs Vlaanderen)				
21	**Opleiding directieleden (GO!)**	Evaluatie van directeursopleiding.	Gesloten	Specifiek	De evaluatie van de directeursopleiding werd uitgevoerd door UGent. Er worden begin- en eindmetingen gehanteerd, waarop de scores en significante stijgingen in kaart gebracht worden.
22	**POV – Bevragen effectiviteit begeleiding vakfiches eerste graad secundair onderwijs (POV)**	Evaluatie van begeleiding rond gebruik vakfiches voor eindtermen.	Gesloten	Specifiek	Geen verdere info beschikbaar
23	**Samen aan de poort (OVSG)**	Opleidingstraject voor schoolleiders.	Gemixt	Specifiek	Geen verdere info beschikbaar over de psychometrische kwaliteit van de vragenlijst. Het maakte wel deel uit van onderzoek aan Universiteit Antwerpen en KU Leuven.

Noot: 'Geen verdere info beschikbaar' impliceert niet dat er geen evidentie voor de psychometrische kwaliteit is.

Tabel 2. Overzicht van de instrumenten verkregen via de PBD en welke elementen van het conceptueel model deze bevragen

Koepel + naam instrument	Kenmerken van DBI's	Contextfactoren		Bereik	Reactie		Leren		Gedrag	Organisatie-resultaten	Leerling-uitkomsten
		Profiel van de participant	Ondersteuning vanuit de school	Bereik doelgroep	Tevreden-heid	Bruik-baarheid	Lereffect deelnemers	Intentie tot gedrags-verandering	Toepassing in praktijk	Wijzigingen in de organisatie	Effect op leerlingen
1 99 inspirerende vragen (Katholiek Onderwijs Vlaanderen)			X		X		X	X	X	X	X
2 Bevraging effecten van begeleiding (Katholiek Onderwijs Vlaanderen)						X	X		X		
3 Effectmeting van langdurige trajecten (OVSG	X				X		X	X			
4 Evaluatie dienstverlening ZOKA (Katholiek Onderwijs Vlaanderen)					X			X	X		
5 Evaluatie directiecongres (Katholiek Onderwijs Vlaanderen)	X				X		X				
6 Evaluatie individuele sessie van een directiecongres (Katholiek Onderwijs Vlaanderen)	X				X	X	X				
7 Evaluatie Leerpaden modernisering SO (Katholiek Onderwijs Vlaanderen)									X		
8 Evaluatie Leerplantoelichting (Katholiek Onderwijs Vlaanderen)	X						X				
9 Evaluatie module in leerplaninitiatie (Katholiek Onderwijs Vlaanderen)					X	X					
10 Evaluatie online aanbod ProfS (directie-opleiding basisonderwijs) (Katholiek Onderwijs Vlaanderen)	X								X		
11 Evaluatie professionele leergemeenschap (PLG) (POV)	X			X	X	X	X		X		
12 Evaluatie project taalbegeleiding (Katholiek Onderwijs Vlaanderen)										X	
13 Evaluatie sessies gemeenschappelijk funderend leerplan (Katholiek Onderwijs Vlaanderen)					X						
14 Exit ticket (Katholiek Onderwijs Vlaanderen)				X	X	X	X	X			
15 IAC-trajecten (Katholiek Onderwijs Vlaanderen)									X		

16 Kwaliteitskwartet (OVSG)									X	X
17 Leesproject (LIST) – aanvankelijk lezen (GO!)									X	
18 Leesproject (LIST) – schoolniveau (GO!)									X	
19 Leesproject (LIST) – vloeiend lezen (GO!)									X	
20 Ontwikkelingsgerichte evaluatie lerende netwerken inzake kwaliteitsontwikkeling (Katholiek Onderwijs Vlaanderen)	X								X	
21 Opleiding directieleden (GO!)	X	X		X	X	X				
22 POV – Bevragen effectiviteit begeleiding vakfiches eerste graad secundair onderwijs (POV)			X		X	X	X		X	
23 Samen aan de poort (OVSG)								X		