Negotiating tension points in the educational system in the Netherlands towards a new model for STEM professional learning

A report on the processes and outcomes of the ELITe project Multiplier Event M6

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1. Introduction

The Dutch Multiplier Event on the outcomes of the Elite project was integrated in a national conference on E-Assessment[1] organized for researchers and practitioners in the educational domain: teachers, teacher educators, policy makers and (beginning) researchers in educational sciences including master students of several part-time master level programs in Educational Science for teachers. This national conference offered a unique opportunity to reach out to a broad group of professionals active in the educational domain gathered together in the context of professional learning: attending a professional conference in which sharing of state-of-the-art knowledge in research and technological development on a highly relevant topic of E-Assessment was blended with discussing direct implications for educational practice and teaching.

The scope of the conference - the state-of-the-art on the topic of Assessment and its digital components, the implications of new trends for teacher daily practice and for teacher professional development - offered a good opportunity of presenting and discussing the Elite outcomes against a broad spectrum of other current initiatives and trends in teacher professional learning in the domain of assessment of and for learning.

Therefore, the focus area for the Dutch Multiplier Event was defined in conformity with the background knowledge of the participants of issues such as assessment and self-assessment of student learning; their interest in the topic as well as the relevance of the focus area for their own learning and competence development. The questions discussed and negotiated with the participants at the ME were centered around the self-evaluation of competence development in the context of self-directed and self-regulated inquiry-based professional learning activities.

The leading question addressed and negotiated at the ME event was:

- How do professionals in the educational domain evaluate the self-evaluation tool for (STEM) teachers learning and inquiry and reflective practice? What is their standpoint on the possibilities of using this tool n the dimensions of effectiveness, usefulness and usability?

The target group of the conference included but was not limited to STEM secondary school teachers.

2. Implementation of the event

The conference on E-Assessment was organized by the Welten Institute, Centre for Learning, Teaching and Technology of the Open University in the Netherlands (OUNL) and held on May 17, 2019. It was hosted in Heerlen, the central OUNL venue. It targeted teachers, teacher educators, policy makers in education and educational researchers in the Netherlands and Belgium. Students from educational master level educational programs - OUNL Master of Science in Educational Science and Fontys Applied University Tilburg, Master of Assessment and Evaluation, all teacher practitioners or working in education, could participate in the conference as part of their study curriculum. Around 100 participants took part, including a group of 25 teacher educators from Fontys Applied University Teacher Education program. For this specific participant group invited by Elite project, admission was free of charge, they were specifically drawn as a relevant target group, able to contribute to the evaluation and the validation of the instrument and as a target group with potential interest in Elite project outcomes.

The conference programme included a plenary session with a general introduction and a key note and a two rounds of interactive activities, such as workshops, interactive paper sessions, round tables held for the participants with diverse interests around the topic of assessment. Between the sessions a posterwalk was held at which presenters could shortly introduce their projects and discuss them with all the interested conference participants. A programme overview can be found in the appendix and online[1]. Elite project formed a separate line throughout the conference, however, sufficient common ground was created to integrate discussions of Elite outcomes with the conference mainstream goals.

Prior to the conference the Elite project guests, teacher educators from Fontys were requested to fill in a short online questionnaire on their personal learning goals for conference participation. The questionnaire was based on the Elite self-evaluation instrument. At the start of the conference (while registering) all conference participants were invited to fill in the paper version of the same questionnaire. Results of the questionnaire are to be found in the appendix.

The conference's chair, dr. Kim Dirkxs, opened the conference with an introduction of the topic and the main focus: to present and discuss the state of the art issues in assessment domain against the background of teacher professional learning and professional development. She briefly introduced Elite project and its focus on teacher professional learning as a relevant focus for the participants.

The keynote of dr. Denise Whitelock focused on the topic of feedback through assessment. She gave an overview of a number of methodologies and best practices for feedback for motivation in the digital assessment settings. The keynote formed an umbrella for discussions of different topics. While not specifically dwelling on inquiry based (STEM) teacher professional learning, dr. Whitelock sketched a viable framework for the assessment and self-assessment of skills perspective in the digital era which is highly relevant for Elite outcomes as well. It gave a point of departure for elaborating on the assessment and self-assessment of inquiry learning in general and teacher inquiry learning in particular during Elite session I.

During the first round of interactive sessions, **Elite project session 1** was held. 8 conference participants joined this session which included a) a general presentation about Elite project, the rationale, the activities and the results in brief; b) a discussion of Elite approach with teacher participating teacher practitioners and teacher educators. This discussion was planned as a world café activity with 3 groups discussing at least three Elite project outcome areas. However, because of the small number of participants, only 2 areas were covered and the discussion was conducted plenary. At this session the self-evaluation instrument was introduced, the way it was applied to collect their own learning objectives for the conference was evaluated and participants discussed their own goals for participation in the conference and the way this input can be used to evaluate the outcomes.

Prior to the lunchbreak a **posterwalk session** (Figure 1) was held that remained open throughout the lunch break allowing all participants to talk to presenters. At the posterwalk dr. Olga Firssova gave several 5 minute pitches on the Elite project and its outcomes and answered questions. During the posterwalk around 30 conference participants were actively involved in the discussion of Elite project and its outcomes.

Elite project session II took part during the second round of interactive sessions and focused on negotiation of the usefulness, effectiveness and usability of the Elite self-evaluation instrument in the context of inquiry based professional learning. 12 participants took part and worked in four groups, each group was expected to reflect on the usefulness, effectiveness and usability of the tool in the context of professional learning in general and inquiry based learning in particular. As input for group discussion a short presentation gave an overview of professional learning activities in Elite scenario's in the Netherlands and in other participant countries and the application of the instrument prior and direct upon the E-Assessment conference. Figure 2 illustrates groupwork.

The final conference activity involved al participants discussing the implications of the topics presented at the conference for their specific educational domain: primary, secondary or further education. In these discussions Elite self-evaluation tool was referred to as part of the instrumentation of teacher professional learning highly usable throughout the domains.
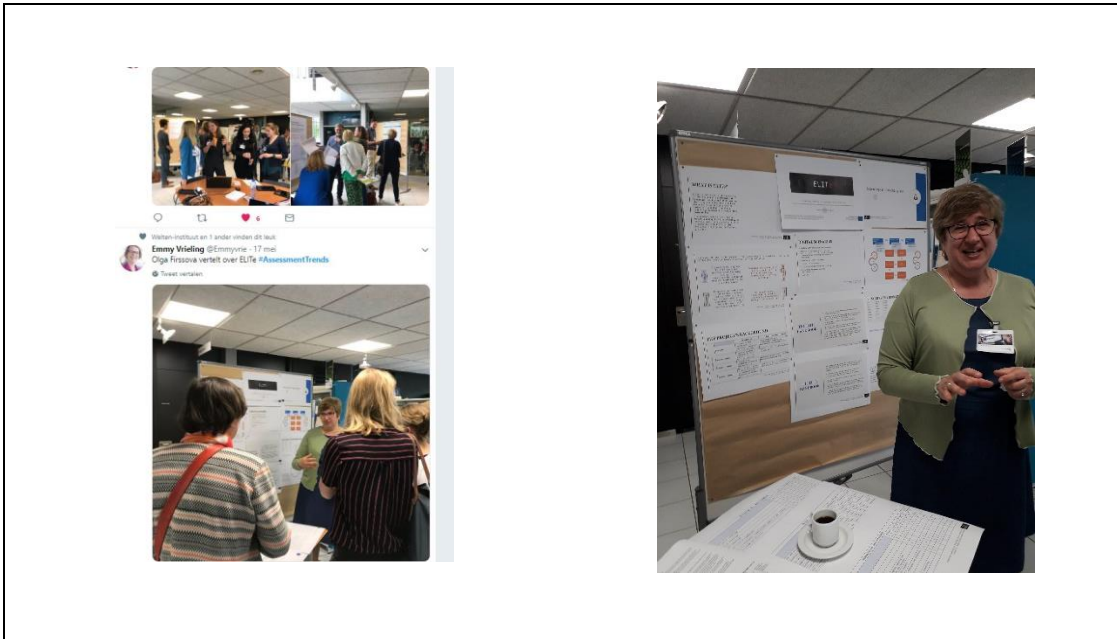

Figure 1: Interactive posterwalk and the stand on Elite project with O.Firssova presenting (a tweet message and a photo).
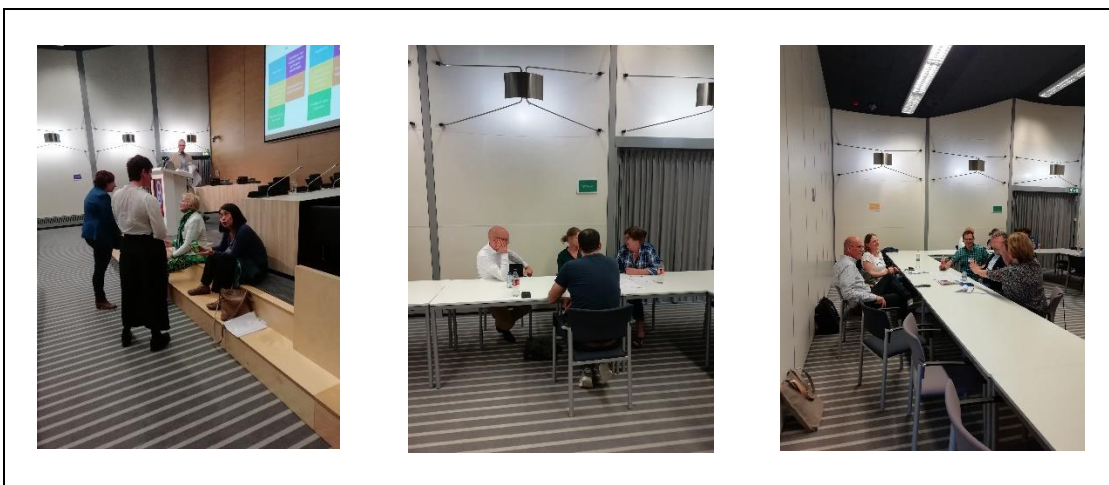

Figure 2: Conference participants during group work during Elite session II (3 groups).

3. Documentation of outcomes of the negotiation process

This section reports the outcomes of the conference sessions and informal discussions with participants during the poster presentation and social networking moments.

Relevant outcomes of the discussion at **Elite project session 1** resulting from exchanges in the groups and during the plenary part of the session and during informal exchanges in the **posterwalk** are as follows:

- Inquiry learning is seen as a viable professionalization strategy in all educational domains, not restricted to STEM (In Dutch: beta-vakken) domains. However, the operationalization of phases in

the inquiry process vary between application domains, and a strict division in phases in research which is followed in natural sciences is, according to the conference participants, less relevant for teacher professional learning.

- Most important phases /steps in the inquiry learning for professional development are the ability to formulate and set learning goals, to determine how to seek for answers (methodology) and how to "measure" when the goals are met.

In a joint presentation of the discussion outcomes at **Elite project session 2** participants stressed the following points:

- **Usefulness:** The instrument enforces the user to think about the learning goals and planned outcomes of this learning. This increases its usefulness. According to the participants, the instrument is not useful when an objective measurement of the achieved result is expected. It is not useful or suitable as a knowledge or skills assessment measurement tool that might be needed for accreditation purposes in formal education because it is based on perception of learners.

- **Effectiveness**: it is difficult to speak about the effectiveness of an instrument based on self-evaluation, on the subjective personal perspective of the user. However, the systematic use of such an instrument by the learner as part of personal portfolio building can make it an effective learning instrument steering reflection and thus contributing to professional development. In the contexts of open learning (i.e., informal learning activities, studying in MOOCs and other forms of open learning), application of an instrument like the Elite self-evaluation instrument can be seen as a sufficient alternative to self-tests if effectiveness of learning is considered from the point of view of the learners intentions and self-formulated goals (Henderikx, 2018). According to the participants the concept of effectiveness was less fitting in the context in which such an instrument could be used and it was preferable to consider feasibility of using it. Following these recommendations, the questionnaire issued after the conference used the dimension of feasibility in evaluating the instrument..

- **Usability**: the instrument was found easy to use by all participants.

Limitations: the absence of objective assessment mechanisms was seen as a threat to credibility of this instrument in the context of measurement and external validation of knowledge gain or skill increase; therefore in the contexts when formal assessment is required, this instrument can be only used formatively. This can be a barrier for introducing it in the context of teacher education where students are often reluctant to use formative assessment instruments voluntarily if these instruments are not related to summative instruments and procedures and teacher educators refrain from making formative assessment compulsory.

According to the participants, this approach is novel for learners who are used to external awards of effort and external validations of learning like credit points or scores and material manifestations in the forms of certificates and grades. Thus an investment in awareness growth might be needed. Learners should see the usefulness of the approach to evaluation that Elite instrument supports.

3.1 SWOT for the adoption/adaption of the ELITe approach in STEM CPD in the Netherlands, based on ME outcomes (for the aspect discussed , namely, the Elite self-evaluation tool for learning and competence development .

		STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Dimensions & components of the ELITe framework negotiated in the ME	**Contextual:**	The approach is relevant for different domains and educational sectors in the Netherlands, and is tried out/implemented in a variety of ways	While the implemented scenarios's corresponded to interests and needs of STEM teachers as concluded at ME-1, an integration in the professional development structures at schools was lacking. Without such integration, participation remains voluntary and knowledge consumption prevails	STEM education has become part of upper primary school curricula and is included (with the use of ibl elements) in teacher training curricula	
	Methodological:	IBL is a well known and widely accepted methodology in education to young learners and question or inquiry led learning is al longer under development and in use in the Netherlands and is a research bke	Informal discussions with the participants indicated that the stringent model-based inquiry process can be a drawback and may lack feasibility	Further research on teacher professional development and the effects of inquiry and question-led approaches leads to increase of the evidence base for – evidence informed implementations.	There is a movement in the Netherlands propagating back to basics in education and the evidence-based character of direct instruction compared to weak "evidence" of effectiveness of ibl. This may influence Elite model implementation
	Thematic	All thematic were found relevant and all open courses on a variety of thematic developed in Elite framework enjoyed interest with resulting high enrolments	The attitude of the learners was however, that of knowledge consumers, Elite IBL scenario's were not or hardly followed in a systematic inquiry fashion. Also completion rate and response to questionnairies was extremely dissapointing	Sharing expertise areas between Elite partners	

3.1 SWOT for the adoption/adaption of the ELITe approach in STEM CPD in the Netherlands, based on ME outcomes (for the aspect discussed , namely, the Elite self-evaluation tool for learning and competence development .

Outcome **Self-evaluation tool for STEM teacher inquiry and reflective practice**	The tool is found useful, effective and usable by a broad range of potential users – teacher practitioners. Stimulates self-directed and self-regulated learning as it supports setting and evaluating realistic goals and reflecting on the goals in the context of learning.	The tool is novel and conceptually not easy to accept for learners who are used to have external assessment and validation frameworks and credits. Requires an effort as it needs to be contextualized for use	Development of an online application is a feasible option. The tool can be used in a variety of domains for professional learning of teachers	Using this instrument in the context that requires formal assessment and accreditation will negatively influence the credibility of certificates based on such self-evaluation of learning outcomes. It is vital to distinguish between the contexts of use.

3.2 Critical issues for the adoption/adaption of the ELITe approach in STEM CPD

The discussions /negotiations in Elite project frame that were conducted at the national conference on E-Assessment focused on one particular aspect of the Elite framework, namely on the self-evaluation instrument. As far as instrumentation of outcome dimension goes, the project provides teachers and teacher educators with a viable, though not yet comprehensive tooling. Teacher professional learning and reflective practice can be effectively supported by such a context-free tool. Use and usefulness of the tool are not limited to STEM teacher professional development domain and is not specific.

4. Results of the validation questionnaire

For the purpose of validation of the self-evaluation tool for (STEM) teacher inquiry and reflective practice, all the invited conference participants from Teacher Education faculty, Fontys Applied University were requested to fill in a questionnaire on their learning and professional development goals (part I of the questionnaire) in relation to this conference and were approached after the conference with a request to fill in part II of this questionnaire.

During conference registration all conference participants had an opportunity to share their personal learning goals through the same questionnaire in print.

After the conference another online questionnaire was issued for the conference participants who were Elite invitees (n=25) and a select group of experts on the topic of Assessment and Teacher professional learning (n=4). This questionnaire consisted of two parts. Part A was based on the learning goals as formulated by the participants prior to the conference online or during registration. Conference participants were invited to reflect on their personal learning outcomes and thus apply the Elite instrument. In part B of the questionnaire they were asked to reflect on the instrument itself, its usefulness, usability and applicability/feasibility in relevant contexts. The self-evaluation questionnaire was constructed o that conference participants could reflect on the goals set prior to the conference.

Part II of the questionnaire was issued after the conference as an expert evaluation of the instrument upon actual use of the instrument. Thus, participants had an opportunity to test the instrument in action by filling in the pre-conference questionnaire about personal learning goals and expected learning outcomes (part I)

and by filling in their personal estimations of the experienced knowledge gain (Part IIA). In Part IIB they reflected on the instruments' usefulness, feasibility and ease of use.

25 Elite invitees and 3 experts on formative assessment were invited to respond, 7 participants responded. Though response on the written questionnaire was below expected interesting insights were collected.

Respondents evaluated the instrument from three perspectives: (a) teacher /teacher educator as learner, (b) as teacher and (c) from the perspective of their students a learners. In all cases two questions were asked: what the value is/can be of this instrument (1) for supporting reflection on knowledge gain and (2) for perception of knowledge gain or insights on the level of knowledge and insights the respondent reached in relation to aspired learning outcomes.

Figure 3 is a visual representation of the results. We see that when <u>questions related to reflective learning or reflecting upon knowledge gain</u> from all the three perspectives and for all the three dimensions the instrument score high (round or slightly above 4 on a scale from 1 to 5, with relatively small variance).

As far as perception of knowledge gain is concerned, the scores for dimensions of usefulness, feasibility and ease of use are 3 – 3,3 on average with similar variance as on the first item. Respondents seem to agree that the instrument is less suitable for evaluating of knowledge gain.

The instrument seems useful, usable and also feasible in supporting reflective learning and less useful, less feasible and even less easy to use from the point of view of self-assessment which relates reflection on current level of knowledge or competence to the desired or aspired level of learning outcomes.

Answers to open questions support this conclusion. The link to reflective learning and the use of this tool as support to the learner, the formative perspective is valued highly.

From the point of view of its use in professional learning activities, one remark is interesting and refers to the discussed during the workshop: according to one respondent, this instrument could be integrated in Professional Development cycle (professionalization).

Evaluation of knowledge gain is related to more summative perspective and assessment of learning outcomes.

The questionnaire outcomes confirm results of the negotiations at the ME event.
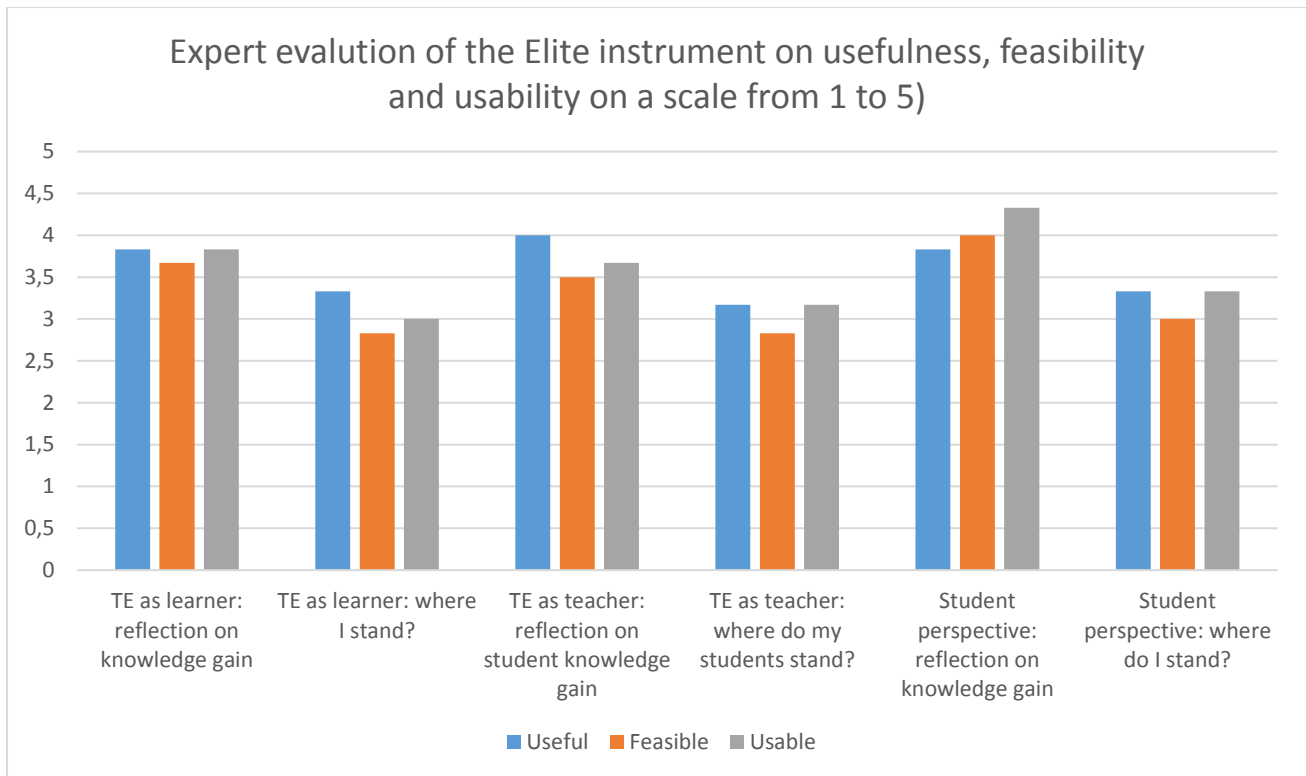
Figure 3. Results of the questionnaire on usefulness, feasibility and ease of use of the Elite self-evaluation instrument

Table 1 Answers to open questions about usefulness, feasibility and usability of the Elite self-evaluation instrument

Usefulness	Feasibility	Ease of use/usability
- Especially the questions regarding new knowledge (first question) and the question about reflection on contribution to learning I find very useful to interpret personal learning experiences. - the desired level [of knowledge] s not indicated. This makes the 2nd question (where am I standing?) difficult to answer. - Since the desired level is not explicitly mentioned here, it is not possible to say where you are with regard to the desired level. You can say "the level you would like to achieve yourself". - The questions between before and after the course provide insight into the way of development. I do wonder if the questions are not very general and specific enough to provide information. In addition, I actually missed some open questions that would bring out qualitative information.	- I have achieved more reflection with this than with a standard evaluation form. The character of non-open questions (not "what did you learn") nor a "scale question" (how much did you learn on a scale of 1 to 5) but the use of descriptions from which you have to choose helps me to think better about where I stand. - In my opinion, it must really be embedded in the cycle of professionalization (R & D conversations, etc.) to be used. - I don't see how the desired level can be estimated. I did not see any level descriptions but only a comparison with before the course so that	- I do think it can be a useful and pleasant instrument. It all depends on the type of questions. These should be specific. Because of this, it can happen that you get a long list of questions which makes the instrument less valuable. - from the personal perspective of a student and teacher I can summarize: I believe that this instrument is very useful, feasible and pleasant. However, I have not been able to determine or compare the relationship between them (i.e. whether it is more feasible or more pleasant etc). I think that the questions are precisely formulated, that they are not with double meaning, and it is very easy to put them in a particular context (course, programme, ...). - The use of this tool would be of great value from the teacher's perspective (to be used by his or her students) and to be used in his or her teaching. This is also based on the fact that the main strength of this tool (in my opinion) is that it can be very well used to reflect on a learning experience. See previous remark about specificity, lack of an ideal standard and

	the difference becomes clear.	similar to the initial situation, as a result of which only development becomes visible.