

Systemic opportunities and challenges for STEM teachers' competence development in the Netherlands

A report on the processes and outcomes of the ELITE's project Dutch Multiplier Event

by Olga Firssova¹

Introduction

Enhancing Learning In Teaching via e-inquiries (ELITE) is an Erasmus+ project aiming at provision of insights in the opportunities for and challenges of teachers' professional learning for competence development, targeting specifically in-service educators in the STEM domain.

According to the proposal and project goals, intellectual output 3 activity is organizing a multiplier event (E3) which in its turn aims at **deepening understandings on the needs and requirements for STEM teachers' competence development at national levels**, as conceptualized and expressed by policy makers, policy mediators and practitioners.

This report presents an overview of outcomes of the E3 multiplier event in the Netherlands, describes the methodology of the E3 multiplier event design and delivery, as well as the main conclusions, the implication of the outcomes for further activities in Elite project towards enhancement of STEM teachers' competence development in the Netherlands.

Approach and methodology

Aims and objectives of the Dutch multiplier event

The aim of the multiplier event E3 is to validate with different stakeholders (teachers, school managers, administrative staff as policy makers and policy mediators) outcomes from activity 1.1 and Intellectual outcome O1, i.e. "Policy envisions and requirements for STEM teachers competence development in Greece, the Netherlands, Bulgaria and Spain", focused on the situation in the Netherlands, determine the

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priorities for developing learning scenario's for teacher workplace learning and the focus of the planned intervention.

The expected outcome of the multiplier event activity is an overview of objectives for the organization and implementation of teachers' professional development that can be realized as e-inquiries. Results will be mapped against the key issues as identified in the desk study (intellectual outcome O1) and formulated in the Key messages document.

Methodology

Two methodologies were used to realize the expected outcome, i.e., to determine priorities for developing learning scenario's for teacher workplace learning and select the ones that can be realized within the Elite project. Namely: the EASW methodology and Group Concept Mapping methodology.

It was chosen to combine these two methodologies in order to maximize the outcomes and benefit from the strengths of both in determining the objectives of future Elite learning activities. The EASW methodology is used by all Elite partners, its use ensures comparability of outcomes. Adding GCM online component was aimed at ensuring validity and reliability of outcomes of the multiplier event.

The EASW methodology

The **European Awareness Scenario Workshop (EASW)** methodology relies on working in varying compositions groups and in plenary sessions in order to develop scenarios on the workshop topics, name barriers and propose strategies and steps for realizing the goals and overcoming the barriers. Building on concrete "scenarios" or problem constellations, it invites working group members to think about realistic challenges rather than dreaming up unlikely problems and solving them. Such a workshop follows three phases - the critical analysis phase, the visionary phase and the implementation phase – "to create a basis for local action". The EASW setting allows for interaction between stakeholders rather than organizing a static event, in which presentations are provided to participants. One disadvantage of EASWs is their reliance on stakeholder balance, which might never be reached realistically.

Following the EASW methodology, three sessions of the multiplier event were planned in three separate activities in which the stakeholder groups were either involved in separate activities or brought together for mutual discussions and decision-making. The sessions were: a) a **Raising issues** session for different stakeholder groups separately, b) a **Needs Analysis and Negotiation and Structuring solutions** session with a consequent wrap-up with all stakeholder interests represented, and c) **Demonstrating Possible Solutions** mini-sessions to all stakeholder representatives. The set-up of each session is described later in the report.

The Group Concept Mapping methodology

In addition to EASW methodology, Group Concept Mapping (GCM) methodology was used to collect input from different stakeholders including those would not be able to attend the live event. Generally speaking, the GCM methodology facilitates arriving at a shared vision regarding a particular issue. The GCM follows several distinct phases, in which all or a selection of participants take part.

The first phase or a starting point of a GCM study is idea generation, it can be organized online or live. Participants are invited to provide answer to a single prompt which is constructed based on theory and/or practical insights. The number of replies to the prompts by the participants is not limited as long each reply constitutes a single statement (idea). Idea generation can be done anonymously in combination with a limited number of background questions. In phase 2 idea generation phase is followed by sorting of collected ideas by participants and by rating ideas on a number of relevant dimensions, f.e., importance and feasibility (Trochim & McLinden, 2017). The input is then analyzed with two advanced multivariate statistical techniques - multidimensional scaling (MDS) and hierarchical cluster analysis (HCA) to identify patterns in the data. Maps visualizing the outcomes of individual activities that are generated in the process are used to validate the shared understanding of the issues under investigation and to formulate further actions or strategies in the subsequent phases (Kane & Trochim, 2007).

In relation to the Dutch multiplier event in Elite project, the first phase of the GCM methodology was used for the generation of input from the target population (stakeholder groups), in order to have an overview of potentially versatile standpoints, be able to differentiate between the standpoints of each group and also to stimulate discussion and further idea generation during the the multiplier event. Further phases of the GCM will be conducted at a later moment and will not be included in this report. In due course, they will be integrated with Elite outcomes.

Rationale for selection of participants

For the successful implementation of the EASW methodology, groups of stakeholders need to be identified. In conformity with Elite project guidelines the stakeholders were defined as **policy makers, policy mediators (those responsible for decision-making) and practitioners.**

For the Dutch multiplier event, the choice was made to integrate the multiplier event in the frame of a regional teacher professional learning activity – a one day Teacher Festival event held as a celebration of Day of Teacher on October, 5th. This activity was organized by several school boards for ca 1200 secondary school teachers. School board directors as policy makers and teachers as representatives of other stakeholder groups were part of this event. By integrating the multiplier event in the Teacher Festival, the Elite project could count on a large representation of all stakeholder groups and realize the dissemination of the project.

Rationale for selection of specific issues for discussion

Teacher professional development is part of the national agenda in the Netherlands as a warrant of the quality of Dutch education. At macro level, the Ministry of Education and Culture and the national teacher agency (Onderwijscoöperatie) take care of the pre-requisites and the general framework by formulating the general quality standards and by financing teachers' professional development. Support of participation in regional, national and international networks of schools contributes to teacher learning as well. Pre-service teacher education, publishing houses, non-governmental educational agencies and university research centers contribute to teacher learning by offering live, online and blended courses and programs and conducting research of teacher professional learning. At meso-level school boards facilitate teacher professional development by allocating time and facilities for learning activities, organizing

intervision and network learning and support of innovation at grassroots level. In doing so, schools pursue specific aims – making the school a professional (learning) organization that operates effectively in a highly demanding and continuously changing society and supporting teachers as professionals and members of these professional organizations in their individual professional learning activities. It is however, the teachers themselves who retain responsibility for and who have the lead in making their own professional development an integral part of the teacher profession.

To become a professional learning organization, the school thus needs to balance between learning needs, wishes and preferences of individual teachers and the collective needs of the school as a professional organization (Vermeulen, 2016). While prerequisites for teacher professional learning at the workplace are guaranteed at both macro and meso level, and the on-going technological and societal changes make innovation in the school a necessity, the teacher remains the core person in the implementation of innovation initiated elsewhere. However, unless the teacher gets the ownership of the innovation, the chance it is a success is low (Borko, 2004; Clarke & Hollingworth, 2002).

Therefore, the multiplier event chose as a focus the current teacher professional learning (workplace) needs as experienced by the teachers themselves. A collection of needs and wishes expressed by the teachers who actually are willing to learn was considered as a legitimate start for a series of workplace learning interventions in Elite.

Implementation

Setting and context of event

The Dutch multiplier event took place on October 5, 2017, as an integral part of a regional large-scale learning event, the so called Teacher Festival. Three regional school boards uniting all secondary schools of the Dutch region South Limburg joined forces to organize a professional day long learning activity for all teachers of secondary schools in the region.

Participants of the Teacher Festival were free to design a personalized professional learning programme and could enroll in a great variety of workshops, hands-on activities, discussions etc. Three universities and a number of local organizations (a Science Museum, an Art Workplace and theatre, the educational department of the local zoo) were also invited to participate.

The OUNL was contacted by the head of the organization committee, drs. Tineke Brocheler with a request to contribute with a learning activity for the day. The initial request led to cooperation in designing a joint programme that would fit the goals of the Elite project according to the multiplier event format.

An outline of the programme fitting the Elite project methodology (EASW & GCM) was submitted to joint school boards. Approval of the approach and the programme was granted including permission to conduct an online questionnaire based on GCM methodology prior to the event. An important restriction however was that only those interested in the part of the programme offered by the Open University could be approached to fill in the GCM questionnaire. While this restriction was a certain bias, teachers and

decision makers in school-related policies with interest in innovation and professional learning were the target group of the Elite multiplier event and as such a valid target group for the online questionnaire.

Elite project multiplier event activities constituted part of the whole offer and participants were free to sign up for and enroll in all three constituent activities or in any of the three.

96 participants signed up for the ***Raising issues*** session; 99 participants signed up for the ***Needs Analysis and Negotiation and Structuring solutions*** session and 24 participants enrolled for the ***Demonstrating Possible Solutions*** session.

Evaluation of the event was conducted by TF organizers and is available for all activities taken together. It was not possible to hold a separate evaluation of the multiplier event activities.

Structure of the event

Online questionnaire (GCM) and live input for GCM idea generation

Online GCM questionnaire was used 3 weeks prior to the Teacher Festival. An idea generation activity on personal needs and wishes of Teacher Festival participants was conducted. All those who enrolled in the OU session on Teacher Professional Development by professor Vermeulen were invited to respond to a short online anonymous questionnaire conducted with the GCM tool. The questionnaire consisted of 4 background questions and a prompt. The background questions concerned professional background, discipline, years of experience and the highest level of education. The prompt was worded to elicit answers to the question on what needs in professional learning respondents experienced in relation to their professional activities.

The input was integrated in the key note address to trigger discussion of the topic and introduce the central interactive part of the session (described above as Needs Analysis and Negotiation and Structuring proposals session in line with the EASW methodology). Brainstorm during the Needs Analysis session was collected as an output from the multiplier event.

The online questionnaire (GCM) was sent by the organizing committee to 99 Teacher Festival participants who had enrolled for participation in the Needs Analysis session. The GCM online questionnaire contained 39 unique responses (response of 39%).

Start of the Teacher Festival

After the registration procedure, the Teacher Festival was opened at a plenary session for all 1200 participants in the Main Hall of the Parkstad Theatre in Heerlen.

A large variety of activities started directly after the Introduction including the sessions organized by the Open University as parts of the Elite multiplier event. The complete programme (in Dutch) is included in the Appendix (Attachment 1).

Figure 1 illustrates the plenary opening on the TF prior to the multiplier event activities. These activities are described in 3.2.2, 3.2.3. and 3.2.4.



Figure 1 Opening of the Teacher Festival (registration and plenary start)

Elite session 1: Raising issues session (9.45-10.45)

During the Raising issues session the focus was on the opportunities that current technological developments open for education and application in the classroom, in particular in STEM classroom against the frame of teacher professional learning needs and opportunities. Professor dr. Marcus Specht started the session with an introduction of a variety of tools and the implications of their introduction in the classroom. Thereafter the implications for teacher competence requirements and competence development were discussed in small groups each united by a particular tool or technology. Participants could choose a specific anchor from a technological perspective to talk about application of technological enhancement of teaching and learning, identifying opportunities and challenges for these applications and thus for the needs in relation to teaching. Discussions were held in homogenous interest groups, aiming at identifying the opportunities and challenges on implementing activities for STEM teacher's competence development and in particular the teacher tasks in designing, implementing, orchestrating student learning.

4 separate groups worked on the following topics: (1) challenges of inquiry-based learning and the use of technology in tackling the challenges; (2) development of scenarios of using Dashboards for supervision, monitoring and instruction in online and blended learning formats; (3) Computational Thinking and learning in the classroom – opportunities and challenges and (4) sensor based technology in the classroom.

This session was organized together with another Erasmus + project Adulet, insights from Adulet were shared with the participants and discussed from the teacher as designer and teacher as learner perspectives.

Figures 2 and 3 illustrate these activities.



Figure 2 Presentation and discussion at the Raising issues session (sensor-based technologies in the classroom)



Figure 3 Demonstrations and brainstorm activities at the Raising issues session (inquiry based learning challenges with DojoIBL)

Needs Analysis and Negotiation and structuring proposals session (10.45-11.30)

The **Needs Analysis and Negotiation and Structuring proposals** session was arranged as a joint activity for representatives of all stakeholder groups together. The aim of the session was to stimulate active discussion of learning needs and needs of schools as an organization, reflect on the generated ideas as opportunities and challenges from different perspectives. Led by prof. Marjan Vermeulen participants brainstormed about the needs and possibilities to tackle arising issues and main challenges.

During this session - an exchange of standpoints between the participants of the session - a paper and pencil version of the GCM tool was used to trigger deep discussions and exchanges that were used to create a shared understanding of the topic and collect the output for phase two of GCM to be held later.

For the discussion of different perspectives color envelopes and postcards were used. The envelopes were distributed among the participants and participants were requested to discuss and share expectations

they have from different stakeholders, such as the government /policy makers, school boards, broad society and research community. Figure 4 is an illustration of how this part was orchestrated by the key note speaker prof. dr. Marjan Vermeulen.



Figure 4 Screenshots of the presentation with colored envelopes used to orchestrate discussion

Structuring proposal part of the session was a plenary reflection on the outcomes against the theoretical background of Professional Development theories and research findings moderated by prof. Vermeulen. Input of all participants on the needs and wishes of teachers against the opportunities and challenges they experienced in their professional practice.

Demonstrating possible solutions mini-sessions

To conclude the topic discussions a series of mini-demonstrations of tackling several challenges were conducted by workshop leaders of the Raising issues session (among others, Angel Suarez with DojoIBL in exemplary scenarios of co-development of inquiry based learning as a workplace learning strategy for teachers, and Jan Schneider with Presentation Trainer (Figure 5).



Figure 5. Jan Schneider presenting the Presentation trainer and demonstrating the tool.

These sessions were concluded with an oral evaluation.

Evaluation

Organizers of the Teacher Festival made use of the Elite evaluation questionnaire to conduct online evaluation of the whole event. Due to fact that Elite multiplier event activities were parts of a larger programme it was not possible to conduct a separate evaluation of the multiplier event sessions.

All participants received a flyer with the link to the evaluation questionnaire and were reminded of the questionnaire one week after the event. Organizers of the day shared the outcomes of the evaluation with the Elite project.

Furthermore, all researchers from the Open University who contributed to the event, shared their evaluation during an oral evaluation meeting. Their feedback points were collected and are summed up in the overview in Table 1.

Table 1. Evaluation and feedback points of the OU researchers who contributed to the Teacher Festival and to Elite multiplier event activities 1, 2 and 3.

Evaluation aspect	Feedback
Organization & communication	A very good organization and clear communication in advance. Limited visibility of the Open University and Elite project att the event outside of the dedicated session (used as a feedback point to the organizers
Content	Overall satisfaction by the quality of discussions and exchanges during the sessions and in the follow up
Relevance	Relevance to professional practice was not directly evident at the Raising issues session. The workshop part of the Raising issues session and the Needs Analysis session were found highly relevant by all participants.
Overall satisfaction	Good

Outcomes

This section presents the outcomes of different activities.

GCM study prior to the multiplier event

The goal of the GCM online questionnaire set out prior to the live event was two-fold: to generate input for further activities and to have points for active discussion during the live session on Needs Analysis. This section presents these results.

Participants

Around 50 people filled in the questionnaire, there were 39 unique answers in the system. According to the provided background data respondents represented a broad variety of educationalists: working in different disciplines, with 1.3 STEM teachers (Figure 6). Among the respondents teachers were in the majority (n=25, and school board of directors and administrative staff represented by 5 respondents each, figure 7). Figure 8 gives an overview of the distribution in the teaching expertise and Figure 9 - in the educational level of participants.

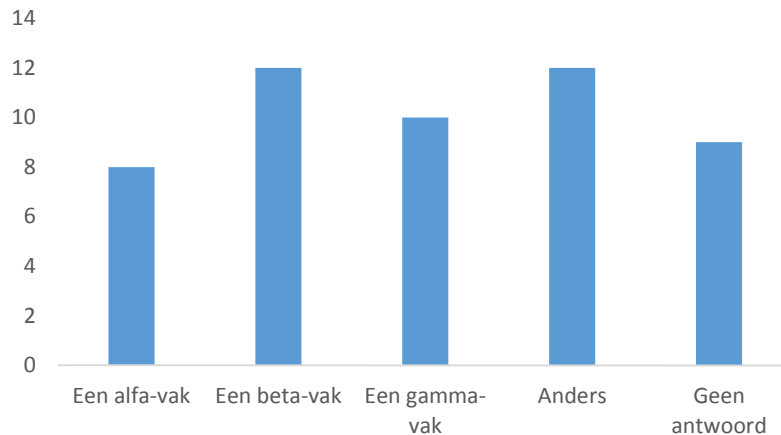


Figure 6. Distribution of respondents to the online questionnaire: discipline

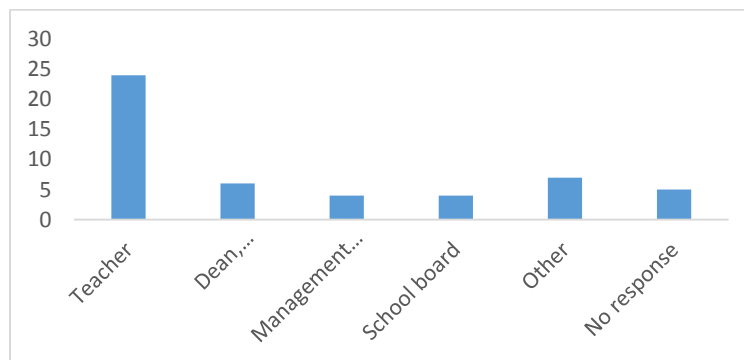


Figure 7. Distribution of respondents to the online questionnaire: occupation

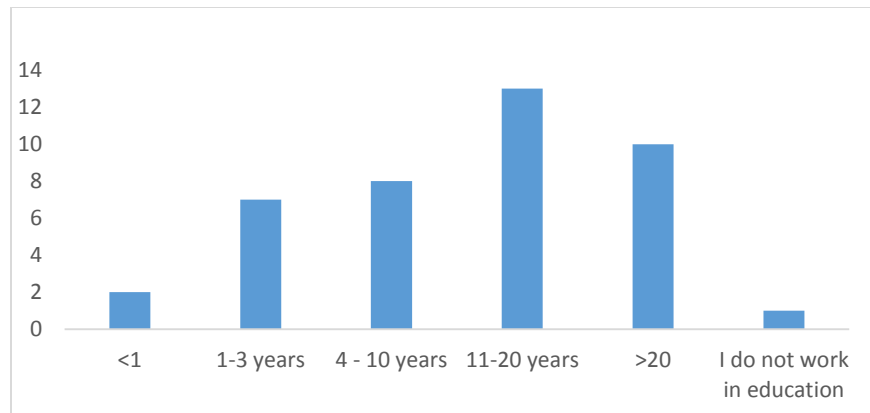


Figure 8. Distribution in expertise level among respondents to the online questionnaire

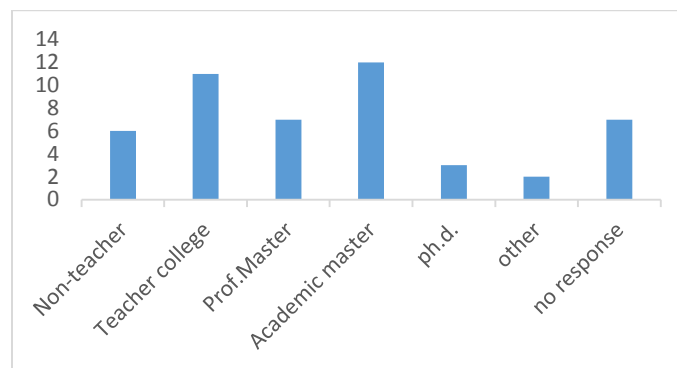


Figure 9. Distribution in the educational level of the respondents to the online questionnaire

In the GCM online questionnaire participants were invited to generate ideas by reacting to a prompt, they could give as many answers as they wanted but each should give only one idea. In phase 2 all unique ideas will be clustered by the participants and experts. In this temporarily analysis the clustering was conducted by an independent researcher. The prompt invited participants to complete the following sentence “In my professional activities for my professional development I need ... “ Answers to the prompt given in the online questionnaire can be divided in several approximately equal statements.

Table 2 presents the outcomes of the online GCM in detail.

Table 2. Outcomes of the preliminary online GCM

Cluster	Total statements	Exemplary statements
Support and advice		Coaching at workplace on effective teaching
Collaboration	7statements	Collaboration with colleagues Exchange of ideas Working on joint projects Doing research together Meeting teachers Contacts with other schools and further education

		Shadowing a colleague Sustainable models of knowledge sharing
Access to knowledge		Knowledge of why students have poor memory more often Insights in the positive and negative effects of the ICT use of by adolescents Knowledge about new teaching methods
Teacher skills		Learn to motivate students (again) Develop better digital skills Time management skills
Job related issues		Just doing my job Spend more time with the students Contribute to the digital learning environment More attention to class management
Formal schooling	10 statements	Get the qualification to teach one more discipline Continue working on my research project Apply for recognition of prior

Raising issues session

The goal of this session was to raise awareness of what is possible and already available for teachers and to let them think of what is directly applicable in the classroom and where additional support is needed and what such support might entail. The second goal was to warm participants up for the next session on professional learning needs. In all groups discussions were animated and active. Collecting input was not seen as an objective. Nevertheless, the group discussing opportunities and challenges of teaching according inquiry-based learning methodology produced an overview of pitfalls for both teachers and learners (Table 3).

As Table 3 demonstrates teachers have a good idea of what implementing inquiry-based learning in the classroom entails and are aware of many pitfalls and challenges. As the discussion moved forward the technical solution with the demonstrated platform DojoIBL was seen as a interesting and also feasible technological answer to many challenges.

Table 3 Answers generated by participants (n=16) discussing the challenges of inquiry based learning

Challenges of designing & organizing (implementing) inquiry-based learning in classroom	
For teachers	For students
Dealing with diversity	Collaboration
Personalized teaching, differentiation	Planning

Monitoring process Getting all students participate How to start Teaching students how to do an inquiry	Inquiry mindedness self-regulation Ability to read and understand what is implied
Acting as a coach Supporting the student in finding answers	Formulating good learning questions
Assessment of outcomes at different levels for different student skills	Discovering what is possible, going beyond the given task Getting from the idea to results
Finding time to organize a learning setting for inquiry based learning	Working technology

According to the participants these issues needed support and/or additional learning or training.

Needs Analysis Session

The core outcome of the needs analysis session was the completed overview of needs in further schooling, training and professional development at the workplace.

86 participants handed in paper and pencil questionnaires that were manually filled in the GCM tool.

According to the collected background information, a following overview of the participants can be provided.

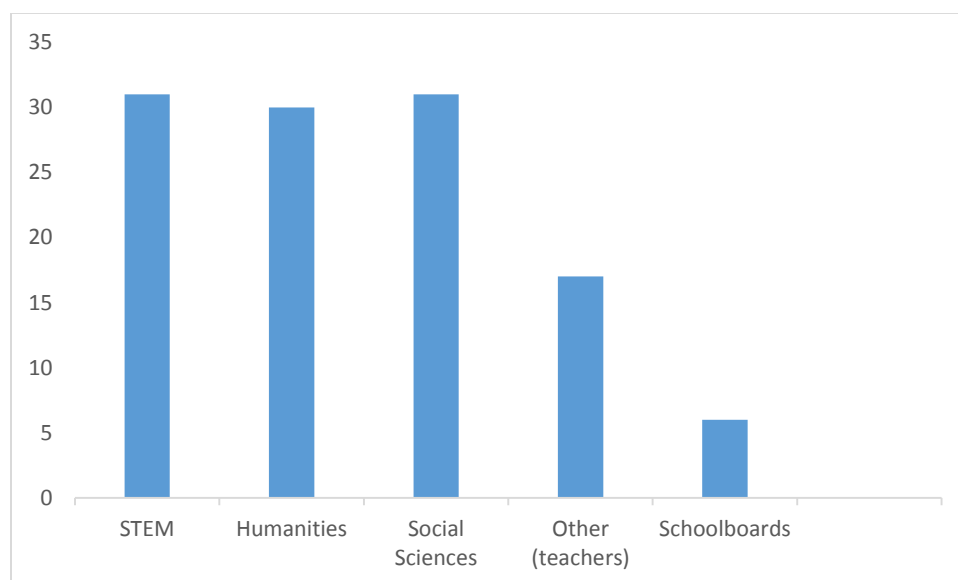


Figure 10. Distribution of respondents of the TF multiplier event: discipline of teaching

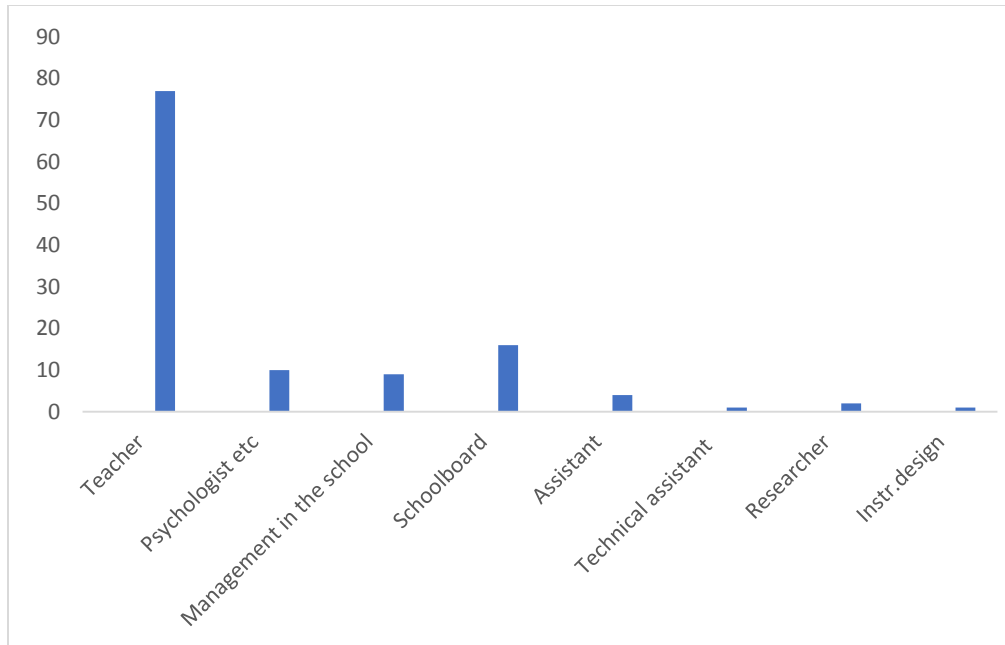


Figure 11. Distribution of participants of the Needs Session: occupation

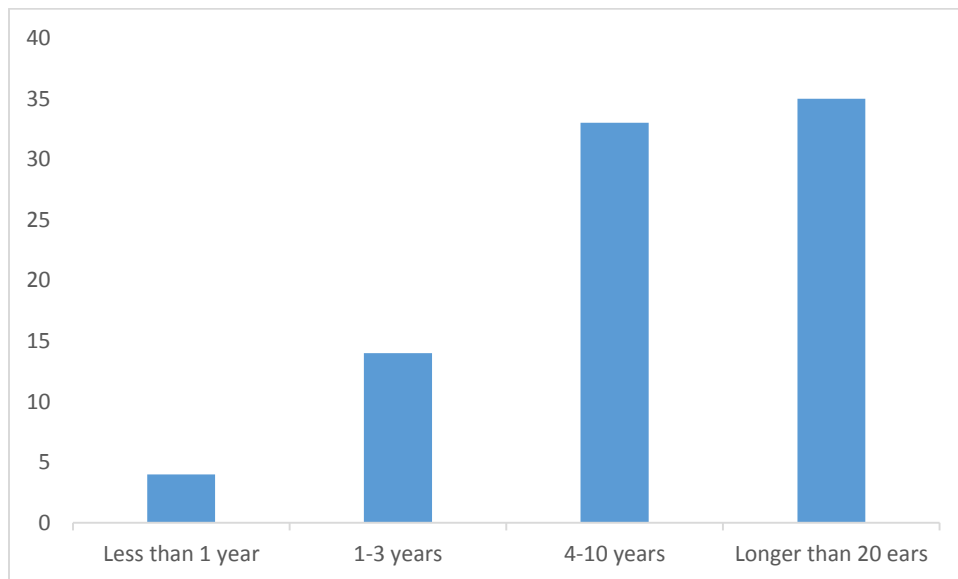


Figure 12 Distribution in expertise level of the participants of the Needs session

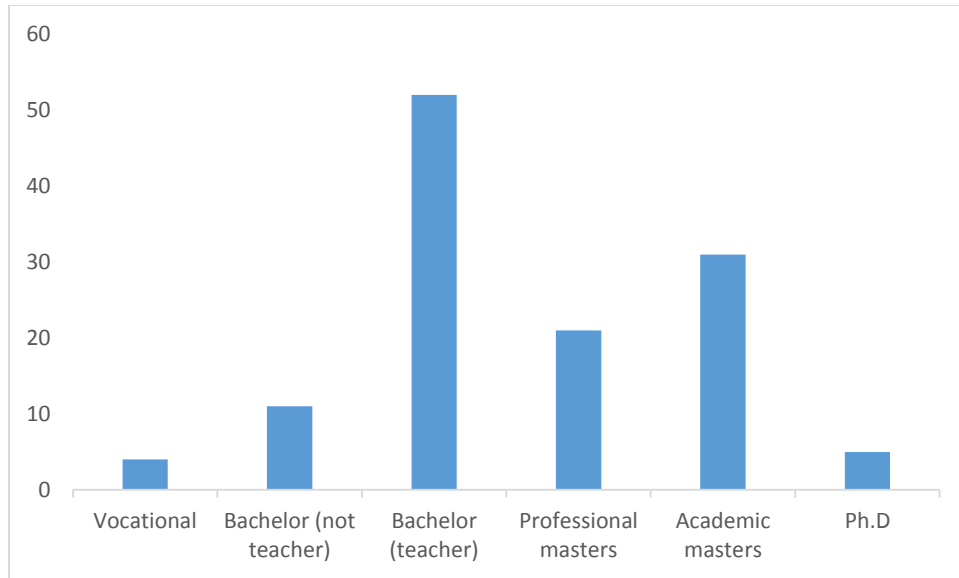


Figure 13. Distribution of participants according to highest educational level at the Needs session

Together with the statements generated prior to the session, GCM idea set comprised 144 unique statements. Three researchers separately analyzed the complete set of statements looking for statements that consisted of more than one idea, identical statements or unclear statements, 45 statements were found identical or very close in meaning by all the three researchers and erased.

The total of 99 unique statements on the expressed needs in professional development activities will be at a later stage clustered by a group of experts (n=30) and rated on importance and feasibility (Kane & Trochim, 2007). For the purpose of report on Output 3 a preliminary clustering is done by one independent researcher will be used.

Table 4 presents the resulting clusters (preliminary results). For the readability purposes each cluster is represented with several statements that typify the cluster.

Table 4 Preliminary results of clustering of all statements generated by the participants of the multiplier event

Cluster	Total statements	Exemplary statements
Facilities for professional learning	22 statements	Support and time for learning (taking courses), more time to develop lessons; trust and independence in designing and implementing lessons
Informal learning support	2 statements	Use of daily practice as a source of pd More opportunities to learn from each other
Interaction and exchanges with colleagues	12 statements	Exchange of experiences, talking to colleagues, meeting colleagues, brainstorm about tasks with others

Peer feedback and consultation	6 statements	Asking feedback, getting feedback from colleagues, more supervision by colleagues, visiting each other lessons, open door policy
Collaboration	4 statements	Joint work on learning environment Collaboration and exchange of ideas with colleagues from other schools
Access to knowledge	26 statements	Lecture, courses, training and experience in ... new pedagogies, socio-emotional development, new teaching methods, behavioral disorders of schoolchildren
Doing research	3 statements	Together colleagues setting up experiments and study what works; More inquiry based reflection on the teaching process
Organizational changes	18 statements	Changing school organization; making school an organization for professional learning, less control, more autonomy and trust, less administrative workload
Self-directedness and self-regulation	10 statements	Being able to reflect one's actions, reflecting on one's skills. Motivations and ambitions. Learning to make mistakes and learn from them

Demonstrating solutions sessions

The two hands-on Demonstrating solutions sessions did not produce tangible outcomes in the form of artefacts. The session provided the link between the teacher challenges discussed in the first session (f.e., challenges of Inquiry-based learning), available technical solutions that can help resolve some of the challenges and teacher learning on the one hand and school organization on the other.

If the school does not provide pre-requisites for implementation, technological innovations cannot succeed. Unless the teacher masters the approach and the tools, he or she cannot act as an agent implementing such tools or approaches in daily practice. The teacher who learns is the key to success, was the joint conclusion.

In the final activity of the Teacher Festival, this point was repeated in a broader context of all activities of the programme, enhancing the relevance of the Elite multiplier event.

Evaluation Results & SWOT analysis

Evaluation questionnaire results

Evaluation was filled in by 186 participants of the Teacher Festival. The evaluation referred to all activities taken together. On the 10 point scale the event was evaluated with 7, 41 final score. Four participants gave an unsatisfactory (1, 2 or 3) while the majority (171 participants). Feedback and wishes of the participants about future professional learning activities were in line with the outcomes of the Needs Analysis session: more variation between knowledge oriented and hands-on tasks, opportunities for networking, and as topics – effective use of ICT in school practice, the use of open learning and MOOCs, in combination with exchange of good practices and experiences of colleagues.

The complete evaluation is to be found in the Appendix (In Dutch).

SWOT analysis results

Strengths: The multiplier event provided valuable insights for the organization of teacher professional learning activities that can contribute to workplace learning and competence development of secondary school teachers in the Netherlands and in particular to teachers in STEM disciplines. The input from the multiplier event activities provided additional information and insights to the literature overview and the Key Messages document.

Weaknesses: Integration of the multiplier event in a large scale activity was both a strong point and a limitation because the potential of the EASW methodology could not be enjoyed to the full in the constraints of the programme of the event in which participants were free to attend activities. The same is true of the strengths of the GCM methodology which could have provided richer results if it could be held with all participants of the Teacher Festival and not only with those who chose the OU activity.

Opportunities: collaboration at regional level offers a good opportunity to create long term relationships between educational research and technology development and the teacher practice on the one hand,

and is a guarantee that educational and training activities designed and delivered within the Elite framework will not be one-time activities. The alignment between the offer and the experienced needs in learning activities increases the chance that the intervention will indeed be effective and help change and further develop the instructional practice.

Threats: for the OU team of researchers and educational designers comprising the ELITE team has a limited capacity to provide learning activities and, more importantly, the follow up for such activities in the form of counselling and co-creation of new learning experiences. To tackle this threat network and community building strategies need to be developed.

Conclusions

The multiplier event E3 conducted in October 2017 demonstrated that professional learning is a relevant issue and that designing, organizing and orchestrating professional learning is a complex task that can be best tackled in a manifold way. The preliminary online questionnaire provided input for a good discussion at the multiplier event but foremost, it showed that learning in relation to the job context is relevant yet versatile – there is need in formal knowledge, skills and work related collaborative activities, however, the participants pointed to both specific needs that are specific and work related and needs that are more abstract and related to general competence growth. Collection of input at the Needs Analysis session at the multiplier event confirmed this conclusion: needs in professional learning are versatile and are both related to specific issues as to general competence development perspective. Prominent are the need in facilities at the workplace (time!) and collaboration, being able to communicate and collaborate with colleagues at the workplace and outside. An offer of professional learning trajectories that caters to these needs within the Elite intervention is an opportunity to contribute to teacher professional development in an effective way.

Input collected at the Raising Issues session and the Demonstration pointed out to several specific themes that are of interest as anchors in professional learning events for teachers interested in innovative pedagogies such as inquiry based learning. Active participation in the sessions demonstrating other innovative tools and discussions around their application (i.e., Learning Analytic Dashboards, Sensor-based technologies and Computational Thinking) made it clear that there is interest in new concepts and tools while the relevance of application of the new knowledge in the classroom, in one's professional practice can be seen as a predictor of whether professional learning events introducing such tools and approaches will effectively contribute to teacher competence development in general in STEM-related disciplines in particular.

Another lesson concerns the importance of offering opportunities for collaboration, joint work and sharing of one's own practice. Taking a look into each other's "kitchen", learning from each other is considered most relevant by participants of the multiplier event. However, facilitation of learning by school management, allocating time for professional learning activities is an aspect that cannot be tackled by a provider of a learning event. Investing in long-term cooperation with school boards and school management is an important pre-requisite for an institution engaged in development of professional

learning activities, in this case of the Welten-Institute of the OU as one of the Elite partners. This implies that responding to the needs of school boards, collaboration in organizing events such as the Teacher Festival is an integral part of the offer from the OU as the Elite partner to the teacher practice.

Based on all the collected input at the multiplier event and taking in the account the conclusions of the literature study summed up in the Key Messages document, the following conclusions are formulated.

As an Elite partner, the Open University will offer a series of introductory online open learning activities for teachers in all disciplines, while the relevance for STEM teacher practice will be emphasized and specified whenever relevant. These learning events will be of short duration (ranging from 15 to 30 hours workload) so that teachers could participate and learn even when the time that can spend on these learning activities is limited and their learning effort is not in other ways facilitated by school management. Sharing experiences, practical solutions and ideas will be integrated in the pedagogical approach in combination with the pedagogy and tooling that supports exchanges between learning and orchestrates the learning process leaving sufficient space for the contribution of the learner. The courses will thus be based on design principles for open learning (Firssova, Brouns & Kalz, 2015) and collaborative inquiry based learning with DojoIBL (Suarez, Ternier & Specht, 2017).

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Appendixes

1. Agenda/programme of the TF
2. Key messages document

	Tijd	Rabozaal (1050)	INGzaal (138)	Limburgzaal (180)	DSM Theatercafé
OCHTENDPROGRAMMA	9.00 - 9.30	Opening Congres			
	9.30 - 9.45				
	9.45 - 10.00	P - Jan Fasen - Mundium College: Agora (Max 500)	P/ W - Marianne van Kan - Kindarte (SWPBS Coach)	P/ W - Marcus Specht en collega's (OU) - Nieuwe Technologie	Showcase - Serge Wauben - Emmacollege Techniek (Max 50)
	10.00 - 10.15				
	10.15 - 10.30				
	10.30 - 10.45				
	10.45 - 11.00			P - Marjan Vermeulen OU - Docentenprofessionalisering	W - Linda van Raak - Digitale revolutie in onderwijsland (Max 50)
	11.00 - 11.15	P/ W - Jack Vinders - Het geluk van Limburg (Max220)	D - Marie-Chantal Lommen Boomwhacker (Ronde 1) (max 100)		
	11.15 - 11.30				
	11.30 - 11.45				D - Theaterquiz (Max 100)
	11.45 - 12.00			P - Vince Meens (25 min.) Brightlands - 12:05u	
	12.00 - 12.15		W - Andy Dijkstra - Positiviteit leerlingen	P - Lieve Schouferden VDL Nedcar (25 min.) vanaf 12:05u	PAUZE
	12.15 - 12.30				PAUZE
	12.30 - 12.45	PAUZE	PAUZE	PAUZE	PAUZE
	12.45 - 13.00	P - Martin Valcke - Universiteit Gent	W - Inne Vandyck & Carla Haeleermans	W - Continium/ Museumplein Limburg	PAUZE

	Tijd	Vebege Foyer	Thuis & Partner lounge (80)	AZL Lounge (80)	Artiestenfoyer (20)
OCHTENDPROGRAMMA	9.00 - 9.30				
	9.30 - 9.45				
	9.45 - 10.00	Overleg Talen Ronde 1 Infomarkt (HELE DAG)	P/ W - Hans de Ruiter CBS in de klas - aardrijkskunde & maatschappijleer	P - Ellen Laeven & Bert Heesdahl - Zuyd Hogeschool	Harold Limpens - Stella Maris - Kunstkapskolan
	10.00 - 10.15	Overleg Talen Ronde 1 Infomarkt (HELE DAG)			
	10.15 - 10.30	Overleg Beta vakken Ronde 1 Infomarkt (HELE DAG)			
	10.30 - 10.45	Overleg Beta vakken Ronde 1 Infomarkt (HELE DAG)	P/ W - Hans de Ruiter CBS in de klas - wiskunde & economie		W - Christiane Beaumont - De leerling aan het roer
	10.45 - 11.00	Overleg Gamma vakken, LO en Kunstvakken Ronde 1 Infomarkt (HELE DAG)		P/ W - C. Sangers-Keuren Leerlab Arrangeren van Digitale Content	
	11.00 - 11.15	W - Daniël Fermont - De werkplaats Overleg Gamma vakken, LO en Kunstvakken Ronde 1 Infomarkt (HELE DAG)			
	11.15 - 11.30	W- Daniël Fermont - De werkplaats Overleg Praktijkvakken Infomarkt (HELE DAG)	W - (Schunck*) - Driver's seat (MAX 20)		Jan Fassen Marcus Specht en collega's OU - Demonstratie tools
	11.30 - 11.45	W - Daniël Fermont - De werkplaats Overleg Praktijkvakken Infomarkt (HELE DAG)			
	11.45 - 12.00	Overleg VWO Infomarkt (HELE DAG)		W - Maïke Pollaert - Theatertechnieken voor docenten	
	12.00 - 12.15	Overleg VWO Infomarkt (HELE DAG)			Marjan Vermeulen OU
	12.15 - 12.30	PAUZE	PAUZE		

	Tijd	ITH Lounge (20)	Loods	Buiten Apollolaan	Binnen bouwen	Kleedkamer 9 en 10 (20)
OCHTENDPROGRAMMA	9.00 - 9.30					
	9.30 - 9.45					
	9.45 - 10.00	P - Bureau VSV Samenwerken	D - Floral Design (Max 20) Ronde 1			W - Antonia van der Beesen - Stemtechniek
	10.00 - 10.15			D - Graffiti Ronde1 James Jetlag (Max 20)	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 1	
	10.15 - 10.30			D - Graffiti Ronde1	D - Tim Scheffer Kunstwerk maken R1	
	10.30 - 10.45	W - Vera Heijermath Nieuwe Themen		D - Graffiti Ronde1	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 2	
	10.45 - 11.00		D - Floral Design (Max 20) Ronde 2		D - Tim Scheffer Kunstwerk maken Ronde 2	W - Antonia van der Beesen - Stemtechniek
	11.00 - 11.15			D - Graffiti Ronde 2 James Jetlag (Max 20)	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 3	
	11.15 - 11.30			D - Graffiti Ronde 2	D - Tim Scheffer Kunstwerk maken Ronde 3	
	11.30 - 11.45	W - OU Demonstratie tools		D - Graffiti Ronde 2	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 4	
	11.45 - 12.00		D - Floral Design (Max 20) Ronde 3		D - Tim Scheffer Kunstwerk maken Ronde 4	
	12.00 - 12.15	PAUZE		D - Graffiti Ronde 3 James Jetlag (Max 20)	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 5	PAUZE
	12.15 - 12.30	PAUZE		D - Graffiti Ronde 3	D - Tim Scheffer Kunstwerk maken Ronde 5	PAUZE

R = Ronde

	Tijd	Rabozaal (1050)	INGzaal (138)	Limburgzaal (180)	DSM Theatercafé
MIDDAGPROGRAMMA	12.15 - 12.30	PAUZE	W - Andy Dijkstra - Positiviteit leerlingen	P - Vince Meens (25 min.) & P - Lieve Schouterden (25 min.)	PAUZE
	12.30 - 12.45	PAUZE	PAUZE	PAUZE	PAUZE
	12.45 - 13.00	P - Martin Valcke Universiteit Gent (Max 500)	W - Inne Vanduyck & Carla Haelemans Universiteit Maastricht - Differentiatie	W - Continium/ Museumplein Limburg	PAUZE
	13.00 - 13.15				D - Theaterquiz (Max 100)
	13.15 - 13.30				
	13.30 - 13.45				D - Theaterquiz (Max 100)
	13.45 - 14.00	P - Renate de Groot - OU - Puberteit extended (Max 500)	W - Harold Limpens - Stella Maris -Kunskapskolan		
	14.00 - 14.15			W - Joris Ghysels & Carla Haelemans	
	14.15 - 14.30			Universiteit van Maastricht Lente- en zomerscholen en ouderparticipatie	W - Brahim Ait Mellouk - Leidinggeven aan een team (Max 50)
	14.30 - 14.45				
	14.45 - 15.00	P - Laaggeletterdheid (Max 500)	D - Marie-Chantal Lommen - Boomwhacker (Ronde 2) - 15.25u (Max 100)		
	15.00 - 15.15				
	15.15 - 15.30				
	15.30 - 15.45	Luuk van de Moorlele (1050) -15.55u & Gezamenlijke afsluiting congres (1050)			
	15.45 - 16.00				

	Tijd	Vebego Foyer	Thuis & Partner lounge (80)	AZL Lounge (80)	Artiestenfoyer (20)
MIDDAGPROGRAMMA	12.15 - 12.30	PAUZE	PAUZE	PAUZE	Marjan Vermeulen OU
	12.30 - 12.45	PAUZE	W - Gino Kamp OU - Effectief Leren	PAUZE	PAUZE
	12.45 - 13.00	Showcase Emmacollege: Frank Marcus Overleg Talen Ronde 2 Infomarkt (HELE DAG)		W - Jeroen Jansen & Teun Vreuls - Inflex	PAUZE
	13.00 - 13.15	Showcase Emmacollege: Frank Marcus Overleg Talen Ronde 2 Infomarkt (HELE DAG)			Lieve Schouderden & Vince Meens
	13.15 - 13.30	Showcase Emmacollege : Frank Marcus Overleg Beta vakken Ronde 2 Infomarkt (HELE DAG)			
	13.30 - 13.45	Showcase Emmacollege: Frank Marcus Overleg Beta vakken Ronde 2 Infomarkt (HELE DAG)	P/ W - Ellen Rusman OU & Theo Janssen - Viewbrics	W - Andrew Simons - Movare - Gezonde school	
	13.45 - 14.00	Overleg Gamma vakken, LO, Kunstvakken R2 Infomarkt (HELE DAG)			
	14.00 - 14.15	W - Lars Rompen MTH (-14:45u) Overleg Gamma vakken, LO, Kunstvakken R2 Infomarkt (HELE DAG)			
	14.15 - 14.30	Overleg HAVO Infomarkt (HELE DAG)			
	14.30 - 14.45	Overleg HAVO Infomarkt (HELE DAG)	W - Merie Michiels SBB	W - Egld van Houtem & Janke Grassere - Grasswoods	Martin Valcke Universiteit Gent
	14.45 - 15.00	Overleg VMBO Infomarkt (HELE DAG)			
	15.00 - 15.15	Overleg VMBO Infomarkt (HELE DAG)			
	15.15 - 15.30				
	15.30 - 15.45				
	15.45 - 16.00				

	Tijd	ITH Lounge (20)	Loods	Buiten Apollolaan	Binnen bouwen	Kleedkamer 9 en 10 (20)
MIDDAGPROGRAMMA	12.15 - 12.30	PAUZE	D - Floral Design (Max 20) R3	D - Graffiti Ronde 3	D - Tim Scheffer Kunstwerk maken Ronde 5	PAUZE
	12.30 - 12.45	PAUZE	PAUZE	D - Graffiti Ronde 3	PAUZE	PAUZE
	12.45 - 13.00	PAUZE	PAUZE		D - Tim Scheffer (Max 10) Kunstwerk maken 6	W - Peter Adriaans Pictochart
	13.00 - 13.15	P - Lars Leensaen Het dealerbedrijf 2.0	W - Techniekcollege (Max 35)	D - Graffiti Ronde 4 James Jellag (Max 20)	D - Tim Scheffer Kunstwerk maken Ronde 6	
	13.15 - 13.30			D - Graffiti Ronde 4	D - Tim Scheffer (Max 10) Kunstwerk maken Ronde 7	
	13.30 - 13.45			D - Graffiti Ronde 4	D - Tim Scheffer Kunstwerk maken Ronde 7	
	13.45 - 14.00				PAUZE	W - Halszka Jarodska - OU Visuele expertise
	14.00 - 14.15		W - Techniekcollege (Max 35)		D - Tim Scheffer (Max 10) Kunstwerk maken R8	
	14.15 - 14.30				D - Tim Scheffer Kunstwerk maken Ronde 8	
	14.30 - 14.45	P - Bureau VSV Samenwerken			D - Tim Scheffer (Max 10) Kunstwerk maken R9	W - Pionie Nijhof & Rodica Ernst Universiteit Maastricht - Wiskunde
	14.45 - 15.00				D - Tim Scheffer Kunstwerk maken Ronde 9	
	15.00 - 15.15					
	15.15 - 15.30					
	15.30 - 15.45					
	15.45 - 16.00					

R = Ronde

6

De competentieontwikkeling van STEM docenten in Nederland

Sleutelboodschappen die in het Nederlandse multiplierevenement worden besproken

Docentprofessionalisering is meer dan een relevant onderdeel van het onderwijsagenda in Nederland. Met de Wet Beroepen in het Onderwijs (Wet Bio, 2006) is professionalisering een integraal onderdeel van de professie van leraar geworden. Met deze verankering en de instrumentatie via Lerarenregister en het creëren van financiële randvoorwaarden in de vorm Lerarenbeurs heeft de Nederlandse onderwijs belangrijke randvoorwaarden voor permanente professionalisering van leerkrachten en docenten geschapen. De realisatie van de professionalisering binnen deze randvoorwaarden en ook benutten van datgene wat dankzij deze randvoorwaarden mogelijk is, ligt bij de school als organisatie, enerzijds en de individuele docent, anderzijds.

Relevante vraagstukken zijn

- **Op macro niveau:** afstemming tussen nationale interesses in innovatie en technologische ontwikkeling en de organisatie van initiële onderwijsstructuren en de structuren voor de permanente docentenprofessionalisering op de werkplek. De recent herijkte docentencompetenties dienen als een trigger voor discussie over toekomstgericht en toekomstbestendig docentprofessionalisering.
- **Op meso niveau:** school als organisatie en werkgever is op zoek naar innovatieve aanpakken van professionalisering waarmee niet alleen individu maar de organisatie als geheel het predicaat “lerende organisatie” zou kunnen hebben. Wat betekent voor de school als organisatie het leren van docenten als een integraal onderdeel van het functioneren van deze organisatie? Hoe evalueert de school door de individuele transformaties van leraren en wat betekent de transformatie van de school in de lerende organisatie voor toekomstgericht en toekomstbestendig docentprofessionalisering?
- **Op micro-niveau** heeft het vraagstuk van docentprofessionalisering meerdere kanten. Integratie van transversale vaardigheden, de zo genaamde 21e eeuwse vaardigheden, alomtegenwoordigheid van ICT, curricula die niet de vakinhouden maar de leerling centraal stellen, personalisatie van leren veranderen het onderwijs en de leerkracht. De kennis en vaardigheden opgebouwd in initiële opleidingen leggen de basis voor het carrière lang bouwwerk van

docentprofessionalisering waarbij de houding, met name de onderzoekende en reflecterende houding prominent naar voren komen en ontwerp- en onderzoeksvaardigheden steeds meer tot de basisrepertoire van de leraar beginnen te behoren.

⇒ Het centrale thema van het Nederlandse multiplayer event

Docentprofessionalisering en de impact ervan op de schoolpraktijk

Op 5 oktober 2017 organiseren schoolbesturen LVO (cluster Parkstad), SVO | PL en Citaverde (afd. Vmbo) een Dag van de Leraar voor alle betrokkenen bij het voortgezet onderwijs in Parkstad Limburg. In het theater van Parkstad Limburg komen naar verwachting circa 1200 docenten, onderwijsondersteunend personeel, schoolmanagement en andere stakeholders bij elkaar om een dag lang samen met elkaar en van elkaar te leren. Het thema van de dag is: 'Zaaien, groeien, bloeien en oogsten'. Het Parkstad Limburg Theater wordt voor deze dag omgetoverd in een soort onderwijsfestival met keynotes, good practice workshops, inspiratiesessies en netwerkplekken. Elke deelnemer zal online een geheel gepersonaliseerde route voor die dag uit kunnen stippelen.

Het Welten-Instituut koppelt een onderzoek zal aan naar de behoeften van leraren aan professionalisering aan deze dag en zal op de dag via een serie workshops de vragen die zowel op micro als op meso niveau betrekking hebben verhelderen.

Door middel van een Groep Concept mapping worden de behoeften van individuele leraren geïnventariseerd.

In een gezamenlijke sessie wordt vanuit verschillende rollen naar deze expliciet gemaakte behoeften gezamenlijk gekeken.

Vervolgens worden de standpunten van de betrokken stakeholders aan de schoolbesturen voorgelegd.

De uitkomst is een overzicht van de behoeften en leerwensen van de docenten op zowel individueel als collectief niveau.