

Intellectual Output 3

INTERNATIONAL SUPPORT NETWORK IN EVIDENCE-INFORMED STEM-EDUCATION

Erasmus+ Project 'Research in Teacher Education (RiTE)'

2019-1-NL01-KA203-060339

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Summary

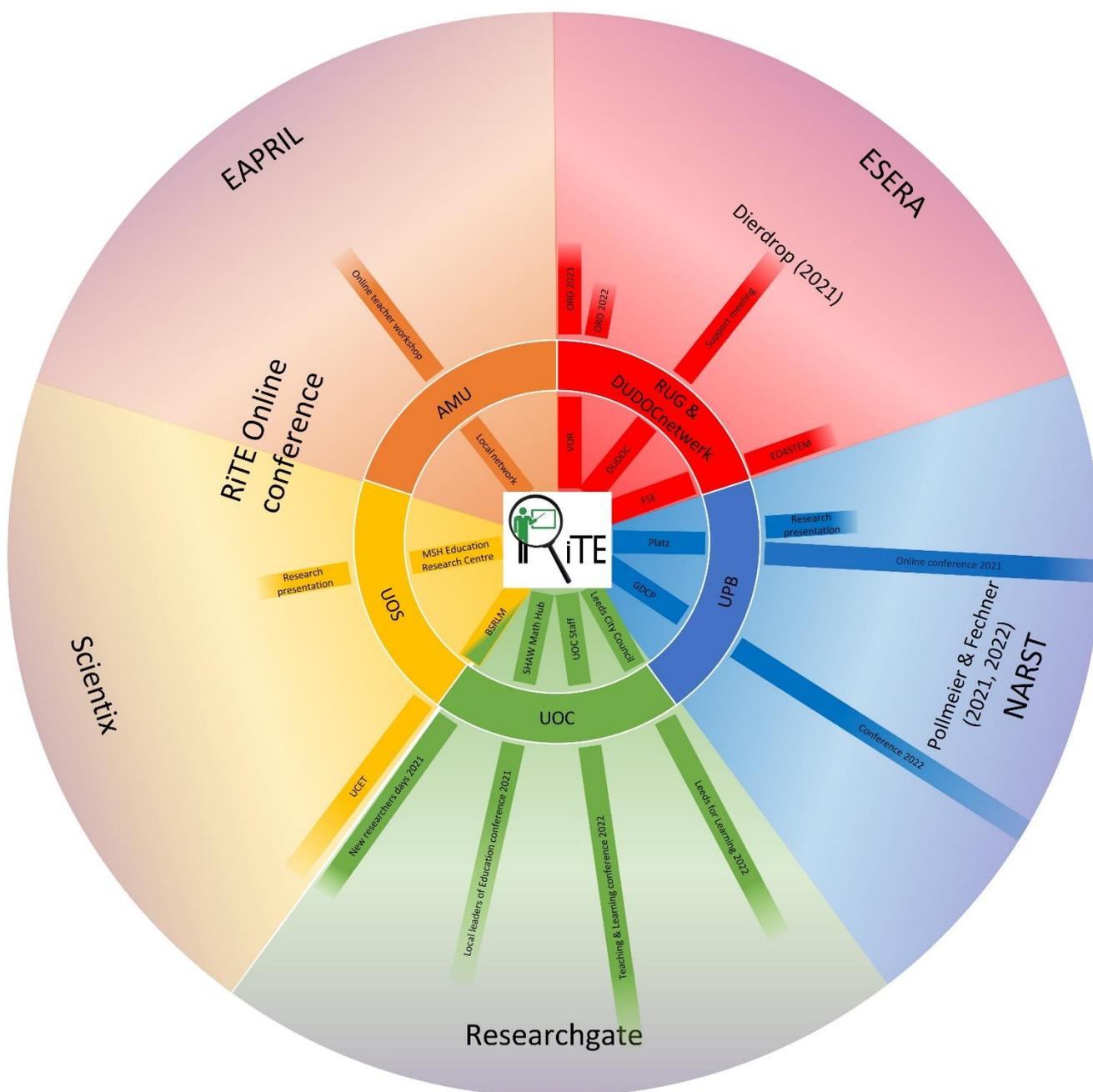


Figure 1.a Representation of the International Support Network created by the consortium partners in the RiTE-project

1. Introduction

Through the support network, the project has an impact on local, national and international levels. This is presented in the picture on the frontpage of this report. The network stimulates, facilitates and supports its members to engage in implementing evidence-informed teaching



www.dudocnetwork.nl

practices. The partners form the initial core of the support network to foster the implementation of evidence-informed teaching practices. The network has been expanded with researchers, teacher educators and teachers who are engaged in implementing evidence-informed teaching practices. The DUDOCnetwork, in collaboration with Utrecht University, coordinates the network in order to sustain and further develop the activities, materials and publications.

First of all the RiTE-project mainly has an impact on the participating organisations (higher education institutes and DUDOCnetwork). Through the intensive collaboration, the partner organisations learned how to support (student) teachers in implementing evidence-informed teaching practices. Secondly, the project's impact increased by disseminating the new insights, and materials through a variety of communication channels, media and platforms and by embedding support activities in existing networks. The purpose was to engage educational researchers, teacher trainers and (student) teachers in initial teacher education in implementing evidence-informed teaching practices during and after the project.

The innovative element is that expertise, materials, and activities are shared in a low-threshold way within international platforms using the networks of existing (European) associations. Using these platforms and the networks of these associations could make it possible to bring researchers and practitioners together on a European level to stimulate collaboration to improve education.

This section describes the impact each partner created individually at local and national level, followed by the impact that all partners created collaboratively at international level.

2. Support network activities and deliverables by each partner

Each partner organized local support activities in and around their own institute and ITE-context in order to bring the urgency of implementing evidence-informed teaching practices on the agenda of policy makers. In addition, each partner organized national support activities at for example national conferences and similar gatherings of teachers, educators, educational developers and researchers. Besides, the products and results of the project were shared through national information channels, such as teacher associations and platforms, publications in scientific and trade magazines, newsletters, and so on.

2.1 University of Groningen & DUDOCnetwork

Impact was created by initiating discussions about the relevance of creating an evidence-informed teaching practice and implications for educational development within the organisations. This led to prioritizing the subject on formal governance agenda's. For example, the aim to create an evidence-based teaching practice is now explicitly mentioned in the strategic plan 2020-2025 of the Faculty of Science & Engineering of the RUG. The 'Teacher Training for PhDs', which was redesigned during this project, runs now twice a year supporting each iteration around 15 PhDs in implementing evidence-informed teaching practices. In addition, the framework of the course was used to design a similar course at the Faculty of Science of the University of Utrecht where it supports another 10-15 PhDs each year.



Figure 2.1.a Teacher training for PhDs at the University of Utrecht

Support and dissemination activities that were conducted by the University of Groningen, in collaboration with the DUDOCnetwork, involved a support meeting within the DUDOCnetwork and contributions to the national conference of educational research.

2.1.1 DUDOCnetwork Support Meeting



www.dudocnetwork.nl



Date:	7 January 2020
Type of activity:	Presentation & brainstorm session
Impact:	5 participants, 30 members, 15 institutes through the newsletter

Purpose

The main purpose of the DUDOCnetwork meeting is to share the developments within the RiTE-project, and verify the results among the members of the DUDOCnetwork to receive critical advice, feedback and support.

Description

The RiTE-project, its aim and purpose was introduced to the members of the DUDOCnetwork. As a first step in the project, we started the discussion among the members of the DUDOCnetwork about 'What is evidence' and 'How to use evidence to improve teaching practice?'

2.1.2 EO4STEM Conference

Date: 8 December 2020
Type of activity: Online roundtable session
Impact: 10 participants

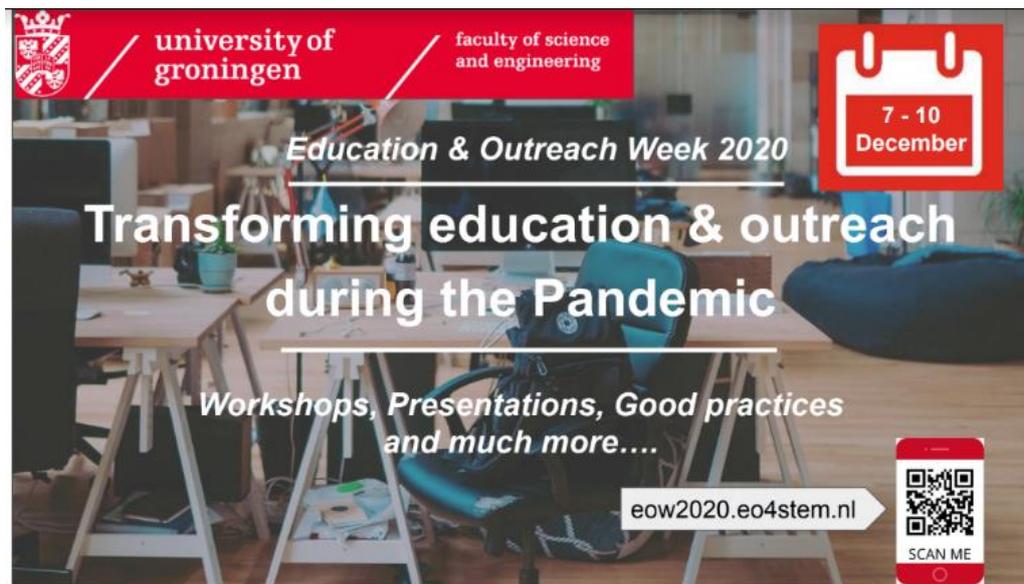


Figure 2.1.b Flyer of the conference

Purpose

Encouraging and facilitating university teachers in STEM to use research results to improve their teaching practices.

Description

The session was titled 'Creating an evidence informed teaching practice'. After watching the introduction video, during the session the following four questions were discussed among staff members of the Faculty of Science & Engineering of the University of Groningen.

1. What is 'the best information' to use to improve your teaching practice?
2. How to use this information to improve your educational design?
3. How to generate information systematically during your teaching practice?
4. How to share this information with colleagues?

Products

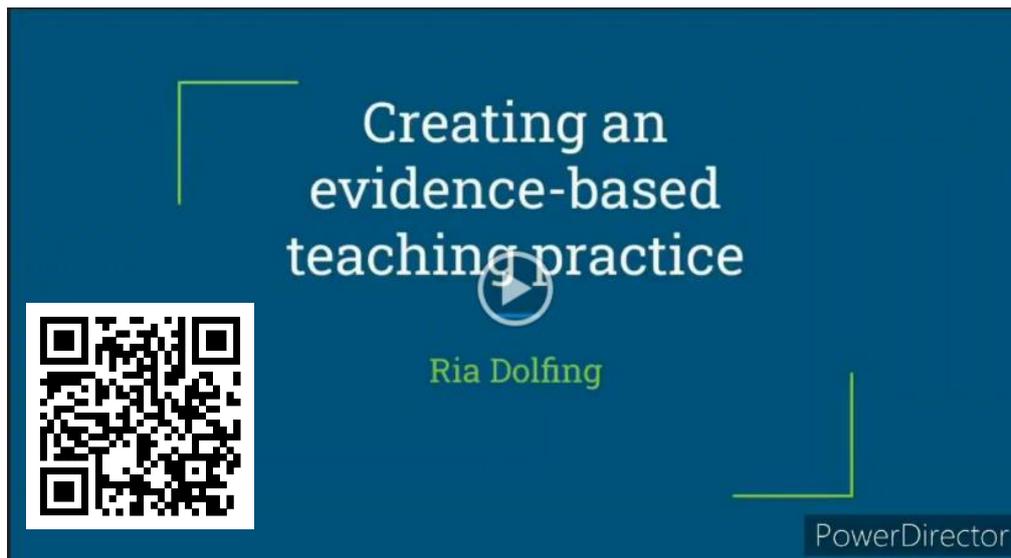


Figure 2.1.c Introduction video of the round table session

2.1.3 VOR 'Onderwijs Research Dagen (ORD) 2021'



vorse.nl



Date:	9 July 2021
Type of activity:	Online roundtable session
Impact:	11 participants, 14 institutions

Purpose

The purpose of this round table session was to encourage and facilitate researchers, educational developers, practitioners and (student) teachers to use evidence from literature in their teaching practice.

Description

After a short presentation about the project with the title 'Research in Teacher Education: Creating an 'evidence informed teaching practice' was provided. This was followed by a discussion around the following questions:

1. What competencies do teachers need to create evidence-informed practice in their own teaching practice and how can we best support them to develop it?
2. How can general and context-specific influences be distinguished in educating and supporting teachers in creating evidence-informed practice, given the different countries participating in this project?



Figure 2.1.d Screenshot of the online session

Research in Teacher Education: Het creëren van een 'evidence-informed teaching practice'

De universiteiten van Groningen, Southampton, Paderborn, Poznan en Chester ontwikkelen, in samenwerking met het DudocNetwerk en de Universiteit Utrecht, een curriculum om studenten binnen de vijf lerarenopleidingen te ondersteunen in het creëren van een 'evidence-informed teaching practice'. Elk van deze universiteiten (her)ontwerpt, implementeert en evalueert de eigen curriculumonderdelen. Het onderzoek is gericht op het ontdekken en beschrijven van de individuele en overkoepelende succesfactoren van een dergelijke onderwijsinnovatie in lerarenopleidingen.

Als gemeenschappelijke theoretische basis voor het herontwerpen van het curriculum, worden de samenhangende leeractiviteiten van expansive learning van Engeström en Sanino (2010) gebruikt. Deze leeractiviteiten betreffen: opstellen van een onderzoeksvraag over en het analyseren van de onderwijspraktijk, een nieuwe oplossing formuleren en deze testen en evalueren, het invoeren van de oplossing, het reflecteren op het proces, en verankeren en veralgemeniseren van de uitkomsten. Door de cyclische werkwijze, de aandacht voor zowel zoeken van een eigen oplossing, het uittesten in de praktijk als op het reflecteren, is dit model geschikt voor gebruik in een lerarenopleiding zoals wordt aanbevolen in de kennisbasis lerarenopleidingen (Van Driel, 2017 - Katern 3: H16). Het procesmatige model is dusdanig algemeen dat het gebruikt kan worden door de vijf verschillende universiteiten die elk hun eigen context en hun eigen cultuur kennen. De studenten aan de vijf (STEM) lerarenopleidingen worden vertrouwd gemaakt met het gebruiken en inzetten van bewijzen uit de vakinhoudelijke en (vak)didactische literatuur in interactie met de eigen lespraktijk en het evalueren en reflecteren op dit gebruik.

Het onderzoek heeft als doel inzicht te verkrijgen in hoe dit model op elke lerarenopleiding kan worden ingezet en hoe docenten ondersteund kunnen worden in het creëren van een evidence-informed teaching practice'. Het RiTE-project zal 'best practices' opleveren die internationaal beschikbaar zullen worden gesteld en gedeeld zullen worden via de netwerken van Dudoc onderzoekers en EAPRIL.

Tijdens de rondetafelsessie brengen we graag de volgende zaken ter discussie:

1. Welke competenties hebben docenten nodig om een evidence-informed practice te creëren in hun eigen lespraktijk en hoe kunnen we ze het beste ondersteunen om deze te ontwikkelen?
2. Op welke wijze kunnen algemene en contextspecifieke invloeden onderscheiden worden bij het opleiden en ondersteunen van docenten in het creëren van een evidence informed practice, gezien de verschillende landen die meedoen binnen dit project?

Figure 2.1.e Abstract of the round table session

Research in Teacher Education - RiTE

DUDOCnetwerk RiTE Project



Resultaten op ddn-rite.eu
Publicaties op [ResearchGate](https://www.researchgate.net)

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



Doel:
Stimuleren en faciliteren van bètalararen-in-opleiding om onderzoeksresultaten te gebruiken bij het lesgeven in de bètavakken

Middel:
De expansive learning cycle van Engestrom & Sannino (2010) & de evidence-use mechanisms van Brackon & Dodgen (2016)



VRAGEN VOOR HET RONDETAfelGESPReK

- Welke competenties hebben docenten nodig om een 'evidence-informed practice' te creëren in hun eigen lespraktijk en hoe kunnen ze het beste ondersteund worden om deze te ontwikkelen?
- Op welke wijze kunnen algemene en contextspecifieke invloeden onderscheiden worden bij dit opleiden en ondersteunen van docenten in het creëren van een evidence informed practice, gezien de verschillende landen die meedoen binnen dit project?

TOT ZO!

- Lesley de Putter
- Adri Dierdorp
- Ria Dolfing



Figure 2.1.f Handout of the round table session

2.1.4 VOR 'Onderwijs Research Dagen (ORD) 2022'



vorsite.nl

ORD 2022



Escape the classroom

Date: 8 July 2022
 Type of activity: Workshop
 Impact: 4 participants, 2 institutions

Purpose

The purpose of this workshop was to stimulate the audience to think about how to use evidence in university teacher training using the expansive learning cycle as a guide.

Description

In this workshop a short explanation was given on the goals of the RITE project, after which the participants actively engaged with the expansive learning cycle of Engeström and Sannino (2010). The approach provided the participants with insights into how this cycle can be used in research and in training of teachers.

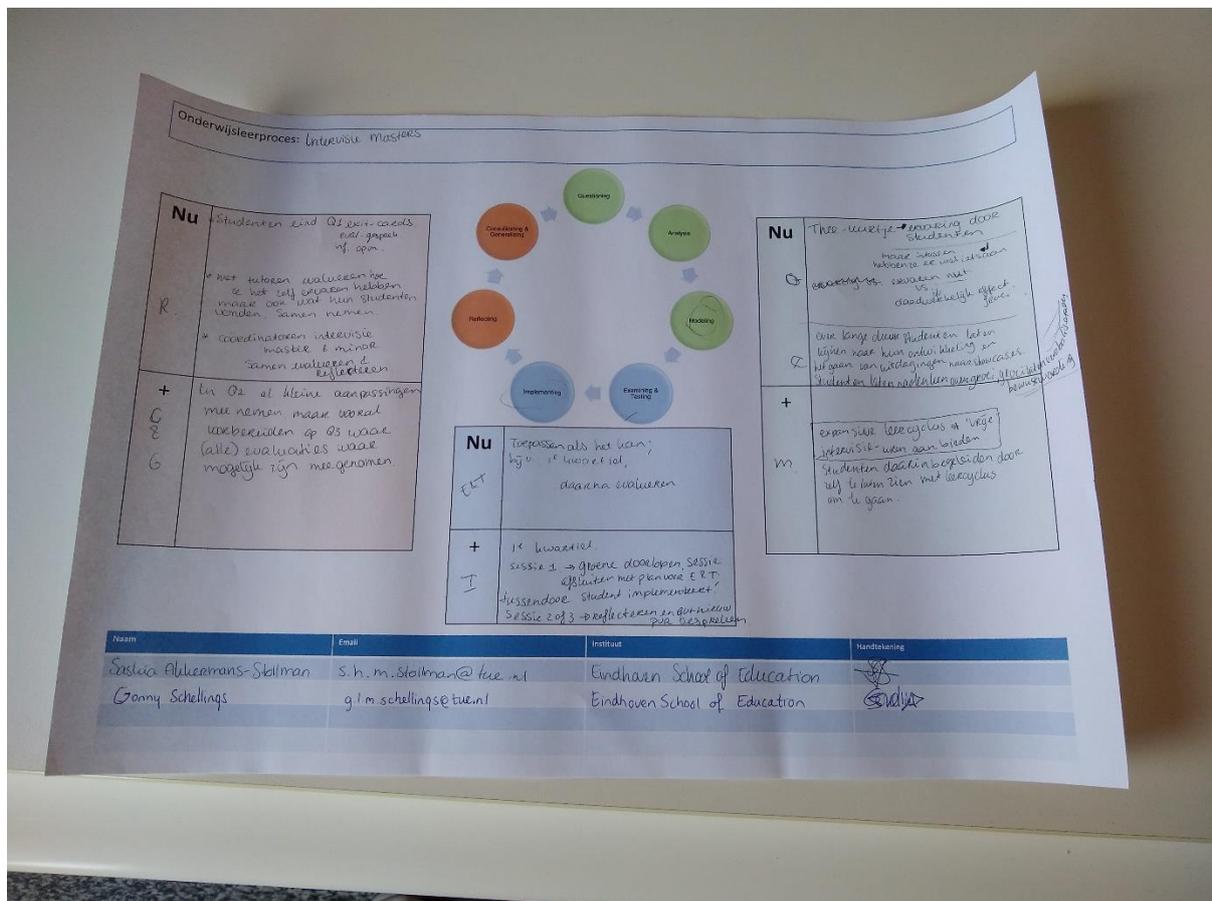
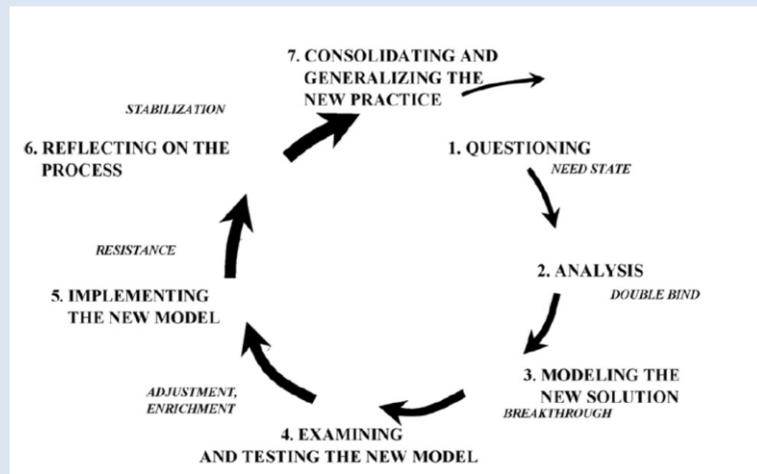


Figure 2.1.f Worksheet of one of the participating groups in the workshop

Products

Het project 'Research in Teacher Education (RITE)', gesubsidieerd door het Erasmus-programma, is in het eerste jaar van uitvoering. In dit project werken vijf universiteiten in Europa samen om docenten beter te ondersteunen in het creëren van een 'evidence-informed teaching practice'. Het RITE-project zal 'best practices' opleveren die internationaal openbaar beschikbaar zullen worden gesteld en gedeeld zullen worden via de netwerken van Dudoc onderzoekers en EAPRIL.

De partners herontwerpen en evalueren de eigen lokale lerarenopleiding. Daarvoor gebruiken ze het gemeenschappelijk theoretisch model van de expansieve leeracyclus die Engeström en Sannino (2010). De cyclus kent de stappen: vraag stellen, analyse, oplossing formuleren, oplossing bekijken en testen, oplossing in praktijk brengen, reflecteren op het proces en oplossing consolideren voor toekomstig gebruik.



Opeenvolging van leeracties in een uitgebreide leeracyclus (Engeström en Sannino (2010))

Het onderzoek heeft als doel inzicht te verkrijgen over hoe dit model op elke lerarenopleiding kan worden ingezet en welke leeropbrengsten dit oplevert met betrekking tot de ondersteuning van docenten in het creëren van een 'evidence-informed teaching practice'. Het model wordt onder andere ingezet om leraren-in-opleiding (lio's) te leren om literatuur in te zetten voor de eigen ontwikkeling, de ontwikkeling van praktijkgericht onderzoek, en de ontwikkeling van lesmaterialen voor de klassen waar zij stage lopen.

Aan de universiteit van Southampton, bijvoorbeeld, wordt het model ingezet in de lerarenopleiding om literatuur die als waardevol wordt aangedragen over het lesgeven in wiskunde kritisch te bekijken en van commentaar te voorzien. Hiermee wordt bereikt dat leraren-in-opleiding literatuur op waarde leren schatten en kunnen gebruiken in hun lesgeven. Aan de universiteit van Chester wordt het model gebruikt om staande praktijken in het lesgeven in algebra onder de loep te nemen en te verbeteren. Aan de universiteit van Paderborn is het waarheidsgehalte van wetenschappelijk publicaties en de impact die ze kunnen hebben op de samenleving het gekozen onderwerp waar leraren-in-opleiding zich mee bezig houden.

De nieuwe manier van werken wordt door alle vijf de universiteiten op dezelfde geëvalueerd en levert daarmee inzichten op hoe de expansieve leeracyclus kan worden ingezet bij het opleiden van leraren. De Dataverzameling & analyse richt zich op de perspectieven, overtuigingen en capaciteiten van leraren-in-opleiding in het gebruik van 'evidence' in het verbeteren van hun lespraktijk. Daarvoor worden 3 instrumenten gebruikt:

- Een vragenlijst voor het evalueren van LIO's perspectieven en overtuigingen (aangepast van Melnyk, Fineout-Overholt, & Mays (2008)).
- Een 'Evidence-Informed Decision-Making in Education Test (EIDM-ET)' om de capaciteiten van Lio's te evalueren (aangepast van Ramos & Tracz (2003)).
- Semi-gestructureerde pre-post interviews om de uitkomsten van de vragenlijst en de test te kunnen evalueren.

In deze workshop wordt een korte toelichting gegeven op de doelen van het RITE project waarna de deelnemers actief zelf aan de slaggaan met de expansieve leeracyclus van Engeström en Sannino. De werkvorm levert de deelnemers inzichten op hoe deze cyclus ingezet kan worden in onderzoek en in opleiding van docenten.

Referenties

- Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review*, 5(1), 1.
- Melnyk, B. M., Fineout-Overholt, E., & Mays, M. Z. (2008). The evidence-based practice beliefs and implementation scales: Psychometric properties of two new instruments. *Worldviews on Evidence-Based Nursing*, 5(4), 208-216.
- Rock, T. C., & Wilson, C. (2005). Improving teaching through lesson study. *Teacher Education Quarterly*, 32(1), 77-92.
- Ramos, K. D., & Tracz, S. (2003). Validation of the fresno test of competence in evidence based medicine. *Bmj*, 326(7384), 319-321.

Figure 2.1.g Abstract of the workshop

2.1.5 Publications



Article

Evidence-Informed Teaching: Investigating Whether Evidence from 'Flipping the Classroom' Research Improves Students' Motivation for Mathematics

Adri Dierdorp



Freudenthal Institute for Mathematics and Science Education, Utrecht University,
3508 AD Utrecht, The Netherlands; a.dierdorp@uu.nl; Tel: +31-648819775

Abstract: This study from 2019 investigates whether the impact on a STEM teacher's evidence-informed teaching approach using the evidence of flipping the classroom research improves students' (13–14 years old) motivation in a Dutch setting and if this approach allows students to perform better. We report this approach in line with the cycle of expansive learning of Engeström. We asked: "To what extent can evidence based on the flipping the classroom approach improve the motivation and results of grade 8 preuniversity track students doing mathematics?", followed by the subquestions: "To what extent does education by the FtCA increase student motivation?" and "To what extent does education by the FtCA ensure better test results for students?". A questionnaire is used to investigate to what extent the motivation of students increased, and a teacher is interviewed about his experiences with the "flipping the classroom" model. To test whether the results have improved, a pre- and post-test is taken and analyzed. A significant increase in both intrinsic and extrinsic motivation has been found, and students gained a stronger sense of autonomy, competence, and belonging. The test results improved, but the difference is not statistically significant. However, despite the disappointing test results, the teacher was very positive about the new way of working.

Keywords: evidence informed teaching; flipping the classroom; motivation; expansive learning



Citation: Dierdorp, A. Evidence-Informed Teaching: Investigating Whether Evidence from 'Flipping the Classroom' Research Improves Students' Motivation for Mathematics. *Educ. Sci.* **2021**, *11*, 257. <https://doi.org/10.3390/educsci11060257>

Figure 2.1.h Abstract of Dierdorp (2021)

2.2 University of Southampton

In the duration of the project, impact within the UK has happened in a few distinct ways. Firstly, the redesign of the Masters assignments and the role of evidence in the mathematics ITE course aligned with wider societal changes in ITE of evidence-informed practices. Although it is difficult to argue a direct causal effect, thinking about evidence has received ample attention in our courses. Secondly, the theme of evidence-informed teaching practices was central in some of our direct contributions for talks in several conferences, including the day conference of the British Society for Research into Learning Mathematics (March 2021), internal presentations like that for the Mathematics, Science and Health Education research centre of the Southampton Education School (July 2021), and the annual conference of the Universities Council For The Education Of Teachers (November 2021). Finally, after the project, we will do a talk for the Association of Mathematics Education Teachers.

2.2.1 Mathematics, Science and Healthcare Education Research Centre



Mshe.org.uk

Date: 14 July 2022
Type of activity: Presentation
Impact: 10 participants

Purpose

Portfolio work 'in progress' including RiTE work. This presentation provided an overview of the projects that were conducted by the UOS-project coordinator, including a section on the RiTE project.

Description

This was an internal presentation of the RiTE-project for the local Mathematics, Science and Health Education research centre at the University of Southampton. Attendees were members of the research centre.

2.2.2 BSRLM Universities council for the education of teachers (UCET)



Ucet.ac.uk



Date: 1 November 2022
Type of activity: Online workshop
Impact: 20 participants

Purpose

To share and invite discussion questions on the theme “*How can we develop expansive, research-informed ITE?*”

Description

This is a workshop for UCET where we presented the UOS and UOC contexts and findings to the audience, and gave tasks to discuss the findings.

2.3 Paderborn University

At Paderborn University (UPB), the RiTE-project has been communicated at different occasions. At first, the UPB case study and studies connected to the RiTE-project were presented at conferences (NARST, GDCP see proofs). Especially in the context of our virtual multiplier event, there was huge impact. Apart from the event itself, many people got in touch with the project while organizing the event. The event was planned by the group of Prof. Fechner and the "PLAZ professional school". The professional school of education can be described as a centre where all groups from general and subject-related education are associated at UPB. The school of education also joins forces with practice-partners such as schools and the in-service training centres (ZfsL). Representatives of all institutions come together in a steering committee which also discussed and approved the approach to be distributed among the members of their institutions. All other employees of the school of education (approx. 40 people) also got insights into the project and the aim of the event. Apart from staff of the school of education, teachers from school, governmental staff and staff from the in-service training centres reflected our approach and might use it in their daily work now. Staff from the in-service training centres are experienced teachers who accompany students in their in-service training at school, before they get their final teacher exam. Moreover, there were many other contributors to the event from all institutions who got into touch with the notion of evidence-informed practice. Those people provided workshops and round tables to figure out what role evidence-informed practice could play in their specific context. As has been shown, within the context of the multiplier event many different people and institutions were introduced to the project. The project was also presented in a research colloquium organised by the school of education.

Besides the immense impact in connection to our event, the project (nearly) weekly got discussed within the group of Prof. Fechner. Scientific, as well as non-scientific, staff got insights into the project and discussed occurring problems.

Moreover, two publications were delivered in connection to the project. Those publications focus on the teacher training context of Paderborn University and the implementation of the RiTE-project. While the first paper ("Zwischen den Stühlen? _ Verknüpfung von Erfahrungen des Praxissemesters mit Theorien im Lehramtsstudium Chemie") focuses on the connection of theory and practice, the second paper (Förderung angehender Lehrkräfte im Umgang mit Evidenzen für den naturwissenschaftlichen Unterricht) describes the implementation of our project in more detail. In connection to the second paper, a podcast was produced that elaborates on the role of evidence for science education in more detail.

Due to the COVID-19 pandemic, an invited workshop at the University of Vienna at the PlusLucis-conference was cancelled. The partners at Paderborn University are excited, that this workshop will be held in 2023.

All in all, there was huge impact at Paderborn University and regional partners. Contributions to different conferences enabled international discussion. Within the local context, there was a lot of (sometimes) informal discussion with different people within and outside Paderborn University.

2.3.1 PLAZ online conference



Zentrum für Bildungsforschung
und Lehrerbildung
PLAZ-Professional School

Plaz.uni-paderborn.de/en/

Date: 24 September 2021
Type of activity: Multiplier event
Impact: 90 participants (49 national, 41 international of which 1 onsite)

Purpose

Within this event, titled “Mentor Dialogue 2021: Alternative Facts?! Dealing with Evidence in the Classroom”, experiences of the case studies were discussed and the topic was aligned to the project so that evidence-based decision making and teaching played a role in selected keynote, workshops, round tables and poster sessions. All partners presented their case study to a large audience and discussed their findings with them. Moreover, the event aims to spread the word of evidence-based teaching. Theoretical aspects like evidence-use mechanisms and possible implementations of the expansive learning cycle were discussed. Due to the fact that the event targets teachers, the partners could discuss their ideas about evidence-base teaching with frontline-workers. Discussions about the practical realization and the importance can be enriched by different perspectives (scientist and practitioner perspective).



Figure 2.3.a Screenshot of the online session

Description

The multiplier event is connected to an annual teacher's conference at Paderborn University. Within this conference, mentors of students within a long-term internship discuss how to accompany student teachers in school. The conference usually gets organized by the PLAZ professional school of Paderborn University (UPB). In this year's edition, the conference is enriched by the topic of alternative facts and evidence-use. The conference gets organized in cooperation of the PLAZ professional school and the chemistry education group at Paderborn University, the UPB partner within the RiTE- project.

Within the program there is a keynote with discussion, nine workshops (two of them with regard to the RiTE-project), a poster session and three round tables (2 aligned to the RiTE-project). The conference is planned bilingual, so that German and international guests can participate in discussions and thematic work. The keynote is translated in the zoom translation function, while the workshops are offered either in English or German.



Mentor Dialogue 2021

Alternative Facts?!

Dealing with

Evidence in the Classroom

Friday, 24 September 2021
 08.30 a.m. to 3.15 p.m. (CEST)
 Online via Zoom and Moodle (COMO)
 Paderborn University

For years, the dialogue with and between mentors has been an essential and highly valuable element for the school internship semester. This year's event focuses on evidence-based learning and on dealing with alternative facts. At the annual event, we look forward to welcoming participants from schools, the centres for practical teacher education (ZfsL) and university reflecting on current aspects of the last and most intensive practical phase for student teachers before they complete their studies.

In addition to information for new mentors, the ZfsL of Paderborn, Detmold and Bielefeld (for vocational schools) also invite experienced mentors to share their expertise. Interactive sessions will enable participants to collaboratively explore new opportunities for the enhancement of the school internship semester and the event's theme of dealing with information in the classroom. Subject-specific networking groups provide an opportunity for fruitful discussions.

Alternative facts have become a dangerous phenomenon in more and more areas of society; they also affect schools and the classroom. How can the critical consumption of information be fostered in schools and classrooms? As part of the Erasmus+ project "Research in Teacher Education (RiTE)", researchers from the universities of Groningen, Southampton, Chester, Poznań and Paderborn will discuss ways to support future teachers in dealing with evidence in the classroom.

Andre Wolf from the Austrian NGO Mimikama will address this topic in the keynote: "Facts – Fakenews – Conspiracy Myths: An overview of the variety of information on social media". Since 2011, Mimikama has been dedicated to exposing false information on the internet and to informing the public about internet abuse. In 2020, the association's commitment was awarded the Human Rights Award of the Tonhalle Düsseldorf.



www.mimikama.at

In addition to the keynote speech, Andre Wolf will offer a follow-up workshop on how to identify manipulative content on the internet. In further workshops by the ZfsL and the university, two key questions will be at the heart of the discussions: how can future teachers be supported in dealing with evidence in the classroom and how can evidence-based practice succeed in the school internship semester. The programme will end with a poster session on lesson study projects from the school internship semester and methodological approaches of evidence-based practice as explored in the RiTE project.

The event is open for mentors from schools, university teachers, researchers, teacher educators and other interested parties. Sharing ideas and expertise about evidence-based practice in the school internship semester and in teaching in general is the event's primary objective and participants will have the opportunity to uncover new perspectives and suggestions for their own practice.



Foto: Angelina Benschke/PAZ

Programme at a glance:

- 08.30 a.m. | Welcome
- 08.45 a.m. | Keynote
- 10.15 a.m. | Workshops
- 11.45 a.m. | Break
- 01.00 p.m. | Commencement of the afternoon programme
- 01.05 p.m. | Poster session and subject-specific networking groups
- 02.00 p.m. | Round tables
- 03.00 p.m. | Conclusion and summary
- 03.15 p.m. | Closing ceremony

Hosts:

- PLAZ Professional School
- Centres for practical teacher education (ZfsL) in Paderborn, Detmold, Bielefeld (vocational schools)
- Erasmus+ project „Research in Teacher Education (RiTE)“ represented by the chemistry education group

Registration open until 13 Sept 2021: <https://plaz.upb.de/psx>

Contact: praxissemester@plaz.upb.de



Figure 2.3.b. Conference programme including abstracts of the sessions

<p>Keynote 08.45-10.45 a.m.</p> <p>Facts – Fakenews – Conspiracy myths: An overview of the diversity of information on social media (in German) Andre Wolf, mimikama.at</p> <p>Workshops 10.15-11.45 a.m.</p> <p>Workshop 1: The school internship semester in the education region Paderborn (information event in German) Silke Ernesti, ZfSL Paderborn Martin Kottkamp, ZfSL Detmold Alexandra Nolte, headmaster Leopoldinum Detmold Bardo Herzig, Aleen Wittke, PLAZ-Professional School</p> <p>This workshop provides an overview of the objectives and guidelines of the school internship semester with a focus on evidence-based learning. Mentors will learn about support structures available to them. The workshop will also provide guidance on how to handle potential problems during the school internship semester, how to find suitable solutions, and how to receive further assistance if needed.</p> <p>Workshop 2: Supporting, advising and mentoring students during the school internship semester (in German)</p> <ul style="list-style-type: none"> - at primary schools: Anja Bahnschulte, ZfSL Paderborn Franziska Dargies, ZfSL Detmold - at lower secondary schools: Sabina Schütt, ZfSL Paderborn - at high schools: Kathrin Morhenne, ZfSL Paderborn Andrea Weinaug, Benjamin Magofsky, ZfSL Detmold - at vocational schools: Claudia Lehmann, ZfSL Bielefeld Kirsten Levermann, ZfSL Paderborn - with a focus on special education needs: Heidrun Hiddemann, ZfSL Paderborn <p>These workshops are tailored to the different types of schools in Germany and address the specific needs of the mentors. Participants are encouraged to suggest topics related to mentoring students in the school internship semester: from very practical questions about organizing the school internship semester at your school, to involving students in lesson planning, to ideas for successful appraisal dialogues with the students. The main objective of this workshop is to offer a space for meaningful dialogue between mentors.</p>	<p>Workshop 3: The lesson study project in the school internship semester – added value or overload?! (in German) Andrea Becher, Sabine Fechner, Paderborn University</p> <p>In this workshop, examples of lesson study projects that have been carried out in primary and secondary schools will be presented, analysed and discussed. In this context, we will discuss to what extent and under which conditions students can create new knowledge in the school internship semester through evidence-based learning and relying on systematic observations or documentation. The workshop aims to elaborate arguments for the lesson study project and to derive criteria for its successful implementation with the goal of making it valuable for all parties involved.</p> <p>Workshop 4: Don't give alternative facts a chance – evidence-based teaching (in German) Pascal Pollmeier, Paderborn University</p> <p>In recent years, the terms 'alternative facts', 'post-factual' or 'perceived truths' have become increasingly important. The COVID-19 pandemic has brought science increasingly to the attention of society. This workshop will focus on evidence-use mechanisms that were originally designed to deal with information in politics. A transfer of these mechanisms to the classroom and possible assignments will be discussed.</p> <p>Workshop 5: Designing online science experiments based on evidence (in English) Ria Dolfing, University of Groningen, NL Renata Dudziak, Eliza Rybska, Adam-Mickiewicz-University Poznań, PL</p> <p>Providing online education in current times requires that teachers adapt their education designs and teaching practice. Especially designing experiments that students can perform at home can be challenging. In this workshop, the participants are supported in designing a small practical experiment that students can perform at home. In order to create effective designs, we will use 'evidence' regarding teaching strategies in online and distance learning, retrieved from different information sources, like scientific and professional literature, from online and distance learning experts, and from our peers. Based on our experiences during the workshop, we will discuss what the best information could be to improve our educational designs and teaching practice.</p>	<p>Workshop 6: From analysis to synopsis: How do I identify manipulative content on the internet? (in German) Andre Wolf, mimikama.at</p> <p>The workshop is a follow-up to the keynote speech and explores relevant aspects in greater depth. Ways in which to deal with manipulative online content are explored.</p> <p>Round tables 02.00-03.00 p.m.</p> <p>Round table 1: Questioning the value proposition of the school internship semester. Are there opportunities for enhancement? (in German) Silke Ernesti, ZfSL Paderborn Martin Kottkamp, ZfSL Detmold</p> <p>The school internship semester was launched almost a decade ago. As an important component of the first phase of teacher education it has become indispensable. But has this programme reached its full potential? Can the different practices during the pandemic at schools and universities be used to identify opportunities for enhancement? Are there opportunities – both conceptually and pragmatically – to continue to improve the education of teachers?</p> <p>Round table 2: Research in the school internship semester? – Discussion on the lesson study project (in German) Sabine Fechner, Dominik Rumlich, Paderborn University</p> <p>The lesson study project in the school internship semester is perceived as stressful and sometimes as not very productive with regard to the educational objective – by students and partly by the supervising teachers as well. At our round table, participants will discuss new ideas for beneficial implementation of lesson study projects. For this purpose, we invite you to share your experiences.</p> <p>Round table 3: How to enhance student teachers' evidence-based decision competences? (in English) Sally Bamber, University of Chester, UK Christian Bokhove, University of Southampton, UK</p> <p>In this round table we will discuss effective ways in which we can instill evidence-informed practices in (trainee) teachers. We will ask the hard questions in this session: What is 'evidence' anyway? Is there some sort of 'gold standard' when it comes to evidence? And crucially, how can we improve this? You will interactively be asked to think and share your opinions.</p>
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Figure 2.3.b. Conference programme including abstracts of the sessions

2.3.2 Conference “Gesellschaft für Didaktik der Chemie und Physik [GD^{CP}]’



Gdcp-ev.de



Date: 14 September 2022
Type of activity: Research presentation
Impact: 20 participants, 400 conference attendees
(85% EU, 15% other continents)

Purpose

Within the presentation, the adapted instruments of the RiTE project were presented. Moreover, the theoretical background of evidence-use was shared.

Description

A presentation was given about a study in which the evaluation instruments of the RiTE-project were used. The title of the presentation was “Influence of a practical training phase on the use of evidence in the classroom”.



Jahrestagung der Gesellschaft für Didaktik der Chemie und Physik
„Lernen, lehren und forschen in einer digital geprägten Welt“
vom 12.-15. September 2022
an der Rheinisch-Westfälischen Technischen Hochschule Aachen
(RWTH Aachen)



Figure 2.3.c Picture of the research presentation

Products

F22 (Session: Mi, 16:30 - 18:30 Uhr, Ho5)
Pascal Pollmeier
Christoph Vogelsang
Sabine Fechner



Einfluss des Praxissemesters auf den Umgang mit Evidenzen im Unterricht

Naturwissenschaftliche Erkenntnisse spielen eine wichtige Rolle in gesellschaftlichen Debatten (MSB NRW, 2019). Aktuelle Themen wie die Covid-19 Pandemie zeigen eindrücklich, wie relevant die Evidenzbasierung von Diskussionen ist. Der angemessene Umgang mit Evidenzen ist ein wichtiges Ziel des naturwissenschaftlichen Unterrichts. Die Schüler*innen sollen durch den Umgang mit Evidenzen komplexe Situationen bewerten können. Um dieses Ziel zu erreichen, ist es notwendig, dass auch (angehende) Lehrkräfte im Umgang mit Evidenzen versiert sind.

In dieser Studie wurden Studierende aller Fächer vor und nach dem Praxissemester bzgl. ihres Umgangs mit, bzw. Einstellungen gegenüber Evidenzen befragt. Der eingesetzte Online-Fragebogen fokussiert dabei sowohl auf die Überzeugungen und selbst eingeschätzten Kompetenzen im Umgang mit Evidenzen als auch deren Nutzung. Die vorliegenden Daten erlauben Vergleiche über Studierende verschiedener (naturwissenschaftlicher, wie auch geistes-/kulturwissenschaftlicher) Unterrichtsfächer hinweg sowie einen Einblick zu möglichen Veränderungen im Praxissemester.

Figure 2.3.d Abstract of the research presentation

2.3.3 Conference “National Association for Research in Science Teaching [NARST]“

Date: 28 March 2022
Type of activity: Research presentation
Impact: 20 participants, 1200 conference attendees (600 onsite/ 600 online)

Purpose

NARST is a global organization for improving science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy. The theme of the conference of 2022 was ‘Unity and inclusion for global scientific literacy: invite as a community. Unite as a community’. Within this presentation, the case-study of Paderborn University was presented, including the theoretical background linked to the RiTE project in order to share and discuss the importance of implementing evidence-informed teaching practices.



Figure 2.3.e Picture of the research presentation

Description

A presentation was provided with the title: “Preservice science teachers' competences in evidence-based practice – A longitudinal case study”. The case study at Paderborn University got presented to an international audience.

Products

Pascal Pollmeier Sabine Fechner

Preservice science teachers' competences in evidence-based practice – A longitudinal case study

Is the earth flat? Is the coronavirus dangerous? Is there man-made climate change? – All these questions need evidence to be answered. Evidence can be seen as the bottom-line for science. However, evidence is not limited to science – it is important for the whole society as can be seen in many present debates. Therefore, students should build up competences to deal with evidence in school. Teachers must guide students to align discussions and judgements on existing evidence. However, even teachers often lack a fruitful understanding of the nature of evidence (Ledermann, 2007). In this longitudinal case study, an intervention was implemented in a pre-service university course to strengthen their evidence-based competences. The intervention was aligned to existing interventions from the health sector. Interviews and a pre-post questionnaire were used to collect data. As first findings show, there is a need to explicitly thematise the nature of evidence in university courses. Teacher students often do not realise that they are actually dealing with evidence.



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| 95th NARST International Conference | March 27–30, 2022 |

Figure 2.3.f Abstract of the research presentation

2.3.4 Research Colloquium „Forschungskolleg empirische Bildungsforschung“



[Plaz.uni-paderborn.de/en/](https://plaz.uni-paderborn.de/en/)



Zentrum für Bildungsforschung
und Lehrerbildung
PLAZ-Professional School

Date: 22 November 2022
Type of activity: Research presentation
Impact: 15 participants

Purpose

Within the research colloquium “Forschungskolleg empirische Bildungsforschung“, researchers of different educational subjects at Paderborn University meet up. The colloquium is organized by the PLAZ professional school. The aim is to bring educational researchers together, to discuss their projects. The event is held virtually approximately once a week during the semester. There is one presentation every 1-2 weeks.



Description

A presentation was provided about a study in which the evaluation instruments of the RiTE-project were used. The title of the presentation was “Evidence-use of future science teachers”.

<https://plaz.uni-paderborn.de/bildungsforschung/forschungsfoerderung/fk-empbf>

Zwischen den Stühlen? – Verknüpfung von Erfahrungen des Praxissemesters mit Theorien im Lehramtsstudium Chemie. Sukzessiven Kompetenzaufbau nach dem Praxissemester gestalten

Pascal Pollmeier und Sabine Fechner

Zusammenfassung

Das Praxissemester im lehramtsbezogenen Masterstudiengang lässt die Studierenden des Fachs Chemie meist erste Erfahrungen mit der Schulpraxis gewinnen. Neben der eigenen Unterrichtsplanung sehen sie sich mit diversen Anforderungen und neuen Situationen, wie dem schulorientierten Experimentieren und der Diagnose von vorhandenen Schülervorstellungen, konfrontiert. Mit der Rückkehr an die Hochschule für das letzte Studienjahr stehen erneut theoretische Aspekte im Vordergrund. Die Studierenden bringen unterschiedliche Erfahrungen aus dem Praxissemester mit: teils scheinen Beobachtungen im Einklang mit theoretischem Wissen zu stehen, teils scheinen sie vollkommen davon abzuweichen. Dieser möglichen Spannungslage zwischen Theorie und Praxis des Lehrens und Lernens soll mit der vorliegenden Seminarstruktur begegnet werden. Der Artikel gibt einen Überblick über die Studieninhalte im Zusammenhang mit dem Praxissemester und stellt ein Seminarkonzept als mögliche ‚Brücke‘ zwischen Theorie und Praxis in den Fokus. Ziel des Seminars ist es, die Bedeutung von wissenschaftlichen Theorien und Konzepten für die schulpraktische Arbeit zu stärken.

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C. Caruso et al. (Hrsg.), *Theorie und Praxis in der Lehrerbildung*,
Edition Fachdidaktiken, https://doi.org/10.1007/978-3-658-32568-8_16

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Figure 2.3.g Abstract of Pollmeier and Fechner (2021)

Förderung angehender Lehrkräfte im Umgang mit Evidenzen für den naturwissenschaftlichen Unterricht

Pascal Pollmeier & Sabine Fechner



Im Jahr 2016 wählte die Gesellschaft für deutsche Sprache e. V. das Wort „postfaktisch“ zum Wort des Jahres (GfdS, 2016). In der Begründung der Auswahl geht die Jury auf die abnehmende Bedeutung von Fakten zugunsten gefühlter Wahrheiten und Emotionen innerhalb der Gesellschaft ein. Besonders im Themenbereich des menschengemachten Klimawandels kann die Bedeutung von wissenschaftlichen Evidenzen für die gesellschaftliche und politische Diskussion erkannt werden (Schaal et al., 2017). Der Bildungssektor sieht sich mit der Herausforderung konfrontiert, die Evidenzbasierung derlei Diskussionen zu erhöhen. In erster Konsequenz müssten Lehrkräfte über entsprechende Kompetenzen evidenzbasierter Praxis verfügen (Wenglein et al., 2015). Dies beinhaltet neben persönlichen Fähigkeiten, relevante Evidenzen recherchieren und interpretieren zu können, auch Lernenden grundlegende Strategien zum Umgang mit Evidenzen zu vermitteln. Wenngleich Lehrkräfte sich eher motiviert und selbstbewusst bzgl. des Gebrauchs von wissenschaftlichen Evidenzen einschätzen (Williams & Coles, 2007), zeigt sich, dass es tatsächlich Probleme vor allem bei der Recherche und beim zielführenden Einsatz von Evidenzen gibt.

Im EU-Projekt „Research in Teacher Education“ (RiTE) wird untersucht, wie angehende Lehrkräfte im MINT-Bereich schon in der Ausbildung bei der Evidenzbasierung ihres Unterrichts gefördert werden können. Dabei geht es nicht ausschließlich um das Erstellen und den Umgang mit experimentellen Daten (Data Literacy) wie etwa in Ansätzen des Inquiry-based Learning, sondern auch um das Wahrnehmen subjektiver Einflüsse auf Studienergebnisse oder die Vertrauenswürdigkeit von Quellen. In der ersten Phase des Projekts werden Fallstudien an den fünf teilnehmenden Universitäten (in den Niederlanden, Großbritannien, Polen und Deutschland) durchgeführt. Ziel der ersten Projektphase ist es, den angehenden Lehrkräften Grundlagen der Evidenzbasierung zu vermitteln. In der zweiten Phase werden die Teilnehmenden im ersten Jahr ihres Referendariats bzw. Schuldienstes begleitet. Hier soll untersucht werden, inwiefern der tatsächlich gehaltene Unterricht evidenzbasiert ist. Der Fokus des Projekts liegt somit auf der Förderung der Kompetenzen der Lehrkräfte und nicht auf dem Umgang mit Evidenzen von Lernenden. Im vorliegenden Beitrag soll die Implementation der ersten Phase des Projekts an der Universität Paderborn vor dem Hintergrund ihrer konzeptionellen Gestaltung vorgestellt werden.

Podcast

In connection to the publication „Förderung angehender Lehrkräfte im Umgang mit Evidenzen für den naturwissenschaftlichen Unterricht“, a podcast-session was produced. In this podcast, one of the authors discussed evidence-use in school with Prof. Dr. Nicole Graulich (Justus Liebig University Giessen) and possible interventions within the training programme of future science teachers. The podcast is available on many streaming portals (e.g. Spotify, Apple Podcast, etc.).



2.4 University of Chester

The two phases of the UOC case study had an impact on the beginning teachers' beliefs and practice, especially in relation to using multiple representations of mathematics concepts and in allowing the learners to make sense of a concept through reasoned connections. Contradictions between the activity of the school where they were training and the university teacher education were exposed and used to support expansive professional learning in spite of constraints from policy. Where teachers were not able to research further as newly qualified teachers, they were able to apply what they had learned in the case studies in their initial stages of teaching.

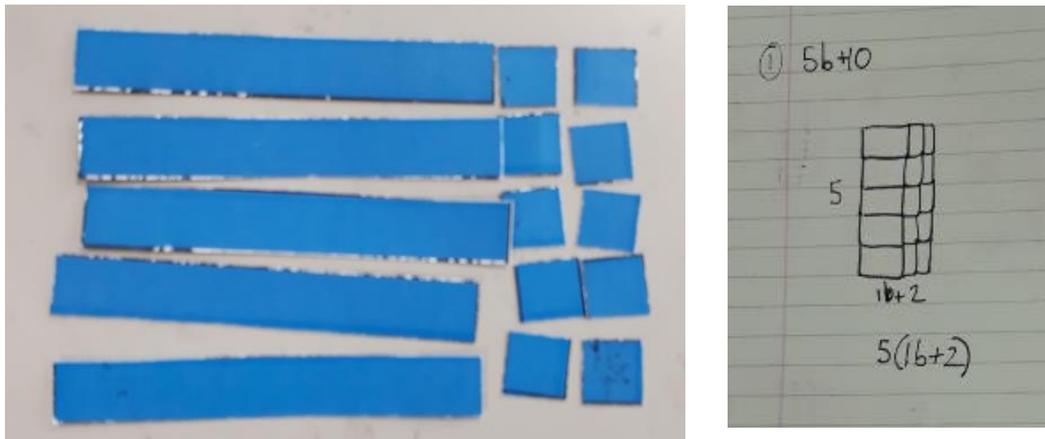


Figure 2.4.b Illustration of phase 2: ITE Student's Practitioner Enquiry
An example of a student's response to the hinge question.

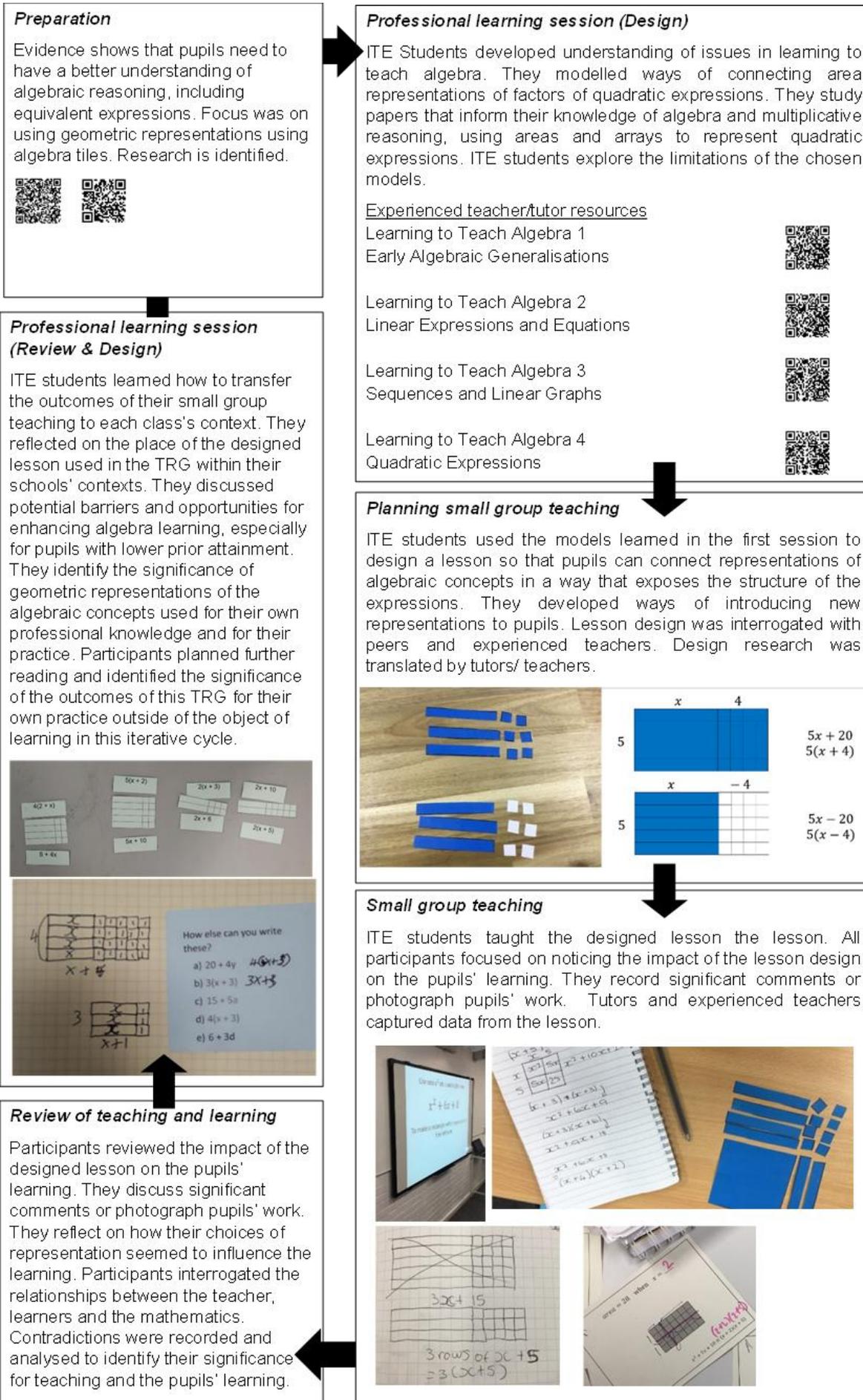


Figure 2.4.a Illustration of phase 1: The Teacher Research Group Using Geometric Representations of Equivalent Expressions

2.4.1 BSRLM New Researchers Day Programme



[Bsrlm-members.org.uk](https://bsrlm-members.org.uk)



British Society for
Research into
Learning Mathematics

Date: 6 March 2021
Type of activity: Online presentation
Impact: 30 participants

Purpose

To share and invite discussion questions on the theme “*How can we engage mathematics ITE students with research?*”

Description

In the Erasmus+ Research in Teacher Education (RiTE) project, student teachers are stimulated to use evidence from educational and scientific research to experiment and innovate their teaching and learning processes. In two case studies, we use the Engestrom’s expansive learning cycle. The first case study reports on the design and implementation of materials designed to enhance student teachers’ critical review of literature in the context of the post-graduate study that is incorporated within their teacher education (UOS). The second case study presents the design of collaborative lesson research that aims to foster authentic connections between school-based learning (teaching practice) and research that informs mathematics teaching and learning (UOC). We discuss the aims of research-informed mathematics teacher education at each site, demonstrate some of the approaches used and discuss tensions within the design and early implementation of the projects.

Products

Marks, R. (Ed.) Proceedings of the British Society for Research into Learning Mathematics 41(1) March 2021

How can we engage mathematics ITE students with research? 

Sally Bamber¹ and Christian Bokhove²
¹University of Chester, ²University of Southampton

In the Erasmus+ Research in Teacher Education (RiTE) project, student teachers are stimulated to use evidence from educational and scientific research to experiment and innovate their teaching and learning processes. In two case studies we use Engestrom's expansive learning cycle. The first case study reports on the design and implementation of materials designed to enhance student teachers' critical review of literature in the context of the post-graduate study that is incorporated within their teacher education. The second case study presents the design of collaborative lesson research that aims to foster authentic connections between school-based learning (teaching practice) and research that informs mathematics teaching and learning. We discuss the aims of research-informed mathematics teacher education at each site, demonstrate some of the approaches used and discuss tensions within the design and early implementation of the projects.

Keywords: evidence-informed practice; evidence-use; teacher training; mathematics education

Figure 2.3.c Conference paper

2.4.2 SHAW Maths Hubs Local Leaders of Education conference



Shawmathshub.co.uk



Date: 8 December 2021
Type of activity: Workshop, presentation, discussion
Impact: 20 participants, 80 conference attendees

Purpose

To share and invite discussion questions on the theme “The use of Research in the Teacher Research Group”

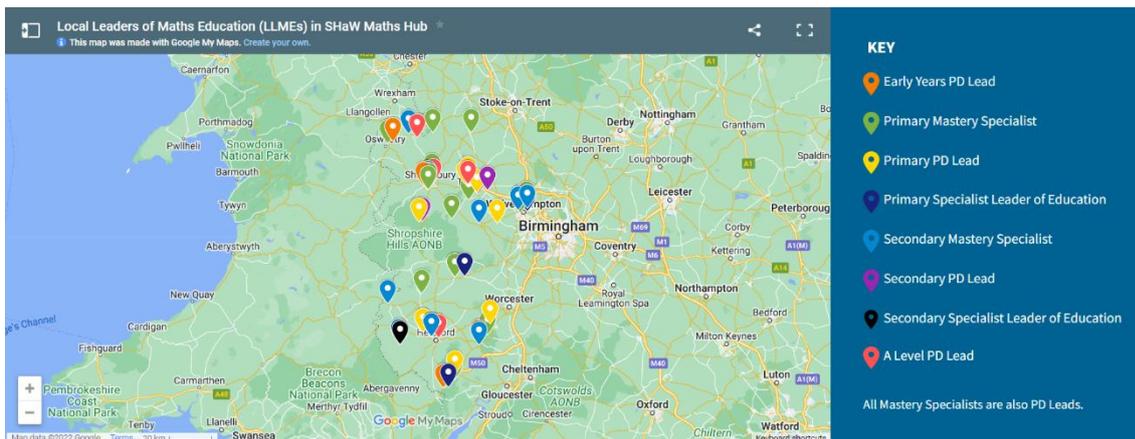


Figure 2.3.d Local leaders of maths education in SHAW Math Hub

Description

In the workshop participants identify tensions between research and practice in school. They identify the research within the TRG in terms of design and then research activity through teacher enquiry. Participants apply this to transforming practice in relation to algebra teaching and learning. The case study was modelled and shared to show how whole departments can use the TRG Model-

In the Erasmus+ Research in Teacher Education (RiTE) project, teachers are stimulated to use evidence from educational and scientific research to experiment and innovate their teaching and learning processes. In two case studies we use Engestrom’s expansive learning cycle. I discuss the aims of research-informed mathematics teacher education at each site, demonstrate some of the approaches used and discuss tensions within the design and early implementation of the projects with whole mathematics departments.



Figure 2.3.e Picture of the workshop

2.4.3 Leeds for learning (Leeds City Council)



leedsforlearning.co.uk



**Empowering solutions,
inspiring learners**

Date: 17 March 2022
Type of activity: Workshop, presentation, discussion
Impact: 30 participants, 120 conference attendees

Purpose

To share and invite discussion questions on the theme “*Using Multiple Representations to Create a More Inclusive Mathematics Classroom*”

Description

Leeds for Learning Mathematics Conference is for mathematics teachers across the Yorkshire region. This was an invitation to present a workshop at the conference focussing on research that informs inclusive classrooms through the use of multiple representations of algebra and number concepts.

2.4.4 UOC Learning and Teaching Conference

Date: 29 June 2022
Type of activity: Presentation
Impact: 100 conference attendees

Purpose

To share and invite discussion questions on the theme “*Research Informed Professional Learning*”

Description

A University of Chester wide conference is held annually to share research and develop future practice. This conference addressed the nature of research informed professional learning for those in practice focused professional degrees such as teaching, nursing, policing and management. The RiTE case study from UOC was used to exemplify the tensions between policy, research, assessment and practice- demonstrating a model of expansive learning despite restrictions from culturally situated practices and policy.

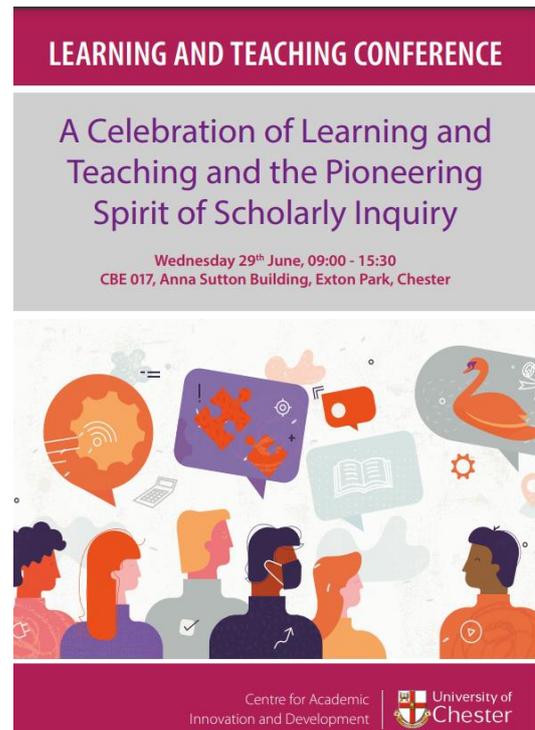


Figure 2.3.f Flyer of the conference

2.5 Adam Mickiewicz University

Impact within the AMU was created in the first phase of the project, by providing workshops on evidence-informed education for future biology teachers participated. In addition, PhD students participated in classes on academic teaching that included also evidence-based practices. Some of these PhD students also participated in research part.

In phase II, future biology teachers participated in additional courses. For pre-service biology students evidence-informed education was created (syllabus below), materials available on the project website (<https://www.rite-project.eu/>). In this courses, they were designing educational research and didactical interventions, and conducting them at schools.

All together 21 future biology teachers and 25 PhD students were familiarised with the idea of evidence-based informed practices, so they went through at least a questioning and analysis phase of the Engstrom cycle (most of them went through all the steps). To sum up 46 students were “touched” by the idea of the role of evidence in education.

A course on Evidence-based practices at school co-organised with Teacher Professional Development Centre was prepared and will be conducted yearly. On average 22 in-service teachers participate each iteration. Most of these teachers work additionally as teacher providing methodological support to other teachers. One of the idea of introducing evidence - informed practices to school, that they have come up with was providing for students mini pre- and post-test, that is checked by students at the end of the lesson – so each of the student can justify how much he or she have learned during class.

2.5.1 Online teacher workshop

Date: 28 April and 12 May 2021
Type of activity: Workshop
Impact: 22 participants

Purpose

To introduce the idea of evidence-based education to the teachers and methodological advisers.

Description

The course ‘Evidence-based practices’ was prepared and conducted at school, co-organised with Teacher Professional Development Centre. Describe what is evidence, why do we need evidence while teaching. How science works, why does it change all the time? What are the principles of science, why do we need to understand the nature of science while teaching? Why do we need evidence while teaching and learning? Also methodological issues - basic ideas of doing small-scale research in the classroom. Teachers were asked to design small scale research on their own subject and received feedback on this. Most of these teachers works additionally as teacher providing methodological support to other teachers. One of the idea of introducing evidence -informed practices to school, that they have come up with was providing for students mini pre- and post-test, that is checked by students at the end of the lesson – so each of the student can justify how much he or she have learned during class.

Products

Title: Evidence-based education

General information

Field of study: Teaching biology and nature, full-time studies

Type of coursework/subject (compulsory or optional): compulsory

Level of study (first or second degree, long-cycle studies): first year master students (II degree)

Types of classes and number of hours: workshops 20 hours; conversations 10 hours

Number of ECTS credits: 3

Objectives of the course/subject

- 1) developing the ability to plan and conduct didactic research
- 2) familiarization with the basics of planning the educational process based on scientific evidence
- 3) preparation for interpreting test results
- 4) improving the ability to assess the reliability of information sources and use it in educational practice
- 5) improving the ability to write scientific studies and use literature sources written in Polish or English
- 6) improving communication skills and group work

Prerequisites for knowledge, skills and social competences (if applicable) basics of pedagogy, didactics, bachelor's degree in biology teaching

Learning outcomes (EU) for coursework and reference to learning outcomes (EK) for the field of study

A student after the course:

- defines what evidence is, and in particular what is a scientific proof;
- lists the basic criteria for assessing the reliability of information sources;
- designs a small-scale didactic study (study of students in the classroom);
- analyzes didactic research projects described in the literature in English;
- conducts and analyzes didactic research and writes a report on the completed project

Curriculum content ensuring the achievement of learning outcomes (EU) with reference to the relevant learning outcomes (EU) for the coursework/subject

- Scientific evidence and its importance for the development of science, criteria of scientific proof
- Criteria for assessing the reliability of information sources
- Didactic research - paradigms, goals, problems, types of research questions, research methods and tools
- Qualitative and quantitative data analysis

Methods and forms of conducting classes

- Lecture with multimedia presentation of selected issues
- Discussion
- Working with text
- Case study method
- Practice method
- Project based methods
- Inquiry based methods
- Collaborative (group work)

Figure 2.5.a Syllabus for the course 'Evidence-based Education'

3. Joint support network activities and deliverables

All partners collaborated in dissemination at international level by contributing to the conferences of EAPRIL and ESERA and disseminating the results and products among these networks. These networks support practice and research in lifelong learning in interacting, collaborating and benefiting from each other's roles and strengths with the aim to contribute to the professional development of both. In addition, the consortium jointly organized an online conference on 'Research in Teacher Education' at the end of the projects period.

The support activities, results and products were published within the community of Scientix and ResearchGate reach out and connect with peers in Europe and around the world. In this way expertise, materials, and activities are shared in a low-threshold way within international platforms using the networks of existing (European) associations. This stimulated collaboration in improving education at European level.



ResearchGate.net/project/
Research-in-Teacher-
Education-RiTE-2

3.1 EAPRIL conference 2021



Eapril.org

Date:	25 November 2021
Type of activity:	Online Round Table Discussion
Impact:	15 participants, 291 conference attendees, 28 countries (85% EU, 15% other continents)

Purpose

Supporting student teachers in creating an evidence-informed teaching practice in STEM-education

Description

The universities of Groningen, Southampton, Paderborn, Poznan and Chester, under the support of the DUDOCNetwork, are jointly developing curricula to support students in creating an 'evidence-informed teaching practice'. The aim is to teach students how to use evidence from research in education and domain-specific fields of science, technology, engineering and mathematics (STEM) to improve their own teaching practice. Following a cyclical learning process of developing, implementing and evaluating, curricula are developed using mechanisms of evidence-informed policy making. All universities conduct a case study in which they develop, implement and evaluate their curriculum in their local initial teacher education (ITE) context. Data collection instruments involve a questionnaire, student test and pre-post interviews. Data analysis focuses on getting insight into student teachers perspectives on, beliefs about and abilities in creating evidence-informed teaching practices. This project results in five empirical validated curricula which could result in universal insights about student teachers who systematically use evidence to develop, implement and improve their lessons.

Research in Teacher Education

A European project to improve student teachers' research literacy in science, technology, engineering and mathematics education

Introduction

Teachers develop their teaching practice continuously. They experiment in their classroom, trying new pedagogical approaches and developing new ways of teaching domain-specific content and skills. Teachers, however, hardly base their experiments on scientific evidence and rarely use information from scientific sources to improve their teaching practice (Broekkamp & Van Hout-Wolters, 2007). In addition, in the teacher training for secondary and tertiary education, there is little attention for a systematic evidence-informed approach in developing and innovating teaching and learning processes. This might be due to many factors, like the unavailability of a suitable source for scientific information, lack of reading competences, interpreting, evaluating and using scientific information, or social and organizational factors within the school (Lohman, 2006). As a consequence, little attention is paid to teachers' professional development in competencies required for an evidence-informed teaching practice (Van Veen, Zwart, Meirink, & Verloop, 2010).

An evidence-informed approach in which teachers conduct small scale experiments (Engeström & Sannino, 2010), such as action research and lesson study (Rock & Wilson, 2005), could encourage them in the process of educational change based on evidence from research in education and the domain-specific fields of science, technology, engineering and mathematics (STEM). In such an approach, teachers set their own learning objectives and experiments in interaction with the scientific knowledge base in STEM-education. According to Rock and Wilson (2005), the incorporation of evidence in undergraduate curricula could increase the learning outcomes of students with regard to the development of reflective judgment and problem solving.

The aim of this project is to positively influence student teachers' perspectives, beliefs and abilities in creating an evidence-informed teaching practice in STEM-education. Therefore, the universities of Groningen, Southampton, Paderborn, Poznan and Chester, under the support of the DUDOCNetwork, develop a curriculum to stimulate and support students to use evidence from educational and domain-specific research to experiment and innovate their teaching and learning processes. Although the universities use their local ITE context in secondary and tertiary education, the curricula are developed based on a common theoretical background.

Theoretical background

For redesigning the curriculum, the expansive learning cycle of Engeström and Sanino's (2010) is used as a common theoretical base. In this cycle, the phases questioning, analysis, modeling a new solution, examining and testing, reflecting and consolidating are recognized. Due to the cyclical method, this model is suitable for use in an academic teacher training programme. The process-based model is so general that it can be used by the five different universities, each with their own context and their own culture. Following this cycle, the students of the five teacher training courses are familiarized with the use of evidence from educational and domain-specific literature in interaction with their own teaching practice and the evaluation and reflection on this use.

In addition, teachers could be role models for their students to become later decision-makers for evidence-informed policies (Breckon & Dodson, 2016). Consequently, to develop the curricula, we endeavour to apply the mechanisms of evidence-informed policy making, described by Breckon and Dodson (2016) to our initial teacher education (ITE) settings. These mechanisms include a. building awareness and finding agreement regarding the use of evidence; b. providing access to and communication of evidence; c. facilitating interaction between decision makers and researchers; d. supporting decision-makers to develop skills in using evidence; and e. influencing decision-making structures and processes.

Research questions

This project asks:

- How can the expansive learning cycle of Engeström and Sanino's (2010) and the strategies of evidence-use mechanisms for policymakers (a-e) be used to redesign ITE-curricula in order to support student teachers in creating an evidence-informed teaching practice?
- To what extent does the redesigned ITE-curriculum influence student teachers' perspectives, beliefs and abilities in using evidence from educational and domain-specific literature to improve their teaching practice?

Methods

In order to address the aim and questions of this project, the five universities will conduct case studies (Creswell, 2007) in which they redesign their local ITE-curriculum to support student teachers in creating an evidence-informed teaching practice according to the steps in the expansive learning cycle of Engeström and Sanino's (2010) and using the strategies of evidence-use mechanisms for policymakers (a-e). All universities will construct a support structure for cohorts of at least 15 trainees to integrate evidence-informed practices into their curriculum. In order to evaluate the curricula, data collections and analysis focussed on student teachers' perspectives, beliefs and abilities in using evidence from educational and domain-specific literature to improve their own teaching practice. Three instruments are used:

A questionnaire (5-points likert scales) to evaluate student teachers' perspectives and beliefs (adapted from Melnyk, Fineout-Overholt, & Mays (2008)).

An Evidence-Informed Decision-Making in Education Test (EIDM-ET) to evaluate student teachers' abilities (adapted from Ramos & Tracz (2003)).

Semi-structured pre-post interviews to cover the mechanisms (a-e) which were not addressed through the questionnaire and EIDM-ET.

Contribution to practice-based educational research and practice

The project addresses a gap in evidence-informed teaching practices by suggesting strategies to integrate into ITE. In this project we focus on research literacy for all subjects in STEM-education. This results in five empirical validated designs of curricula to support student teachers in creating evidence-informed teaching practices. This European project could lead to universal insights into training teachers who systematically use scientific evidence to develop, implement and improve their teaching practice.

During the round table session, we would like to discuss what 'evidence' student teachers could use to inform their teaching practice, how to support student teachers to develop abilities in using evidence to improve their teaching practice, and how to properly set up research, using appropriate methodology, into (international) cooperation, with different contextual and cultural backgrounds.

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Figure 3.1.a Extended Summary of the Round Table Discussion

Research in Teacher Education- RiTE



AIM

Promote and facilitate (student) teachers to create an evidence- informed teaching practice in science, technology, engineering and mathematics (STEM) education.

In this RiTE project, (student) teachers are stimulated to use evidence from educational and scientific research to experiment and innovate their teaching and learning processes.



METHOD & STRATEGY

- The expansive learning cycle of Engestrom & Sannino (2010)
- Evidence-use mechanisms of Brackon & Dodgen (2016)

QUESTIONS FOR THE ROUNDTABLE DISCUSSION

1. What 'evidence' could student teachers use to inform their teaching practice?
2. How to support student teachers to develop abilities in using evidence to improve their teaching practice?
3. How to properly set up research, using appropriate methodology, into (international) cooperation, with different contextual and cultural backgrounds?

Follow us on



Contact
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Figure 3.1.b Handout Round Table Discussion

3.2 ESERA conference 2021



esera.org



Date: 30 August-3 September 2021
Type of activity: Asynchronous online poster presentation
Impact: 922 conference attendees from 49 countries
(75% EU, 25% other continents)

Purpose

Encouraging and facilitating student teachers in STEM to use research results in their teaching practice.

Description

The universities of Groningen, Southampton, Paderborn, Poznan and Chester, under the support of the DUDOCNetwork, are jointly developing curricula to support students in creating an 'evidence-informed teaching practice'. The aim is to teach students how to use evidence from research in education and domain-specific fields of science, technology, engineering and mathematics (STEM) to improve their own teaching practice. Following a cyclical learning process of developing, implementing and evaluating, curricula are developed using mechanisms of evidence-informed policymaking. All universities conduct a case study in which they develop, implement and evaluate their curriculum in their local initial teacher education (ITE) context. Data collection instruments involve a questionnaire, student test and interviews. Data analysis focuses on getting insight into student teachers perspectives on, beliefs about and abilities in creating evidence-informed teaching practices. This project results in five empirical validated curricula which could result in universal insights about student teachers who systematically use evidence to develop, implement and improve their lessons.

SUPPORTING STUDENT TEACHERS IN CREATING AN EVIDENCE-INFORMED TEACHING PRACTICE IN STEM-EDUCATION

Keywords: Research informed Teaching, Initial Teacher Education (Pre-service), Educational Reform

INTRODUCTION

Teachers develop their teaching practice continuously. They experiment in their classroom, trying new pedagogical approaches and developing new ways of teaching domain-specific content and skills. Teachers, however, hardly base their experiments on scientific evidence and rarely use information from scientific sources to improve their teaching practice (Broekkamp & Van Hout-Wolters, 2007). In addition, in the teacher training for secondary and tertiary education, there is little attention for a systematic evidence-informed approach in developing and innovating teaching and learning processes. This might be due to many factors, like the unavailability of a suitable source for scientific information, lack of reading competences, interpreting, evaluating and using scientific information, or social and organizational factors within the school (Lohman, 2006). As a consequence, little attention is paid to teachers' professional development in competencies required for an evidence-informed teaching practice (Van Veen, Zwart, Meirink, & Verloop, 2010).

An evidence-informed approach in which teachers conduct small scale experiments (Engeström & Sannino, 2010), such as action research and lesson study (Rock & Wilson, 2005), could encourage them in the process of educational change based on evidence from research in education and the domain-specific fields of science, technology, engineering and mathematics (STEM). In such an approach, teachers set their own learning objectives and experiments in interaction with the scientific knowledge base in STEM-education. According to Rock and Wilson (2005), the incorporation of evidence in undergraduate curricula could increase the learning outcomes of students with regard to the development of reflective judgment and problem solving.

The aim of this project is to positively influence student teachers' perspectives, beliefs and abilities in creating an evidence-informed teaching practice in STEM-education. Therefore, the universities of Groningen, Southampton, Paderborn, Poznan and Chester, under the support of the DUDOCNetwork, develop a curriculum to stimulate and support students to use evidence from educational and domain-specific research to experiment and innovate their teaching and learning processes. Although the universities use their local ITE context in secondary and tertiary education, the curricula are developed based on a common theoretical background.

THEORETICAL BACKGROUND

Based on the descriptions in Engeström and Sanino's (2010), Breckon & Dodson (2016), Gorard et al., (2020) and Toulmin (2003), in this study evidence is defined as the best available information regarding a particular topic, especially if it refers to results of various studies. As such creating an evidence-informed teaching practice implies that teachers use the best available information regarding the content of their courses as well as the pedagogy to support students' learning processes to improve their educational design and teaching performance.

For redesigning the curriculum, the expansive learning cycle of Engeström is used as a common theoretical base (Engeström and Sanino's, 2010). In this cycle, the phases questioning, analysis, modeling a new solution, examining and testing, reflecting and consolidating are recognized. Due to the cyclical method, this model is suitable for use in an academic teacher training programme. The process-based model is so general that it can be used by the five different universities, each with their own context and their own culture. Following this cycle, the students of the five teacher training courses are familiarized with the use of evidence from educational and domain-specific literature in interaction with their own teaching practice and the evaluation and reflection on this use.

In addition, teachers could be role models for their students to become later decision-makers for evidence-informed policies (Breckon & Dodson, 2016). Consequently, to develop the curricula, we endeavour to apply the mechanisms of evidence-informed policy making, described by Breckon and Dodson (2016) to use in our initial teacher education (ITE) settings. These mechanisms include a. building awareness and finding agreement regarding the use of evidence; b. providing access to and communication of evidence; c. facilitating interaction between decision makers and researchers; d. supporting decision-makers to develop skills in using evidence; and e. influencing decision-making structures and processes. Adapting these mechanisms for teacher education implies that students will be engaged in discussions in an evidence-based manner.

RESEARCH QUESTIONS

This project asks:

- How can the expansive learning cycle and the strategies of evidence-use mechanisms for policymakers (a-e) be used to redesign ITE-curricula in order to support student teachers in creating an evidence-informed teaching practice?
- To what extent does the redesigned ITE-curriculum influence student teachers' perspectives, beliefs and abilities in using evidence from educational and domain-specific literature to improve their teaching practice?

METHODS

In order to address the aim and questions of this project, the five universities will conduct case studies (Creswell, 2007) in which they redesign their local ITE-curriculum to support student teachers in creating an evidence-informed teaching practice according to the steps in the expansive learning cycle of Engeström and Sanino's (2010) and using the strategies of evidence-use mechanisms for policymakers (a-e). All universities will construct a support structure for cohorts of at least 15 trainees to integrate evidence-informed practices into their curriculum. In order to evaluate the curricula, data collections and analysis focussed on student teachers' perspectives, beliefs and abilities in using evidence from educational and domain-specific literature to improve their own teaching practice. Three instruments are used:

- A pre-post questionnaire (5-points likert scales) to evaluate student teachers' perspectives and beliefs (adapted from Melnyk, Fineout-Overholt, & Mays (2008)).
- An pre-post Evidence-Informed Decision-Making in Education Test (EIDM-ET) to evaluate student teachers' abilities (adapted from Ramos & Tracz (2003)).
- Semi-structured post interviews to cover the mechanisms (a-e) which were not addressed through the questionnaire and EIDM-ET.

Statistical evaluation of the pre-post questionnaire and the EIDM-ET will give insights into the actual knowledge about evidence and abilities in evidence-use. Therefore, the closed and open items of the EIDM-ET will be graded with help of a precise grading manual. Through pre-post comparison the influence of the different case studies on the knowledge and abilities could be seen. The interviews will be transcribed and analysed with qualitative content analysis. Within the interview, the attitude towards the mechanisms (a-e) could be analysed.

CONTRIBUTIONS AND PRELIMINARY RESULTS

The project addresses a gap in evidence-informed teaching practices by suggesting strategies to integrate into ITE. In this project we focus on research literacy for all subjects in STEM-education. This results in five empirical validated designs of curricula to support student teachers in creating evidence-informed teaching practices. This European project could lead to universal insights into training teachers who systematically use scientific evidence to develop, implement and improve their teaching practice.

First results of the pre-test show that most students do not have deeper insights in evidence-based decision making, or evidence in general. Even the pre-post-questionnaire regarding students' perceptions and beliefs shows mostly naïve attitudes within the pre-test. Data-evaluation of the post-tests and the interviews will be conducted in spring 2021 and first insights could be discussed at ESERA Conference 2021.

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Figure 3.2.a Extended abstract

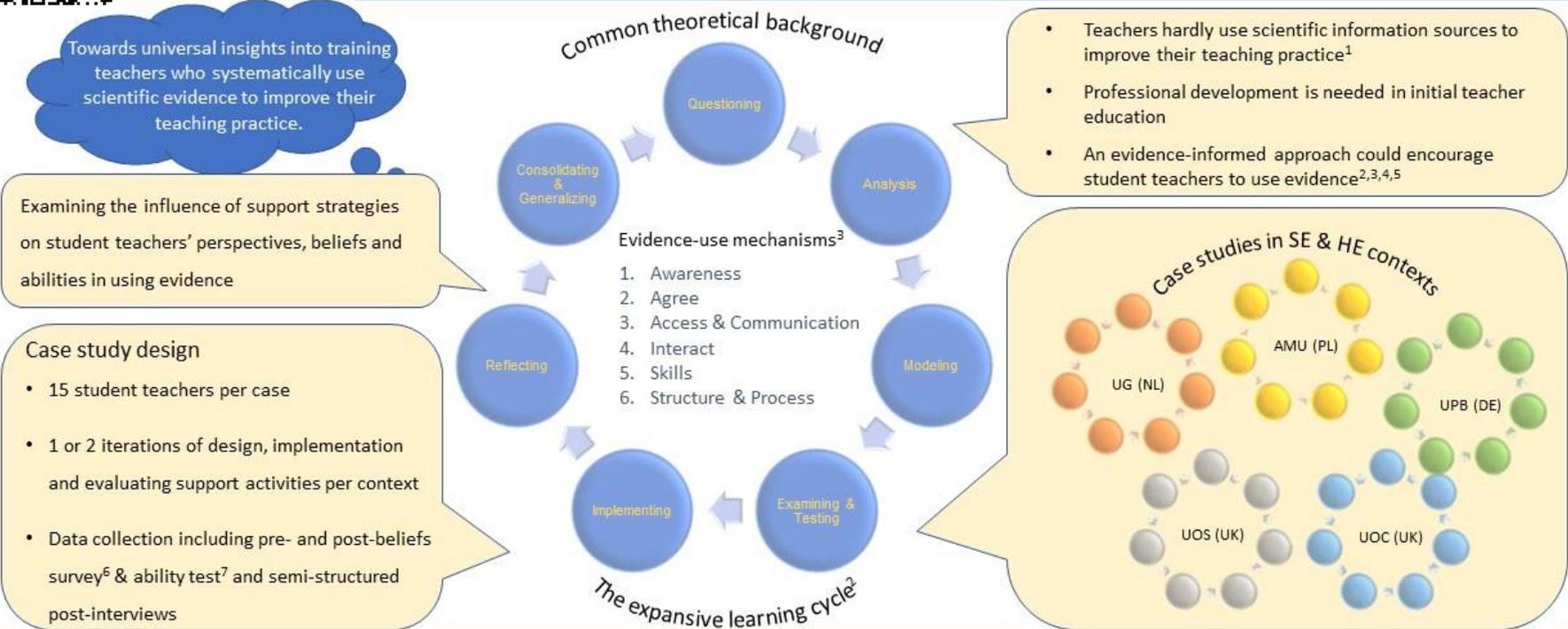


ESERA 2021
 Fostering scientific citizenship
 in an uncertain world
 30 Aug - 3 Sep 2021
 Organised by
 University of Minho, Braga, Portugal

Supporting student teachers in implementing an evidence-informed teaching practice

Redesigning initial teacher training contexts in STEM-education

Dolfing, R.^a; Atia, M.^a; Fechner, S.^b; Pollmeier, P.^b; Bokhove, C.^c; Bamber, S.^d; Rybska, E.^e; Dierdorp, A.^f; De Putter, L.^f
^aUniversity of Groningen; ^bUniversity of Paderborn; ^cUniversity of Southampton; ^dUniversity of Chester; ^eAdam Mickiewicz University; ^fDUDOCNetwork



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



Figure 3.2.b Poster presentation

3.3 Online Conference ‘Research in Teacher Education’



ddn-rite.eu



Date: 21 October 2022
Type of activity: Hybrid webinar, workshop, keynote
Impact: 18 online/ 3 onsite conference attendees,
8 universities, 4 EU-countries

Purpose

To create and increase the IMPACT of the RiTE-project:

- To share the results of the RiTE-project among colleagues in the field of STEM-education;
- To engage (student) teachers, teacher educators, and other interested colleagues in implementing evidence-informed teaching practices;
- To develop content to share on the multimedia website.

Description

The event consisted of three sessions:

- Webinar to share the results of the RiTE-project
- Workshop to engage (student) teachers, teacher educators, and other interested colleagues in implementing evidence-informed teaching practices;
- A keynote to elaborate and learn from an expert in the field about using evidence in STEM-teaching

How can we implement evidence-informed teaching practices?

'Experiences and results of the RiTE-project'

Consortium partners of the Erasmus+ Project
'Research in Teacher Education'

Webinar 21st October 2022



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



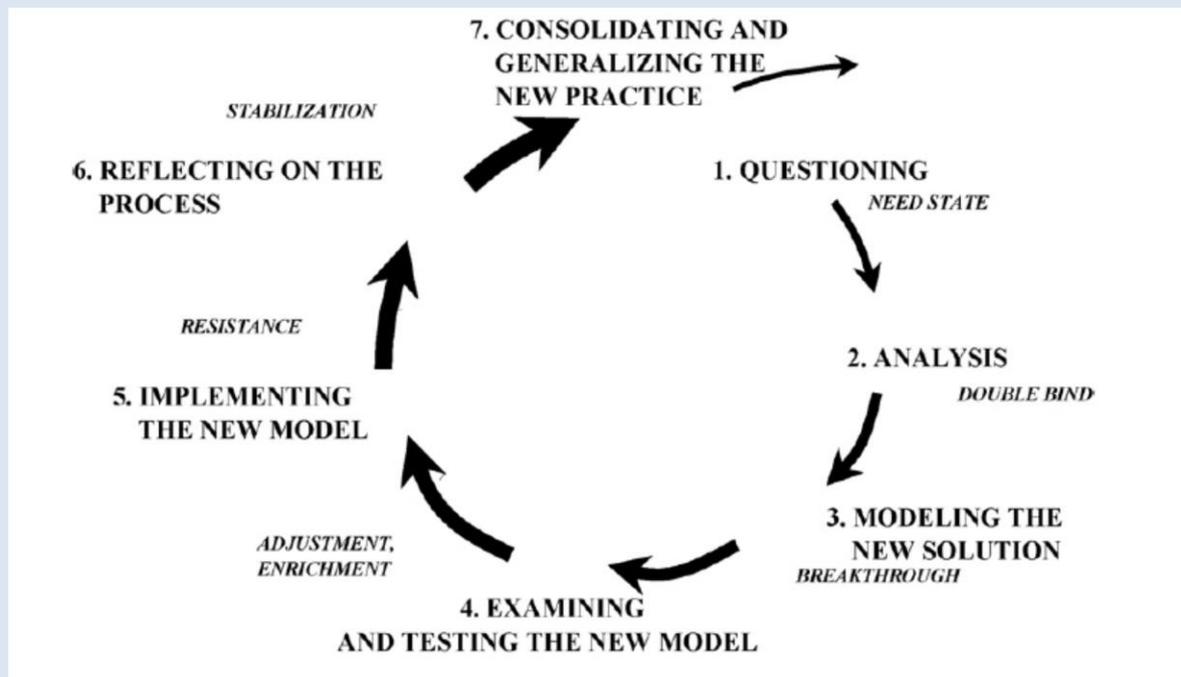
This webinar presents the work, the universities of Groningen, Southampton, Paderborn, Poznan and Chester, under the support of the DUDOCNetwork, completed for the Erasmus+ project 'Research in Teacher Education'. We jointly developed curricula to support students in creating an 'evidence-informed teaching practice'. The aim was to teach students how to use evidence from research in education and domain-specific fields of science, technology, engineering and mathematics (STEM) to improve their own teaching practice. Following a cyclical learning process of developing, implementing and evaluating, curricula were developed using mechanisms of evidence-informed policy making. All universities conducted a case study in which they developed, implemented and evaluated their curriculum in their local initial teacher education context. Data collection instruments involved a questionnaire, student test and interviews. Data analysis focused on getting insight into student teachers perspectives on, beliefs about and abilities in creating evidence-informed teaching practices. This project resulted in five empirical validated curricula. More importantly, it resulted in a validated methodology in order to collaboratively improve initial teacher education taking into account a variety of European teacher education contexts. Each partner presents their experiences and main results of their respective case studies.

Figure 3.3.a Video and abstract of [the webinar](#)

How to use evidence in our teaching practices

Prof. Christian Bokhove, University of Southampton &
dr. ir. Ria Dolting, University of Groningen

The RiTE-project addressed a gap in evidence-informed teaching practices by suggesting strategies to integrate into ITE. This project focused on research literacy for all subjects in STEM-education. All partners used the theoretical model of the expansive learning cycle adopted by Engeström and Sannino (2010) as a guide in order to implement evidence-informed teaching practices. The cycle has the steps: questioning, analysis, formulating a solution, viewing and testing the solution, put solution into practice, reflect on process and consolidate solution for future usage.

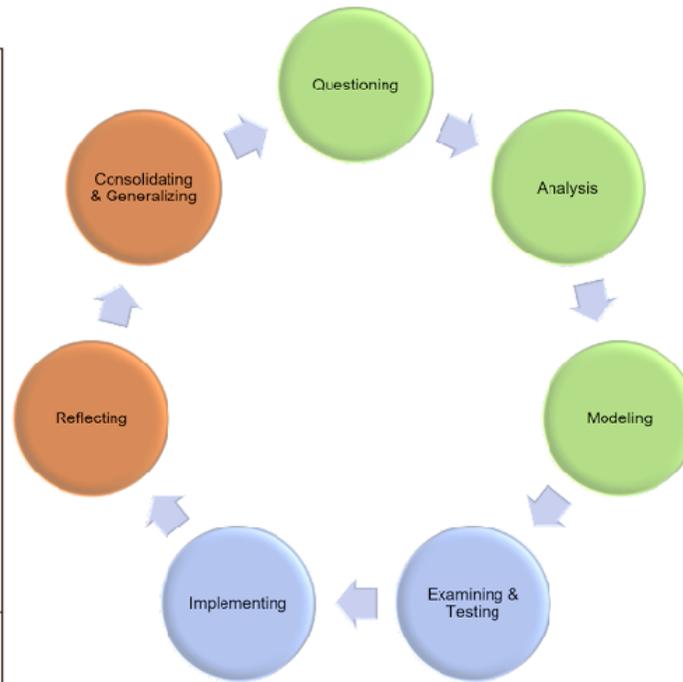


*Sequence of learning actions in an extended learning cycle
(Engeström and Sannino (2010))*

During the workshop we will discuss what 'evidence' could be used to inform our teaching practices. As a follow up we will collaboratively develop strategies to implement evidence-informed teaching practices guided by the cyclic approach described by Engeström and Sannino, (2010).

Figure 3.3.b Abstract of the workshop

Current	<div style="background-color: yellow; padding: 5px; margin-bottom: 10px;"> use starters/exit tickets to consolidate students' learning </div> <div style="background-color: orange; padding: 5px; margin-bottom: 10px;"> gather data during the lessons - to adapt future lessons </div> <div style="background-color: #f9cb9c; padding: 5px;"> I sometimes give a set of journal articles to students on a certain topic. I curate them, but they often have a roughly similar view. </div>
Improve	<div style="background-color: orange; padding: 5px; margin-bottom: 10px;"> Use validated assessment instruments </div> <div style="background-color: #f9cb9c; padding: 5px; margin-bottom: 10px;"> I could try to by default find one article that completely contradicts or disagree with what the prevailing 'truth' is for that topic. </div> <div style="background-color: yellow; padding: 5px;"> use national data to compare your own data </div>



Current	<div style="background-color: yellow; padding: 5px;"> gather data during the lessons - to adapt current lesson </div>
Improve	<div style="background-color: orange; padding: 5px; margin-right: 10px;"> Gather data systematically during teaching </div> <div style="background-color: yellow; padding: 5px; margin-right: 10px;"> use national data to compare your own data </div> <div style="background-color: yellow; padding: 5px;"> use of current/future literature on technology use </div>

Current	<div style="background-color: yellow; padding: 5px; margin-right: 10px;"> use of evidence from the Teacher Training course </div> <div style="background-color: yellow; padding: 5px;"> use of the literature in designing our own resources - for our own contexts </div>
Improve	<div style="background-color: orange; padding: 5px; margin-right: 10px;"> Design lessons on proven educational models. </div> <div style="background-color: yellow; padding: 5px;"> picking apart our past/future lessons and unpicking issues by checking the relevant evidence from literature </div>

Figure 3.3.c Results of the workshop on how to improve the use of evidence in teaching guided by the Expansive Learning Cycle (Engeström and Sannino, 2010)

From Science to Nonsense, the life cycle of news

Dr. Łukasz Lamża, Copernicus Center for Interdisciplinary Research

It is commonly held that we live in times of easy access to knowledge. However, it is probably more accurate to say that we live in times of easy access to content. Solid knowledge is rare and at times difficult to find. One of the many processes through which content is created begins with science and leads to science reporting, YouTube videos and memes. The purpose of the lecture is to analyze this process in detail: from its root in scientific publishing, through science dissemination by universities, the main media, the secondary media and the "memeization" of news. Based on my experience as a scientist, journalist and 'content creator', I hope to shed light on how the system works, and how to use it for our benefit.

Figure 3.3.d Abstract of the keynote