Radboud University

Radboud Teachers Academy Research program

Innovative Teaching and Learning

Radboud University

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Prepared by	Peter-Arno Coppen
Checked by	Mary Kooy, Research Group RDA
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Radboud University
Houtlaan 4
6525 XZ Nijmegen
+31 (0)24 361 61 61

P.O. Box 2345
4567 AE Nijmegen
The Netherlands
www.ru.nl

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General introduction

The Radboud Teachers Academy operates together with and between its natural partners. Its essential mission is educating new generations of creative new academic teachers for tomorrow's society. It is of paramount importance that this education is well-rooted in school practices and firmly founded upon scientific knowledge. This is why the Radboud Teachers Academy is dedicated to a close collaboration with its educational partnerships and secondary schools who are actually carrying out the responsible task of teaching youngsters, and the Radboud university faculties where cutting edge domain specific knowledge and technologies are developed, aiming to have a genuine impact on society and pre-eminently, on school subject domains in all types of secondary education.

The education of academic teachers obviously has to be underpinned by solid scientific and educational research. Working from one's own research is far more efficient than relying on external research, as the latter may not adequately align with local and regional concerns. Therefore, the Radboud Teachers Academy has an already long-standing tradition of educational research not only on students, teachers and schools, but also with them, jointly articulating research needs and questions, and using different combinations of methods (mixed method, quantitative and qualitative, fundamental and applied), with an immediate relevance to its own context. Conducting research this way as a collaborative endeavor optimally accounts for sustainable impact on educational science, policy and practice.

The Radboud Teachers Academy research is motivated by two perspectives closely related to the academy's role as an institution for educating academic teachers: *the secondary school students' development of critical and creative thinking and acting*, and *the (beginning) teachers' professional learning and development*, especially within school ecosystems. Both perspectives focus on transitions: students' transitions from secondary to higher education, and teachers' transitions from teacher training to their first years in the teaching profession.

These two perspectives can be distinguished, but they are closely intertwined: to stimulate students' creative and critical thinking, especially about innovative content, teachers have to learn and constantly develop themselves as well. And conversely, all professional learning and development of teachers in the end is always geared to educating their students, especially in the higher order thinking domain as far as academic teachers are concerned. This research plan brings together these two perspectives, while at the same time deconstructing them.

Research into the development of critical and creative thinking and acting has to take place in an actual school or classroom context, but it also is closely connected to domain specific science. In a changing world, new scientific insights and technologies, or new societal demands have to be included in school curricula, and have to lead to new ways of thinking and acting. Innovative educational material has to be developed in close collaboration between teachers, educational developers and other domain experts working in the university faculties. The Radboud Teachers Academy aims to bring these partners together to establish the school curricula of the future.

Research into teachers' professional learning and development is increasingly important in today's society, where many school subjects face teacher shortages (especially a shortage of academic, university trained teachers), and many young teachers tend to give up teaching in a very early stage of their professional career. This research plan argues that it is crucial to explore school ecosystem characteristics that may prevent this, to create innovative and more stimulating learning environments that foster both beginning and experienced teachers' professional development. It is in this research perspective that the

collaboration between the Radboud Teachers Academy and its educational partnerships is in highest regard.

A notable, and crucial aspect of the considerations above is the *innovative* character of the research aims. Above all, these include new and original learning processes, learning outcomes, and the interactions between them, within their specific contexts. Moreover, they pertain to the aim of empowering learners (teachers and students) to deal with today's and future challenges.

This is why this research plan is titled *Innovative teaching and learning*. The title stresses the importance of innovative teaching and learning, not as a goal per se, but as a crucial prerequisite for necessary new developments, and it brings together *teaching* and *learning* as the two sides of the same coin they really are.

1 Perspective: Innovative teaching and learning within and across school subject domains

Secondary education should empower youngsters to relate constructively and critically to the world and (their) knowledge about it. Accordingly, it should stimulate them to engage in active meaning-making of societal and technical developments, to use their imaginative power and inventiveness, to make personal and social decisions (particularly when values are in dispute) and to act upon well-founded judgments. These skills, often summarized as *creative and critical thinking and acting* are among the most important to be developed at school and beyond (Lai & Viering, 2012; Vincent-Lancrin, et al. 2019). Students are not only encouraged to acquire meaningful knowledge in several subject domains, but also to utilize it in challenging situations through imagination, flexible thinking, critical reflection and (innovative) design activities (e.g., Bransford & Brown, 2000). Teaching and learning processes therefore are often geared towards developing this creative and critical thinking and acting.

The Radboud Teachers Academy aims to gain insight into the effective design and guidance of these teaching and learning processes, both in general and within and across school subject domains. More specifically, the focus is on innovative teaching and learning, not just because innovation is a goal by itself, but because a change in learning processes may shed a new light on their workings and moreover, research often reveals – or is motivated by – a need for new teaching and learning methods, where standard processes fall short.[1] Within this research, studies both include teachers as co-researchers and as 'objects of research' in their role as learning professionals.

Creativity and critical thinking are often mentioned together in policy and in research literature.[2] We perceive them as two distinct but related concepts (e.g., OECD, 2020). Both require substantial mental effort associated with higher order cognitive and affective functioning. However, creativity always involves critical thinking, whereas critical thinking can also occur without a specific creative component. Critical thinking is needed in a creative process to discover new challenges in everyday reality or a knowledge domain, to spell out this challenge, to come up with multiple ideas from various perspectives, and to evaluate these ideas in relation to their value in a specific context. In contrast, creativity is not always needed in critical thinking, for example when a specific reasoned position has to be defended amidst multiple voices, or when some predefined line of reasoning has to be learned. Our research projects may target the combination of creative and critical thinking and acting (both individually and collectively), or focus on either one.

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[1] For example, Van Rijt e.a. (2019) show that existing secondary school textbooks on language teaching fail to implement sufficient concepts from modern linguistics, nor do they stimulate reflective thinking.

[2] A search in google scholar for research papers on the keywords *creativity* and *critical thinking* from 2022 alone reveals 53400 titles on *creativity* and 36100 on *critical thinking*, with an overlap of 16200 on the combination.

1.1 Theme: Critical thinking and acting

Within every subject domain, learners have to learn to cope with the balance between certainties and uncertainties. Data, sources and opinions may be incomplete, contradictory or unreliable. An important part of *subject specific learning* is the development of a subject specific form of *critical thinking* (Facione, 2013; Walter & Walter, 2018), enabling learners to take a stand within the subject domain. Becoming critical thinkers by engaging in (possibly collaborative) problem-solving and through increasingly complex problems, learners eventually develop the skills to evaluate and judge complex and possibly controversial issues on the basis of incomplete data of varying reliability (Kuhn, 1999; King & Kitchener, 2002). They are encouraged to develop themselves as expert sources, to become aware of their own knowledge and skills, and to use them in meaningful contexts. Importantly, this also pertains to a transformative attitude to question and possibly adapt their own beliefs and viewpoints. These skills and attitudes not only support the learners' qualification within the subject domain, but also their socialization (in developing citizenship), as well as their identity formation (to position themselves in specific discourses).

Previous studies within the Radboud Teachers Academy have investigated general and subject specific aspects of *critical thinking and acting*[3], and developmental stages of *domain specific reflective judgement*, the epistemic stances on knowledge and knowing (For biology, Ummels 2014; for computer science, Nijenhuis-Voogt 2022; for economy, Elvira 2016; for history Havekes 2015; for linguistics, Van den Broek 2020, van Rijt 2021, Dielemans & Coppen 2020, and especially Wijnands et al 2022a on measuring reflective judgement; for mathematics, Kooloos 2022).

Many of these studies also connect these aspects to an inquisitive curiosity and research skills. Results show that a more activating, dialogical pedagogy based on relevant subject specific concepts benefits the students' reasoning quality, their general domain specific awareness, and their reflective development (e.g., for concept based pedagogy, cf. Van Rijt 2021, for language awareness, cf. Van den Broek 2020, and for reflective development, cf. Wijnands et al 2022b).

Several of these studies on the role of pedagogical arrangements in fostering critical thinking and acting have also shown the merits of school subject specific inquiry-based learning within authentic contexts (Ummels, 2014; Kienstra, 2016; Van Rijt, 2021; Nijenhuis-Voogt, 2022). Results show that this allows students to learn about the content and practices of science as well as learn about its (wider) social context. Active inquiry of controversial issues is known to trigger students' interests and connect domain specific understanding to issues of social justice and well-being (Zeidler, 2014).

In short, research into critical thinking and acting supports ways of structuring pedagogical approaches focusing on dialogue and citizenship education within the wider framework of inquiry based education (Hand & Levinson, 2012; Verhoeff, 2017). However, less is still known about the processes students use specifically when exploring controversies. To what extent are they able to identify and navigate the different (domain specific) perspectives within a controversy? How do they balance uncertainties or conflicting sources with their own views (Levinson, 2010; Solli et al., 2017; Zeidler, 2014; Lee, Lee & Zeidler, 2020)? Moreover, teachers experience difficulties in guiding such inquiry based learning (Zion et al., 2007). These are the two areas of interests we want to explore in the near future.

Leading questions are:

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[3] In this research, *thinking* is closely related to *acting*, in the sense that acting can be consciously based on critical thinking processes.

- What are the essential conceptual characteristics of within-subject-domain critical thinking and acting, and reflective judgment?
- How can dialogical learning and specific teaching arrangements, notably the use of controversial, confronting or incomplete sources as a means to trigger a constructive dialogue for learning, be used as a pedagogical means to foster critical thinking and acting, and what are the across-domain properties of these arrangements?
- How can reflective development be measured by (formative) evaluation strategies?

1.2 Theme: Creative thinking and acting

Major rapid technological, socio-economic and environmental changes in today's society call for a genuine shift in education towards more creativity (e.g. Ferrari et al, 2009; Redecker, 2008; Vincent-Lancrin et al, 2019). Research demonstrates that it is possible to cultivate creativity in education (Aguilar & Pifarre Turmo, 2019; Van Broekhoven, et al., 2020; Van de Kamp, et al., 2016). However, despite policy attention, creativity has not penetrated the average classroom in for example the USA, the UK and the Netherlands (Blamires & Peterson, 2014; Sternberg, 2015; SLO, 2015). Dutch teachers, although motivated, indicate that they lack the knowledge and support to do this in a responsible manner (SLO, 2015). The RTA aims to contribute to bridging this knowledge gap.

In the last decades, scholars have improved their understanding of the concept of creativity and of the qualities, propensities and processes involved in human creative functioning. In parallel, numerous definitions of creativity were proposed. Inspired by Glăveanu and Beghetto (2020), we perceive creativity as: *'Novel person–world encounters grounded in meaningful actions and interactions, which are marked by the principles of open-endedness, non-linearity, use of imagination and pluri-perspectives, bringing forward ideas and solutions that are original and adequate in a given context.* In an earlier literature study (Oosterheert & Meijer, 2017), we found three characteristics of creativity (in education):

- it requires deep domain knowledge and interest;
- it is multifaceted and therefore calls upon a rich array of human qualities;
- it is vulnerable in light of external evaluation.

From these understandings, in a systematic review study and multiple exploratory studies, essential features of creative challenges were identified as well as indications of the qualities and propensities required of those who aim to cultivate creativity in others (Oosterheert, et al., 2020; Van der Zanden, et al., 2020; Meijer, 2020). For example, we illuminated the delicate balance between openness and structure in creative challenges, next to the importance of trust, respect, and safe group norms in the classroom (Van der Zanden et al., 2020). We also found that teachers' ability to recognize students' work as creative greatly improves when teachers are first exposed to the task themselves (Van Broekhoven, et al., 2020). And in addition, we found that, in learning to teach for creativity, student teachers reported learning outcomes referring to all aspects of their learning and, above all, to (re)considerations of various aspects of their emerging identity as teachers; this indicates that learning to teach for creativity may go hand in hand with the development of one's identity as a teacher (Oosterheert et al., 2020). However, little is known on how to design and guide creative challenges, to enhance creative thinking and acting (of both students and teachers) in the classroom, taking into account the daily reality in schools.

Within this theme, the Radboud Teachers Academy aims to shed light on precisely this knowledge gap, by developing deeper understanding and empirically grounded knowledge that teachers value and use to cultivate creativity in their classrooms. As such, our research on this topic is a creative challenge in itself; it aims to find original and adequate (appropriate, valued) outcomes.

Leading questions are:

- What does it mean and take for a teacher to design and guide creative challenges for/or with students within and across subject domains?
- How can teachers learn to design and guide creative challenges for and/or with students within and across subject domains and which conditions are at stake?

2 Perspective: Fostering teacher professional learning and educational development within schools

It is widely assumed that teaching is the essential profession for making all other professions possible. Education needs high quality teachers who are equipped to prepare their pupils for further education and finding their place in today's society. It is therefore needed that we have strong teacher education and schools, that teacher drop-out rates are as low as possible and that teachers get the opportunity for further professional development.

This program aims to increase the number of well-equipped teachers, to retain teachers in their profession by supporting continuous professional development and to cultivate the innovative potential of beginning and experienced teachers in school ecosystems. Teachers are seen as actors who are operating within a school ecosystem, a complex system shaped by dynamic relations (Daly et al., 2020). In this system, both professional and organizational developments emerge from the interactions between teachers, students, co-workers and the larger school network, including teacher education institutes (Imants & Van der Wal, 2020; Louws et al., 2022).

However, research shows that schools often struggle to benefit from the potential of their employees (Van Leeuwen, Schaap, Geijsel & Meijer, 2022) and their involvement in educational partnerships (Imants, Blankesteijn & Meijer, 2020). At the same time, teachers are expected to be adaptive experts (Bransford, Derry, Berliner & Hammerness, 2005) and exert their leadership in schools (Meirink, Van Der Want, Louws, Meijer, Oolbekkink-Marchand, & Schaap, 2020).

Our research program therefore focusses on cultivating innovative learning contexts and the professional identity development of teachers. In practice, the results may help to further develop teacher education programs, induction programs, and educational development in general.

2.1 Theme: Cultivating innovative learning contexts

In the last few decades collaboration between schools and institutes has strengthened. Teacher education increasingly takes place in networks that focus on the internships of student teachers, the introduction of new teachers in schools and professional development of experienced teachers (Darling-Hammond, 2006), as well as sustainable changes in teachers' professional contexts and school improvement (Imants & Van der Wal, 2020). These networks are founded on the idea that teachers are professionals who give meaning to and shape the school context (Weick, Sutcliffe, & Obstfeld, 2005).

First findings from our own research on innovative learning contexts indicate that student teachers, experienced teachers and teacher educators benefitted professionally from these contexts, but schools and teacher education programs were not affected (Imants et al., 2020). Despite such promising developments in collaboration between schools and teacher education institutes, this development is still 'emerging', and many challenges remain. For instance, research shows that student teachers (still and often) see schools as separate from their teacher education program (Jenset et al., 2018). We thus lack scientific knowledge about how these learning contexts can (also) stimulate the improvement of schools and teacher education programs (McGarr et al., 2017). These programs therefore explore and strengthen coherence between initial teacher training and workplace learning throughout the career (Canrinus et al., 2019).

In this theme, we explore the role of networks of teacher education institutes and schools in addressing issues of (continuing) professional and school development, and development of teacher education programs. Important characteristics of these learning communities are that they are effortful, collaborative, active, constructive, coherent (in terms of substantive focus), create opportunities for professional experimentation and (peer)feedback, and stimulate dialogue between teachers, researchers and teacher educators (Clarke & Hollingsworth, 2002; Desimone, 2009; Van Veen et al., 2010). In line with the mission statement of the Radboud Teachers Academy, the initiatives and trajectories include a focus on fostering students' critical and creative (domain-specific) thinking. They foster an inquiry-based approach and culture, for instance where secondary education teachers and university teachers analyze student products or learning activities together (Van Uum et al., 2021; Kooloos et al., 2022).

Leading questions are:

- How does the collaboration between schools and teacher educational institutes contribute to increasing teachers' well-being, and to reducing teacher burnout and dropout?
- What are essential characteristics of school contexts and networks that promote sustainable professional- and school development?
- To what extent does inquiry-based teaching and learning promote sustainable professional- and school development?
- How do student teacher's cross boundaries between being a student in teacher training while bringing innovative potential to the workplace?

2.2 Theme: Developing teacher professional identity

Professional identity formation plays an important role in the way teachers make sense of, react and adapt to innovation and change (Lockhorst et al., 2021). Teachers' professional identity development is a dynamic and interactive process in which different personal and contextual elements are at stake (Akkerman & Meijer, 2011). It is shaped by prior experiences and beliefs, likely to be challenged and changed as teachers are exposed to the tensions that are an inherent part of changing classroom dynamics, school environments and policy demands (Hong et al., 2018).

Professional identity plays an important role in teacher well-being, burn-out, dropout and educational quality (Izadinia, 2013). In earlier research we found that teachers experience a diverse range of professional identity tensions (Van der Wal et al., 2019; Schaap et al., 2019), with increasing impact during their first years in the teaching profession (Schaap et al., 2021). Moreover, in this context of teachers' professional development, our first findings on innovative professional potential suggest that it is crucial to consider starting teachers as being capable of exercising the full range of teaching activities from the start of their career (Van Leeuwen et al., 2022). Rather than one specific interaction, accumulations of interactions in the school ecosystem appear important for how innovative professional potential emerges. Elements such

as culture in teams of teachers, professional space and school leadership manifest differently within and between schools (Oolbekkink et al., 2022). For example, current Teacher Tapp NL findings revealed a correlation between thinking about quitting a teaching job and being able to teach the way you want to teach. Teachers who said they feel they cannot teach the way they want to, considered quitting their jobs more often (Trent, 2019). These types of interactions are notably helpful to understand why teachers drop-out, show low levels of wellbeing or high levels of dropouts.

Broadly speaking, research within this theme aims to investigate what professional identity is, how it develops and how schools can guide teachers in various stages of their career during such development. More specifically, this program will explore how innovative teacher education programs (including induction of early-career teachers) foster professional identity development. We explore how teachers' professional identity development affects innovative professional potential. In practice, this will lead to cultivating innovative professional potential and reducing (or better coping with) professional identity tensions, which will increase teacher well-being and therefore influence their school ecosystem (Deci et al, 2017).

Leading questions are:

- How do teachers develop their professional identity during initial teacher education, their first years as a professional (during teacher induction), throughout their career?
- How can the development of innovative professional potential be enhanced in school ecosystems?
- What are effective interventions to increase teacher wellbeing and to reduce teacher burnout and dropout?
- What is the relation between innovative professional potential and professional identity tensions?
- How can (unwanted) teacher dropout be explained by the professional identity tensions teachers experience in different schools and educational domains?
- What is the relation between teacher professional identity development and burn-out, well-being and dropout?

Bringing it all together

Although this research program distinguished two perspectives and four themes, both perspectives and themes are closely related in educational practice. Teachers' professional learning and educational development is strongly connected to their teaching and learning within and across school domains, and both call for innovative designs and methods. A research focus on one of the themes will therefore inevitably touch upon one or more of the others. This way, the research program not only aims at unravelling perspectives and themes, and researching them in isolation, but also at bringing them together.

This is also reflected in our dedication to *team science*. We not only aim to bring together the researchers from the Radboud Teachers Academy, but also to make a connection with schools, teachers and students, by jointly articulating research needs and questions, and together work towards the innovative teaching and learning that is needed to empower both teachers and learners in the future.

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