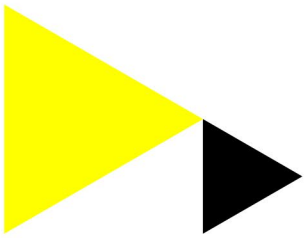
Changes in Curriculum Learning Goals



6

Changes in Curriculum Learning Goals

Linda van Ooijen-van der Linden, Natalie Pareja Roblin,
Jason Nak, Iris Jong and Didi M. E. Griffioen

The Curriculum and Research–Teaching Nexus

Higher-education institutions are challenged to prepare 'future-proof' professionals who think critically, solve complex problems and adapt to a rapidly changing society (Griffioen, Ashwin, & Scholkmann, 2021; van Laar, van Deursen, van Dijk, & de Haan, 2017). These demands have led them to increasingly see research and inquiry as key in students' development (Brew, 2010; Brew & Mantai, 2017). As a consequence, universities worldwide are making growing efforts to strengthen the integration of research and teaching in undergraduate programs (Brew & Mantai, 2017; Healey, 2005a).

Research plays a fundamental role in student learning within higher education (Jenkins, Healey, & Zetter, 2007) because it can positively impact the quality of teaching (Taylor & Canfield, 2007) and students' opportunities to develop research competences (Ruzafa-Martínez, López-Iborra, Barranco, & Ramos-Morcillo, 2016). Currently, most educational programs attempt to enhance the connection between teaching and research in the curriculum; however, there is little empirical ground to guide such efforts (cf. Griffioen, Groen, & Nak, 2019). In turn, policymakers and curriculum developers are left in the dark about how such integration effectively can be realised. Particularly for curriculum developers in higher vocational education, integrating research into the curriculum is a relatively new endeavour. Research has only become part of European higher vocational curricula after the Bologna Declaration in 1999 (Griffioen & de Jong, 2015; Huisman, 2008).

The curriculum defines what should be taught and how (Barnett, 2009), thus outlining the extent to which research plays a role in students' education and

the various ways in which this role is shaped. The integration of research into higher education curricula has received much attention since the introduction of research in applied universities at the start of this century. Higher-education institutes are expected to prepare students for their place in the knowledge society, entailing a need for students to develop competences such as critical thinking, complex problem solving, and the ability to adapt to a rapidly changing society (Brew & Mantai, 2017). Such ambitions have led study programmes worldwide to further strengthen the development of research competences in alumni through their curricula (Brew & Mantai, 2017; Healey, 2005b) as well as to apply research as a didactical tool.

Scholars have proposed various conceptualisations of the research–teaching nexus in relation to the curriculum, although its diversity also resulted in an experienced lack of straightforward definition (Tight, 2016). For example, Brew (1999) stressed that the plurality of the existing complex relationship between teaching and research is dynamic and context driven, as notions of knowledge, research and teaching change over time. She distinguished four conceptions of research among academics' conceptions (Brew, 2001): 'domino', with research as a linear process of 'building block' elements; 'layer', with research as about discovering, uncovering or creating underlying mechanisms, based on data containing ideas and hidden ideas; 'trading', with research focused on trading products, relationships and personal recognition; and 'journey' in which research is a personal journey of discovery that might lead to personal transformation. While the differences between disciplines were expected, Brew did not find an overrepresentation of certain disciplines in particular conceptions. She stated: 'This is consistent with the view expressed earlier that discipline is only one factor influencing the ways research is experienced', which implies that more factors than the discipline likely influences the integration of research in the curriculum (Brew, 2001, p. 284).

A second perspective can be found in Healey's conceptual model of the types of research in education (Healey, 2005a). In this model, four types of research integration on two axes are distinguished, representing the students' involvement as participants or audience on the one hand, and the emphasis on research content versus research processes and problems on the other. The four approaches are often applied as design tools, starting from the presumption that a balanced application of all four approaches presents the student with the best possible benefits from research integration.

A third example intends to reach beyond the divide between research and education. As part of this approach, Annala and Mäkinen (2011) suggest a set

of criteria promoting ideal research–teaching integration in the curriculum, as based on interviews with lecturers and students of a research-intensive university. Criteria include using real research projects with partnerships between students, societal stakeholders and faculty staff; space for a diversity of growth in academic expertise; and the integration of labour market expectations without losing sight of the academic research–teaching nexus and curricular ideals. Such an integrated curriculum of research and education would facilitate 'progress in students' inclination, attitude, and commitment to disciplinary wonder' (p. 16).

In addition to a lack of conceptual clarity, research integration in the curriculum also generally lacks a thorough empirical foundation (Griffioen et al., 2019; Verburgh, Schouteden, & Elen, 2012). In their systematic literature review, Griffioen et al. (2019) provide an overview of the body of knowledge on research in the curriculum by categorising the included papers according to the ten curriculum aspects of Van den Akker's (2003) curricular design model, ranging to its rationale (why are they learning?), its aims and objectives (towards which goals are they learning?), to its content (what are they learning?) and grouping (with whom are they learning?). Empirical evidence on research in the curriculum showed to be limited and mainly focused on aims and objectives and on learning activities, while foremost based on single, descriptive case studies. The authors conclude there is a lack of experimental data on the effects of curriculum design and intended learning goals. The highly needed empirical insight into the way research can be integrated with higher education curricula, and ideally in the effects on student learning, is crucial in informing efforts to rightfully design this integration.

This chapter aids in regard to the first. To be able to envision the integration of research in the curriculum and to formulate the necessary steps towards facilitating it, this chapter focuses on research related to learning goals in bachelor's curricula. Therefore, relevant frameworks are described, followed by empirical findings from different perspectives. Adding to this body of knowledge, an extensive case study focused on the integration of research in all bachelor's curricula of Amsterdam UAS at two points in time is reported. By examining changes in research-related learning goals as described in the intended curricula of bachelor's programmes, a comprehensive picture is painted of the integration of research across disciplines. The closing section discusses changes in the curriculum layer and the role of research in monitoring change.

Integration of Research and Teaching in Higher-Education Curricula

The integration of research and teaching can take many forms, and in turn, approaches to studying such integration also vary widely, as was also shown in the previous chapters. In this section, we specifically discuss the various possible perspectives to studying the integration of research in higher education curricula into curricula as intended (Van den Akker, 2003).

Combined, empirical studies about research integration at the curriculum level generally focus on four perspectives: perceptions of research, development of research skills, amount of research-related activities in the curriculum and the purpose of research in the curriculum as a means to solve societal issues. The first and most frequently used perspective is the teachers' and students' perceptions related to research in the curriculum. Several previous studies on the integration of research in the curriculum have examined the teachers' and/or students' perceptions (Brew & Mantai, 2017; Griffioen, 2020; Vereijken, van der Rijst, van Driel, & Dekker, 2018), often through methods of semi-structured interviews (Brew & Mantai, 2017) or questionnaires (Griffioen, 2020; Hu, van der Rijst, van Veen, & Verloop, 2014, 2015; Vereijken et al., 2018; Visser-Wijnveen, van der Rijst, & van Driel, 2015). These mostly target the challenges and barriers to implementing research in courses as the lecturers perceive them (Brew & Mantai, 2017) or students' perceptions on integrating research (Griffioen, 2020; Vereijken et al., 2018). The findings indicate that students' perceptions of current research in teaching correlate with their motivation for research in general (Vereijken et al., 2018), with teachers' beliefs about the ideal role of research in education exceeding actual teaching practices (Hu et al., 2014, 2015) and with how the types of research involvement differ depending on the study year (Griffioen, 2020). Furthermore, studies indicate that how lecturers perceive their own roles can influence the way they integrate research into their education. For example, five profiles for the research–teaching nexus arose from interviews among humanities lecturers, ranging from the teacher as the content-expert to the teacher as a research motivator for students, the teacher as a research role model, as a tutor and provider of research projects and the teacher as collaborating with students in the ongoing research (Visser-Wijnveen, Van Driel, Van der Rijst, Verloop, & Visser, 2010).

Different conceptions with different emphasises on knowledge, acquiring skills, or becoming a scholar can lead to different integrations of research in education, varying from individual uncoordinated skills development for

students to integration into the scholarly community, each with different opportunities for further development (Brew & Mantai, 2017). Yet, in both the previous curriculum and the changed curriculum of medical education, students' beliefs about the relevance of research for practice and learning did not change over the course of three bachelor's programme years, though their participation in and motivation for research, perceptions of critical reflection on research findings and familiarity with staff research increased after the change (Vereijken, Van der Rijst, Van Driel, & Dekker, 2020). These findings in perception-based studies illustrate the experiences with research integration of the teachers and/or students directly involved, which limits their scope to the range of the experiences that the questionnaire or interview questions elicited.

A second perspective of empirical research focuses on teaching the necessary research skills and the related intended and actual learning outcomes. For example, the pattern of research skill development in science graduate students was investigated by analysing written research proposals to evaluate changes in quality over the course of an academic year (Timmerman, Feldon, Maher, Strickland, & Gilmore, 2013). Another example is the narrative account of three teacher educators teaching research methods using a dialogic pedagogy to tailor their instruction to their students' needs in support of them achieving the learning goals (Baxan, Pattison-Meek, & Campbell, 2020). Case study approaches such as these effectively illustrate the gradual development of certain research competences, such as using primary literature or data analysis, across time. However, it does not provide insight into the integration of research across settings or competences at large.

A third perspective of empirical research considers the balance between research and professional practice in full educational programmes. In this perspective, Baan, Gaikhorst, and Volman (2019) investigated the attitudes towards research as a reflection of its integration in the curricula of one academic and four professional teacher education programmes via a curriculum analysis, survey and interviews. Both types of programmes had integration, but the academic programme addressed more forms of research in a more consistent way and their students were more research-minded. Magnell and Geschwind (2019) used a similar approach and combined labelling activities in the syllabi with staff interviews in an engineering programme. This approach provided a broad insight into the integration of research because the data from the curriculum analysis and the interviews were paired. The purpose was to challenge the perceived incompatibility between research activities and professional practice

activities in the curriculum, showing that engineering education in that specific programme could very well host a seamless integration of research and professional practice (Magnell & Geschwind, 2019). Again, both studies analysed only one department of education, thus providing only context-rich conclusions. One exception to the case study approach found was the Verburgh et al. (2012) study in which they investigated forty-five full bachelor's and master's programmes in Flanders. The findings showed a distinction between three types of educational programmes, based on how much attention research had in all of the curriculum's courses: low-research attention type (47 per cent), in which research related learning goals do not seem to be part of the programme main objectives; result-oriented type (35 per cent), in which acquiring knowledge of research is the most important research-related learning goal, though critical thinking, practical research skills and the competence to become a researcher are also mentioned; and critical thinking type (18 per cent), in which there is distinct attention for critical thinking learning goals, complemented by learning goals on practical research skills and developing students to become researchers. No disciplinary differences that would fit Biglan's (1973) categorisation were found between the three types.

A fourth empirical perspective takes a macro approach to investigate how the integration of research at the programme level may contribute to attaining broader societal issues. This was done, for example, through studying the exploration of the interrelation between competences for research and sustainable development in which earlier defined research competences at Leuven University College were related to a framework of competences for sustainable development (Lambrechts & Van Petegem, 2016). Conclusions focused on the relationship between research competences and the competence to handle sustainable development issues. Another example (Pallant, Choate, & Haywood, 2020) is Allegheny College where the Environmental Science and Sustainability Department educates students to solve real-world environmental problems. Throughout the curriculum, students think through, analyse, research and apply components of all seventeen sustainable development goals to local through global challenges, in a core set of scaffolding courses with the flexibility for specialised focus and depth of understanding about topics of student interest. The authors do note that to allow students to solve sustainability problems, the connectivity between the different sustainable development goals and past context, historical events and contemporary opportunities for application requires being explicitly stated and clarified. Pluim, Nazir, and Wallace (2021) stress the diversity in what they call the environmental perspective on education,

around a core focus of teaching students to think of the Earth more as a series of interdependent systems of which humans are only one part, compared to the previous more anthropocentric ways of thinking.

While the four empirical perspectives provide distinct viewpoints on integrating research and teaching in the curriculum, what is absent is a focus on a more generic design, or design characteristics that reach beyond individual case studies. By considering research-related learning goals across multiple bachelor's programs, this study aims to at least provide insight on how research in the curriculum changes over time. Future research should focus additionally on these goals' specific designs, as well as their effects in the learning of students as members of society.

Disciplinary Differences

Disciplinary differences are a prominent focus of research–teaching nexus studies, although they hardly connect to the curriculum-level design of this connection. Again, there are different perspectives that, when combined, paint a diffuse picture of the disciplines' influence on the types of research integration.

Some studies did find differences between disciplines, but they focus on very different elements of research–education connections. Gros et al. (2020) studied the students' perceptions on research competences and found that they differed from managing knowledge sources in the Law Department, to a focus on problem-solving skills and teamwork in the Medicine and Engineering departments, while the History Department mainly was unclear about research competences. These findings relate to Healey's (2005b) views that hard sciences focus on building practical skills in a more participatory way; he added that this was also done later in the curriculum than in, for instance, the soft sciences. However, Griffioen (2020) contradicted these notions with the students' experiences across different disciplines in a vocational higher education institution. In this vocational setting, all faculties offered programmes in applied sciences, and a distinction between life (e.g. physical therapy) and non-life (e.g. architecture) programmes appeared prominent. The life faculties showed a trend known from the hard sciences: greater active involvement in research of senior students compared to junior students, also in soft-life studies. The non-life faculties showed similar student involvement across all years. By turning from perceptions to written descriptions of intended curricula, Verburgh et al. (2012) found no clear difference in the prevalence of research-related learning in the soft sciences compared to hard sciences, which they assigned

to an overrepresentation of vocational bachelors, who generally are more interdisciplinary in nature. Combined, these studies provide no clear indications of disciplinary differences, leaving curriculum designers on their own accord. The empirical study in this chapter aims to contribute to this disciplinary insight at the curriculum level.

An Instrument to Investigate Change in Research-Related Learning Goals

The empirical study in this chapter aims to bridge the gap between highly focused empirical studies and zoomed out (philosophical) ideas by investigating research integration on a more comprehensive level: written down learning goals in intended curricula. Learning goals provide a clear statement of what outcomes are expected from students as a result of the intended learning experiences in a course over a specific time period. Following Harden (2002), learning goals function for both students and teachers as an effective language to communicate matters of the course curriculum, for sharing appropriate resources and in facilitating a learning environment. Learning goals can be used to map the knowledge and skills intended for students to acquire. In turn, efforts to integrate research competences in higher education can be reflected in the learning goals. By analysing all undergraduate courses of a full university, this study provides a comprehensive image of the intended development of research competences across disciplines in a single university.

One of the issues in monitoring the change process in the university was whether research-related learning goals in the curricula had changed. If such a change occurred, it would be indicative of the shifting views and aims of curriculum developers in the university. Change was expected in the form of increasing or decreasing prevalence of research-related learning goals as a result of developers' shifting attention to and trust in research. Alternatively, a change could be expected in how the content of the learning goals may change, for instance, when increased attention may present itself not only in the increased addressing of research in the curriculum, but also through more in-depth attention to specific steps and skills of doing research. Therefore, the focus of university change in this study is at the level of the research-related learning goals' prevalence as well as their content. Additionally, whether disciplinary differences were found between the different faculties is reported.

Sample and Measurement Instrument

To provide insight into changed prevalence and content as such and between disciplines, nearly 7,000 publicly available study guide texts were collected from the Amsterdam UAS website, from the start year and final year of the strategic programme period (2015–2020). Every study guide text contained information about a single course including its intended learning goals. The research-related learning goals were systematically categorised using an adapted version of the taxonomy Verburgh et al. (2012) developed to adequately consider the change in the position of research in multiple curricula across different faculties. Based on several rounds of coding, the descriptions of the types of research-related learning goals were somewhat broadened to better capture the formulations on research in the Amsterdam UAS learning goals, resulting in the hereafter described six types of research-related learning goals:

Knowledge. Learning goals in this element pertain to integrating research knowledge into the curriculum. The purpose is to acquaint students with research results within their discipline so that they can apply this knowledge in their own professional practice.

Methodology. This goal relates to developing students' understanding of the research process and of how knowledge is produced in the discipline. It has to do with acquiring knowledge about the foundations of research and not learning about the methodology per se. For example, a teacher can aim to develop an understanding of the method's theoretical underpinnings or the impact of it on the results without aiming at learning to apply a research method and interpret the results gained with it.

Instrumental skills. This goal relates to developing instrumental research skills, such as formulating a research question, finding relevant research literature, collecting and analysing data, working with research instruments, formulating a conclusion, and reporting findings.

Critical thinking. This goal relates to developing students' critical attitude towards their professional practice as well as towards information, knowledge and knowledge construction in their discipline. It can be defined as the kind of purposeful, reasoned and goal-directed thinking that an individual needs to solve problems, make decisions, formulate inferences and calculate likelihoods.

Curiosity. This goal pertains to creating willingness and/or interest in students to follow future developments in the field as well as to explore what is still unknown and how the field can evolve.

Research competences. This goal encompasses the previous ones, but enjoins with the long-term value of 'developing researcher-minded attitudes'. The

competence to become a researcher implies an 'integrated set of skills, attitudes and knowledge needed to set-up and conduct research' (Elen & Verburgh, 2008, p. 58). As such, it encompasses the ability to engage in all the steps of scientific inquiry (i.e. formulate a problem, find relevant literature, collect and analyse data and formulate a conclusion), and to integrate these steps into a complete research cycle. If separate bullet points mention independent research steps without integration, these are regarded as instrumental skills.

Analysis of Prevalence of Research-Related Learning Goals in Curricula

To assess the prevalence of research-related learning goals, each modular study guide was scored 0, 1 or 2 for each single learning goal of the taxonomy. The goals in every guide received a 'not present' if that goal was not apparent, an 'implicit' (1) if the text only hinted towards the learning goals/element or a 'present' (2) if a research-related learning goal was explicitly stated. This meant that each study guide text received six separate scores representing the learning goals. Additionally, if the guide had no learning goals section whatsoever or the course did not have a study guide available, it received a 'no info' for all goals.

Every study guide was additionally assigned a weighting according to the amount of credits assigned to the course. In the Dutch system, a nominal student receives 60 credits per college year. These weightings per study guide text were reduced relatively if the course was an elective or part of an optional learning trajectory (for instance if there were three courses of 2 credits each to choose from, each course weighted credits were 2/3). The cumulated combination of presence scores and relative weighted resulted in a score for the presence of each learning goal per each faculty at the start as well as at the end of the strategic programme. This percentage was calculated for each of the six goals from the taxonomy and for each possible coding (not present, implicit, present or no info). This outcome is the unit of data used in this study for assessing prevalence.

Analysis of the Content

To assess the content of the research-related learning goals in the curriculum, all quotes from the guides that received an implicit or present score were collected and their content was summarised for all faculties prior to and after the strategic programme.

One of the important issues in monitoring the change process in the university was whether the learning goals of the bachelor's curricula changed. This followed from the chosen content and mechanism of change as explained in Chapters 1 and 2. If a change in learning goals would occur, it would be an important indication that the focus of the bachelor's programmes, and therefore the students' education, changed (enacted and experienced) as well. Possible changes would be an increase of learning goals related to research as well as a shift in the type of learning goals or even a reduction of research-related learning goals. Additionally, there was the question of whether the prevalence in research-related learning goals would differ between the different disciplinary fields. Further, differences in directions of change in prevalence would be possible.

Finding Change in Research-Related Learning Goals across the University

The findings are presented from quantitative to qualitative: First, the prevalence of the learning goals in both time periods at the institutional level is described, followed by changes in the learning goals' content.

Overall Changes in Learning Goal Prevalence over Time

An overview of learning goal prevalence across all seven faculties shows knowledge, instrumental skills and research competence as the most frequent research-related learning goals for all programmes. Next in terms of prevalence were critical thinking and methodology. Lastly, curiosity received the lowest amount of attention in all programmes of the first period. The prevalence of the six types of research-related learning goals in courses as percentages of the faculty study credits containing these goals ranged from zero to twelve. Overall, these numbers illustrate that research-related learning goals are not numerously present. Furthermore, it illustrates the variation of the overall percentages of research-related learning goals between the separate programmes in the first period.

In the second period, knowledge, instrumental skills and research competences again had the highest prevalence across all faculties, with either Instrumental skills or knowledge as the highest prevalence in different faculties. The prevalence of the six types of research-related learning goals in courses as percentages of the faculty study credits containing these goals then ranged

from three to sixteen. Overall, the study guide texts show a slight increase in research-related learning goals. The knowledge goals category is the only type with a clear increase in prevalence. Critical thinking, methodology and curiosity were three to four times less frequent than knowledge, instrumental skills and research competences, albeit with some slight variation between the different programmes.

In this quantitative comparison, hardly anything appears to have changed over the years, except for an increase in research knowledge being integrated in the curriculum of more programmes than before. Both periods show a similar pattern of prevalence for six research-related learning goals. At this level of data aggregation, the changes over time are small.

Overall Changes in Learning Goal Content

Changes over time do appear clearer when zooming in on the separate learning goals' content.

Knowledge Goals. Learning goals focused on knowledge serve to acquaint students with theories and research results in their disciplinary field. Reading papers and manuals to learn about recent and relevant scientific research and theories are the most common means to this end, for example, to 'make students aware of the most important psychological theories related to choice behaviour' in a social programme, or to 'receive a broad orientation of concepts and theories in the field of industrial automation' in a technical programme.

This rather passive type of knowledge is sometimes complemented by learning goals on more active types of knowledge, such as applying it in professional practice. The faculty of health heavily focuses on this in both time points, while the technical faculty only did so in the second period, thus moving from teaching research results to having students incorporate them into practice. This application is well exemplified in the medical fields where evidence based practice (EBP) is held in high regard. This means that students are stimulated to continuously search for and incorporate recent findings in their own practices. For instance, in one health programme, students are expected to 'integrate evidence into clinical reasoning'.

Additionally, the faculty of education shows a pattern in which both the focuses of passive knowledge (knowing) and active knowledge (application, doing) are more clearly divided across learning goals. This division follows the set-up of the educational programmes in this faculty, which include the duality of learning to teach and to teach in different fields (e.g. biology, chemistry). Pedagogical knowledge goals usually include applying knowledge ('apply the

most relevant theories in pedagogical practice examples'), whereas the subject field-specific knowledge goals are more passive ('read and understand popular scientific articles regarding modern physics research').

Furthermore, where the faculty of health already had a strong focus on EBP in the first period and their research-related learning goals did not show a shift in content in the second, the other faculties showed a change in formulating learning goals, from being very generically formulated learning to more detailed formulations, including specific scientific sources or techniques to use and to what purpose or how to use them.

Methodology Goals. The second goal pertained to acquainting students with the research process. Overall, the content of this goal was concerned mostly with teaching students how to prepare their own research by selecting methods and knowing the different steps in the research process, for instance, 'to understand the process of quantitative analysis'. Overall, this goal was focused on research in general instead of the more field-specific approach that can be found in some other learning goals. An exception was seen in the health faculty where goal formulations were usually related to EBP: '[the student knows] the five steps of evidence based practice'. Other than the faculty of business and economy, which slightly moved towards a stronger focus on being able to explain choices made in research, no meaningful change across time appeared on this learning goal.

Goals for Instrumental Skills. This goal had the largest overall prevalence within the Amsterdam UAS curricula and showed a great diversity of content. In the technical faculty, preparing research was the main focus in both time periods, such as for experiment design, proposal writing or performing aspects or tasks of preparatory research. The faculty of health also positioned research-related instrumental skills as a preparatory tool, in this case for patient care, for instance, 'Identifying uncertainties in a case, regarding cause, diagnosis, therapy and prognosis' or more specifically: 'taking anamneses and identifying relevant items'. This faculty showed a decrease in diversity of content from the first to the second period where mostly 'preparing research questions' was posed. For the faculty of applied social sciences and law, a shift was seen from more 'in-research' skills, such as statistical analysis in the first period; to more preparatory skills, such as devising research questions in the second. The faculty of sports and nutrition combined profession-specific types of research, 'students are introduced to the techniques of ice skating and learn to observe and analyse these techniques and be able to give improvements for a skater's technique' with more generic research skills, such as 'performs a QDA tasting test, imports data into SPSS or Excel, and runs the analyses'. Lastly, for the faculty of education, again a

division between overarching pedagogical skills, such as investigating behaviour in the classroom, and more specific skills, such as preparing microbiological experiments for in-class teaching, were found.

Overall, a slight shift was shown from a somewhat narrow focus on detailed and specific steps of research within a research cycle to somewhat zooming out by adding the proposed steps' context or purpose.

Critical Thought and Curiosity. These goals were least prevalent in the course descriptions. Critical thought mostly related to being able to weigh the value and relevance of literature and the professional practice. In only a few descriptions, the general attitude of 'being a critical thinker' was mentioned. Curiosity overall was the least prevalent of all the goals, but had a spike in the medical school in the second period, due to a single quote being systematically reused throughout the nursing programme, namely, 'the nurse works from an ever-present investigative attitude, leading to reflection, evidence based practice and innovation of professional practice', which raises questions about its depth of content.

The lesser prevalence of critical thought and curiosity may be due to the fact that they – especially curiosity – are hard(er) to pin down and create objective examination tools for; therefore, making it preferable not to mention them as an effect of the system for quality enhancement. This does not mean these goals were not strived for in class, rather the document data simply does not provide insight into teaching–learning interactions, but they were not so much discerned in the formal course guides. The content of goals on curiosity and critical thought did not appear to change across time.

Research Competence. Lastly, the more encompassing research competence goal was prevalent across all faculties and usually pertained to students doing their own research by going through all the empirical cycle's steps in some form. The most fitting quotes would list explicitly the entire process of research the students did and made for valuable information, such as 'applying the empirical cycle; formulating problems and goals embed in literature; make a research design; methodically gather data; data-processing; draw conclusions and present'. However, this learning goal also included the vaguest descriptions, but still indicating a full research process, such as 'going through the steps of research' or 'doing research in the field'. In almost all cases, the quotes focused on field research such as organisational research in the business programmes or 'doing research in the school' in the educational programmes. No overall meaningful changes over time emerged.

Faculty-Level Changes

Zooming in further on research-related learning goals within the faculties reveals prevalence patterns that differ from the overall prevalence because the differences include increases as well as decreases of prevalence in the second period. In some instances, these descriptions require simultaneous consideration of the content of the different learning goals to be able to interpret what happened. Some, but not all, changes in prevalence appear to be related to a shift in content. The apparent coincidences of these changes in prevalence and content of research-related learning goals are illustrated with quotes from the study guide texts.

Faculty of Education

With curiosity as the exception (rise from 0 per cent to 1 per cent), all research-related learning goals in the faculty of education dropped in prevalence from the first time period to the second. As previously explained, the findings show that the faculty of education makes a clear distinction between a similar core educational curriculum all teacher education programmes shared and their subject-specific parts of curriculum, such as biology or geography. This distinction is especially evident in the knowledge learning goals, which were first present in 18 per cent of the syllabi and were aimed at acquainting students with subject-specific theories and literature, as well as the knowledge and application of pedagogical and didactic concepts. Knowledge goals changed over time as their prevalence decreased somewhat to 15 per cent, yet their focus changed as the goals reflected the development of a more active approach: from 'the student develops a conceptual framework' in the first time period to 'is able to independently search and process (scientific) literature' in the second. Another example: 'The student acquired knowledge of important theories about communicating with children' changed to 'you [the student] demonstrate that you can master various theoretical perspectives when analysing your own actions in practice'. In instrumental skills, there was a slight shift from practical execution of techniques to more focus on pedagogical-didactical research-based professional action with, for example, 'the student knows several different observational instruments to determine the developmental level of young children and they uses these instruments in the correct manner'. In the first time point is stated that 'you [the student] have insight and skill with observing (individual) students that have specific education needs'.

In the second time point formulations such as 'You base your actions on these observations and your interpretations' were found. Replacing two highly general goals in the first time point on the empirical cycle and 'conducting research in school' by the single 'setting up, conducting and reporting an educational sciences investigation' in all educational programmes in the second time point, appears to explain the decreased prevalence of goals pertaining to the research competence (from 7 per cent to 5 per cent). Resulting from often repeated goals across the programmes in this faculty, methodology first included a strong orientation towards broad research processes: 'Application of the empirical cycle: formulation of proposal, gathering of data methodologically, processing of data, drawing conclusions and presenting'. However, as the prevalence decreased over time, its focus also shifted to the independent set-up of educational research, focusing stronger on the disciplinary context: 'You [the student] can pick the right research method and the accompanying measurement instruments, based on the literature review'. Methodology (3 per cent to 2 per cent) and critical thinking (5 per cent to 2 per cent) goals dropped in prevalence over the years from slightly present to hardly present.

Faculty of Applied Social Sciences and Law

This faculty includes educational programmes such as public administration, law and social work. As the prevalence of knowledge goals decreased (from 15 per cent to 10 per cent), its focus became slightly more specific. First, it mainly concerned knowing theories and the programme's background, which mostly have become obtaining knowledge of relevant theories over time. The learning goals were rather abstract in the first time period, for instance, 'The student has knowledge of psychological theories, methods and techniques on processes of change and intervention within organisations'. In the second time period, more learning goals were formulated as professional actions and specify what knowledge is required in what way; 'You can analyse a neighborhood based on urban sociology theories and concepts'.

Little change appears to have occurred for the prevalence (9 per cent to 10 per cent) and scope of instrumental skills goals, which continue to have a broad perspective of research: 'independent performance of statistical analysis' and 'know how to perform a literature search'. In addition to this broad perspective, some faculty-specific methods were explicitly mentioned. For example, 'can extrapolate results from the neighborhood research and translate these results to professional advice' and 'research the administrative theme

"social entrepreneurship" by means of desk research and interviews and write a paper on it'. Yet a few goals in the second time period suggest a movement from general and field-specific research skills to more holistic descriptions of applying those general and field-specific research skills. 'The applied psychologist can systematically and methodically interpret data relating to behavioral issues that arise on the group and organisational level' to 'Can identify, analyse and creatively tackle a complex question or developmental need in a changing context, including international ones, by identifying and using psychological knowledge and data to arrive at behavioral interventions and/or advice'. Research competences drop slightly in prevalence (10 per cent to 8 per cent), while goals containing methodology (steady at 3 per cent) and critical thinking (steady at 6 per cent) continue to have the same prevalence. Curiosity hardly appears at all in the study guides.

Faculty of Business and Economics

Educational programmes that fall under the Faculty of Business and Economics are programmes such as human resource management, economics and accountancy, of which all cumulated learning goals present in the study guide texts have increased over time, with knowledge from 6 per cent to 12 per cent, instrumental skills from 12 per cent to 21 per cent and research competence from 8 per cent to 15 per cent. Between the time periods, a content shift appears where the knowledge goals first focused on theoretical knowledge applicable for the professional practice: 'Ability to apply culture-theoretical models', to an addition of knowledge supplementary to conducting research: 'Examine relevant business theories, in relation to the main research question, to formulate and justify sub question'. A change towards using theories and other knowledge to giving arguments and underpinnings, beyond understanding or general 'application' appears to have been made. Another slight content shift occurred in the learning goals covering methodology (prevalence from 3 per cent to 4 per cent) and instrumental skills, which were focused on concretising narrowly defined research skills and understanding related to the professional practice and have become more focused on higher-order research competences. For example, 'Translate a specific business problem into concrete and (partly) measurable research questions' in the first period to 'Analyse a complex business problem in an international business setting with use of an adequate research design, resulting in an evidence based feasible solution' in the second. Also, a focus on collecting, handling and analysing data is extended with interpretation

of findings (into practical solutions). 'You [the student] edit the Excel dataset and organise it according to patterns and trends that are relevant to the complex request for advice' to 'You [the student] can make mathematical, statistical and financial models in Excel and interpret the (business) economic results'. The other goals remain unchanged, such as the research competences goals related to both programme-specific research and more broad goals, such as 'Independent set-up and conducting of a questionnaire-study, followed by performing a quantitative analysis'. Curiosity went from hardly present in the first period, to slightly more present in the second period (1 per cent) and critical thinking also shows a slight increase in prevalence (3 per cent to 4 per cent).

Faculty of Health

The Faculty of Health includes educational programmes to educate paramedical professionals, such as physical therapists and nurses. Knowledge learning goals, whose prevalence more than doubled over time (from 16 per cent to 45 per cent), reflected the faculties' orientation as they revolved around applying relevant knowledge in the field of health sciences. Over time, the focus changed slightly towards applying scientific knowledge and especially establishing patient needs in EBP, mostly found in the syllabi of the nursing programme.

Instrumental skills dropped in prevalence and its content, and became slightly more focused on EBP. More specific, a small focus shift from instrumental skills related to diagnostics to the research part of EBP is visible: from 'Independent and systematic searching, selecting and evaluation of relevant scientific literature' to 'find, choose and use relevant (scientific) literature to substantiate choices'. In addition to instrumental skills and knowledge goals, research competences also demonstrate a focus on specified research situated at the core of the faculty and have augmented enormously (from 5 per cent to 20 per cent), which can be traced back to learning goals that are repeated in multiple study guide texts belonging to the nursing programme, such as

> The nurse works continuously to develop and promote the nursing profession. Her[sic] own expertise and that of her [sic] direct (future) colleagues is continuously improving by actively searching and sharing (different types of) knowledge, and, if applicable, in practice orientated research.

Critical thinking dropped from 8 per cent to 3 per cent prevalence, methodology from 4 per cent to zero and curiosity went from zero to a high (18 per cent)

prevalence of which the latter is again connected to recurring quotes from the nursing programme. This illustrates that for some goals, the augmentation does not equally reflect an increased amount of research-related learning goals for all programmes belonging to this faculty. Overall, the different learning goals together demonstrate that research in the faculty of health is driven by patient-centred EBP, as skills are patient-centred and aimed at obtaining knowledge to choose the best treatment.

Faculty of Technology

This faculty includes educational programmes such as applied math, engineering and architecture. It shows small increases in knowledge (5 per cent to 7 per cent), in instrumental skills (15 per cent to 19 per cent), in critical thinking (2 per cent to 4 per cent), and in research competence goals (11 per cent to 13 per cent). A few curiosity goals are present (2 per cent) before they disappear from the syllabi in the second time point. Methodology remains the same at 3 per cent. The content of the goals shows little change over time, although some goals are described in more detail in the first time point than in the second, for instance, 'Integrally applying previously acquired theoretical knowledge' to 'You [the student] can acquire and build on existing knowledge, and if necessary adjust the process and design based on predetermined sources besides Google (companies, articles and research institutions)'. The rich diversity of programmes housed in this faculty is mostly reflected in the variety of instrumental skill goals that pertain to relative complex skills, such as 'the right skills to design experiments to assess the impact of variability within a system' as well as purely research-orientated skills: 'Ability to research several (frequent) traces and apply several simple research methods'. Between the time points, the scope broadens to more learning goals on research design besides learning goals on measurements and data handling, although this reaches its dominance through two educational programmes.

Research competence goals mainly involve conducting practice-oriented research, of which the content differs greatly within the faculty, especially in the first period, such as 'Conduct urban typological research on city plans, building typology and public space', 'You [the student] can develop a design vision for the redesigned product based on user research', and 'You [the student] learn to conduct practice-oriented research in a team in the field of digital automation with nautical applications'. As for the other research-related learning goals in the second period, most goals are broader formulated, such as 'demonstrate

competency by showing a solid research approach and by making a clear distinction between primary and secondary issues'.

Faculty of Sports and Nutrition

This faculty includes sports-related programmes and nutrition and dietetics. In this faculty, the goals containing knowledge (6 per cent to 14 per cent), critical thinking (2 per cent to 6 per cent), instrumental skills (5 per cent to 7 per cent), and research competences (2 per cent to 5 per cent) increased from the first time point to the second, whereas methodology did not change in prevalence (2 per cent) and curiosity was absent in both time points. A shift in the orientation of the knowledge goals indicates the students are encouraged to become more actively engaged with academic knowledge related to the programme; 'Bases their actions on a multitude of (evidence-based) theories and connects these to each other', where before it was mostly aimed to gain a theoretical background related to the professional practice, such as 'You [the student] know what the discussed psychological theories mean'. Also illustrated by a more active use of scientific papers in the second time point: 'the student has a good knowledge and understanding of the theories of Hofstede, Schwartz, Trompenaars, Hall and Pinto and is based on this knowledge and understanding able to explain and to predict the behavior of people belonging to different cultures', compared to the first time point which aimed to: 'combine the results of scientific papers and come to an overall conclusion, considering the quality of these papers'. While the prevalence of methodology goals was stable over time, the goals have become more specific to understanding faculty-specific research methods, such as 'Can describe the various forms of market research and knows which research method to apply'. Critical thinking is less orientated to the student's own practice in both time points: 'assess the quality of scientific papers'. With limited changed prevalence, instrumental skills are in the first time point focused on learning to use specific methods, such as focus groups and instruments, that measure children's movement development. In the second time point, the instrumental skills learning goals sometimes mention the purpose of using the methods, for example 'You [the student] draw up the dietetic diagnosis, goals and advice and coordinate this with the dietetic research'. The research competences relate mostly to the professional practice, such as 'the student conducts a consumer and sensory research on the developed product and provides a summary of the research objectives, methods, results, conclusion and recommendations in the business plan'.

Faculty of Digital Media and Creative Industries

This faculty includes programmes such as Amsterdam Fashion Institute, IT, Communication and Multimedia Design. This faculty shows a decrease in the prevalence of research-related learning goals between the two time points, except for knowledge goals (6 per cent to 8 per cent). Knowledge goals pertain to both understanding and applying scientific knowledge, and obtaining knowledge from specific types of research: 'To understand what fashion theories are and how they play a role within the field of fashion research'. In the second time point, a larger number of learning goals related to knowledge are formulated in a more detailed manner, for instance: 'apply scientific knowledge' to 'develop, test and present concepts, based on research offered by the lecturer'. A dual approach of broad research skills, but with a practice-specific focus, such as 'the investigation of the functionality and quality of a tool', is reflected in the research competences (9 per cent to 6 per cent) and in instrumental skills goals (13 per cent to 11 per cent). In addition, there is a range of instrumental research skills related to the faculty's specific programmes, such as the design of a research project around an IT problem. In prevalence, methodology learning goals went from 8 per cent to 4 per cent. Curiosity, despite having a low prevalence (less than 1 per cent), shows a changed content and is conceptualised as students' active attitudes where before it was a more general outlook to the field – from 'I and the field: You show a curious, critical and inquiring attitude' to 'Learning how to learn: At the end of this course, students must be able to self-learn a new blockchain architecture and design framework, by exploring the scientific and industrial literature (professional databases, sites, and journals)'. The point of attention for learning goals related to critical thinking (6 per cent to 3 per cent) moved away slightly from theories towards research.

To Conclude: Changes at the Curriculum Layer

As a core case in this book, a strategic programme aimed to create awareness of the value of integrating research in the curriculum and stakeholders' desire to realise such integration at all faculties and programmes. In this monitoring study, in a timespan of four years, the development across the university led to an increase in the prevalence of research-related learning goals in undergraduate curricula and a small but meaningful conceptual shift in formulating these goals. However, differences between the faculties are also more apparent, where

programme managers and teaching teams become more aware of the possible viewpoints on research in education and over the years have started to make more deliberate decisions on what to aim for in courses. Developing the faculty-wide vision documents on the role of research in professional practice and in the curriculum are additional evidences of these developments. Apparently, the changes in vision rationales discussed in Chapter 5 have been parallel to changes in learning goals.

Although the changes found are mostly rather subtle, the learning goals do reflect a change in perceptions from fuzzy to more focus, sometimes professionally oriented in its application, sometimes academically oriented as far as sources are concerned; in other programmes, both orientations can be found. In backward curriculum design, and together with the rationale, the learning goals provide direction for designing the full curriculum. Therefore, the somewhat more precise learning goals provide a clearer path for curriculum developers. Some goals almost prescribe certain learning activities, for example 'After this module you can run a regression analysis in Excel and choose the best model in an economic application'. Other learning goals provide more space for design and teaching, such as 'demonstrate professional competency as a starting applied researcher by creating a research abstract, poster, presentation and paper using communication standards and showing critical thinking and reflection'.

While precisely formulated goals provide a clear orientation for design and teaching, they also include the risk of positioning research in the curriculum only in an instrumental manner of learning tricks. In that case, it is clear what trick should be learned, but why it is learned is unclear. In turn, too general learning goals create the chance of a lack of clarity in terms of direction among curriculum designers, teachers as well as students who do not know towards what they are expected to work. Therefore, the level of detail in learning goals needs to be balanced to include a clear content as well as provide space for including the spirit of the rationale at the level of the learning goal. If the what (learning goal) and the why (rationale) are connected, there is clarity in the choices made in design as well as about the choices to be made in teaching–learning interactions.

From a research perspective, this is an important study to understand how scientific underpinnings are needed for sound monitoring of change. Just as in scientific research, decisions on methods in monitoring determine what type of insight are found and what is left out by design. As the case showed, quantitative and qualitative operationalisations of change led to different findings. Different operationalisations of change within a quantitative approach can also lead to different interpretations of the same data. The changes in prevalence of the

learning goals in percentages within the faculties appear small at first sight because the relative percentages are low. However, this study has shown that additional qualitative insights into the changes are clearer on the changed positioning of research in undergraduate curricula over time. Therefore, combining measures and making the effort to gather data that can confirm or oppose the proposed changes is an important instrument for change agents in universities.

References

Annala, J., & Mäkinen, M. (2011). The research-teaching nexus in higher education curriculum design. *Transnational Curriculum Inquiry, 8*(1), 3–21.

Baan, J., Gaikhorst, L., & Volman, M. (2019). Stimulating teachers' inquiring attitude in academic and professional teacher education programmes. *European Journal of Teacher Education*, *43*(3), 352–67. doi:10.1080/02619768.2019.1693994

Barnett, R. (2009). Knowing and becoming in the higher education curriculum. *Studies in Higher Education*, *34*(4), 429–40. doi:10.1080/03075070902771978

Baxan, V., Pattison-Meek, J., & Campbell, A. B. (2020). Dialogic pedagogy in graduate teacher education research advisement: A narrative account of three teacher educators. *Dialogic Pedagogy: An International Online Journal, 8*, SA60–SA84. doi:10.5195/dpj.2020.308

Biglan, A. (1973). Subject matter in different academic areas. *Journal of Applied Psychology*, *57*(3), 195–203.

Brew, A. (1999). Research and teaching: Changing relationships in a changing context. *Studies in Higher Education*, *24*(3), 291–301. doi:10.1080/03075079912331379905

Brew, A. (2001). Conceptions of research: A phenomenographic study. *Studies in Higher Education*, *26*(3), 271–85. doi:10.1080/03075070120076255

Brew, A. (2010). Imperatives and challenges in integrating teaching and research. *Higher Education Research & Development*, *29*(2), 139–50. doi:10.1080/07294360903552451

Brew, A., & Mantai, L. (2017). Academics' perceptions of the challenges and barriers to implementing research-based experiences for undergraduates. *Teaching in Higher Education*, *22*(5), 551–68. doi:10.1080/13562517.2016.1273216

Elen, J., & Verburgh, A. (2008). *Bologna in European research-intensive universities. Implications for bachelor and master programs*. Antwerp: Garant.

Griffioen, D. M. E. (2020). Differences in students' experiences of research involvement: Study years and disciplines compared. *Journal of Further and Higher Education*, *44*(4), 454–66. doi:10.1080/0309877x.2019.1579894

Griffioen, D. M. E., & de Jong, U. (2015). Mapping Dutch Higher education lecturers' discourse on research at times of academic drift. *Scottish Journal of Arts, Social Sciences and Scientific Studies*, *26*(1), 81–94.

Griffioen, D. M. E., Ashwin, P., & Scholkmann, A. (2021). Who ensures that society has the professionals it needs? Differences in the policy directions of three European countries. *Policy Reviews in Higher Education* (February), 1–16. doi:10.1080/23322969.2021.1880290

Griffioen, D. M. E., Groen, A., & Nak, J. (2019). The integration of research in the higher education curriculum: A systematic review. *The Higher Education Journal of Learning and Teaching*, *10*(1). doi:10.24384/vhs6-1j85

Gros, B., Viader, M., Cornet, A., Martínez, M., Palés, J., & Sancho, M. (2020). The research-teaching nexus and its influence on student learning. *International Journal of Higher Education*, *9*(3), 109–19. doi: 10.5430/ijhe.v9n3p109

Harden, R. M. (2002). Learning outcomes and instructional objectives: Is there a difference? *Med Teach*, *24*(2), 151–5. doi:10.1080/0142159022020687

Healey, M. (2005a). Linking research and teaching to benefit student learning. *Journal of Geography in Higher Education*, *29*(2), 183–201. doi:10.1080/03098260500130387

Healey, M. (2005b). Linking research and teaching: Exploring disciplinary spaces and the role of inquiry-based learning. In R. Barnett (Ed.), *Reshaping the University: New Relationships between Research, Scholarship and Teaching* (pp. 67–78) McGraw Hill: Open University Press.

Hu, Y. J., Van der Rijst, R., Van Veen, K., & Verloop, N. (2014). 'And never the two shall meet'? Comparing Chinese and Dutch university teachers about the role of research in teaching. *Higher Education*, *68*(4), 607–22. doi:10.1007/s10734-014-9734-0

Hu, Y. J., Van der Rijst, R., Van Veen, K., & Verloop, N. (2015). The role of research in teaching: A comparison of teachers from research universities and those from universities of applied sciences. *Higher Education Policy*, *28*(4), 535–54. doi:10.1057/hep.2014.19

Huisman, J. (2008). Shifting boundaries in higher education: Dutch Hogescholen on the move. In J. S. Taylor, J. Brites Ferreira, M. de Lourdes Machado, & R. Santiago (Eds.), *Non-university Higher Education in Europe* (pp. 147–68). Dordrecht: Springer.

Jenkins, A., Healey, M., & Zetter, R. (2007). *Linking teaching and research in disciplines and departments*. Retrieved from York: http://www.heacademy.ac.uk/assets/York/documents/LinkingTeachingAndResearch_April07.pdf.

Lambrechts, W., & Van Petegem, P. (2016). The interrelations between competences for sustainable development and research competences. *International Journal of Sustainability in Higher Education*, *17*(6), 776–95. doi:10.1108/ijshe-03-2015-0060

Magnell, M., & Geschwind, L. (2019). Higher education research & development a seamless blend of research and professional practice: Dual coupling in engineering education. doi:10.1080/07294360.2019.1581141

Pallant, E., Choate, B., & Haywood, B. (2020). How do you teach undergraduate university students to contribute to UN SDGs 2030? In W. Leal Filho, A. L. Salvia, R. W. Pretorius, L. L. Brandli, E. Manolas, F. Alves, U. Azeiteiro, J. Rogers, C. Shiel, & A. Do Paco (Eds.), *Universities as living labs for sustainable development: Supporting the implementation of the sustainable development goals* (pp. 69–86) Cham: Springer.

Pluim, G., Nazir, J., & Wallace, J. (2021). Curriculum integration and the semicentennial of Basil Bernstein's classification and framing of educational knowledge. *Canadian Journal of Science, Mathematics and Technology Education*, *20*, 715–35. doi:10.1007/s42330-021-00135-9

Ruzafa-Martínez, M., López-Iborra, L., Barranco, D. A., & Ramos-Morcillo, A. J. (2016). Effectiveness of an evidence-based practice (EBP) course on the EBP competence of undergraduate nursing students: A quasi-experimental study. *Nurse Education Today*, *38*, 82–7.

Taylor, R., & Canfield, P. (2007). Learning to be a scholarly teaching faculty cultural change through shared leadership. In A. Brew & J. Sachs (Eds.), *Transforming a university. The scholarship of teaching and learning in practice* (pp. 233–47). Sydney: Sydney University Press.

Tight, M. (2016). Examining the research/teaching nexus. *European Journal of Higher Education*, *6*(4), 293–311. doi:10.1080/21568235.2016.1224674

Timmerman, B. C., Feldon, D., Maher, M., Strickland, D., & Gilmore, J. (2013). Performance-based assessment of graduate student research skills: Timing, trajectory, and potential thresholds. *Studies in Higher Education*, *38*(5), 693–710. doi: 10.1080/03075079.2011.590971

Van den Akker, J. (2003). Curriculum perspectives: An introduction. In J. Van den Akker, W. Kuiper, & U. Hameyer (Eds.), *Curriculum landscapes and trends* (pp. 1–10). Dordrecht: Kluwer Academic Publishers.

Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–88. doi:10.1016/j.chb.2017.03.010

Verburgh, A. L., Schouteden, W., & Elen, J. (2012). Patterns in the prevalence of research-related goals in higher education programmes. *Teaching in Higher Education*, *18*(3), 298–310. doi:10.1080/13562517.2012.719153

Vereijken, M. W. C., Van der Rijst, R. M., Van Driel, J. H., & Dekker, F. W. (2018). Student learning outcomes, perceptions and beliefs in the context of strengthening research integration into the first year of medical school. *Advances in Health Sciences Education*, *23*(2), 371–85. doi:10.1007/s10459-017-9803-0

Vereijken, M. W. C., Van der Rijst, R. M., Van Driel, J. H., & Dekker, F. W. (2020). Authentic research practices throughout the curriculum in undergraduate medical education: Student beliefs and perceptions. *Innovations in Education and Teaching International*, *57*(5), 532–42. doi:10.1080/14703297.2019.1674680

Visser-Wijnveen, G. J., Van Driel, J. H., Van der Rijst, R. M., Verloop, N., & Visser, A. (2010). The ideal research-teaching nexus in the eyes of academics: Building profiles. *Higher Education Research & Development*, *29*(2), 195–210. doi:10.1080/07294360903532016

Visser-Wijnveen, G. J., Van der Rijst, R. M., & Van Driel, J. H. (2015). A questionnaire to capture students' perceptions of research integration in their courses. *Higher Education*, *71*(4), 473–88. doi:10.1007/s10734-015-9918-2