The research-teaching nexus in the humanities : variations among academics

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Chapter 5

Relating academics' various ways of integrating research and teaching to their students' perceptions

5. Relating academics' various ways of integrating research and teaching to their students' perceptions[4]

A wide variety of studies has been carried out regarding the way academics view the research-teaching nexus, while other studies focused on the students' experiences of research-intensive environments. This study relates these two research streams and describes how twelve staff members in a Faculty of Humanities integrate research into their teaching, and how their students perceive these learning environments. Data were gathered from both teachers and students. The twelve teachers opted for different ways of integrating disciplinary research into their teaching. The study produced some unexpected benefits as the attained learning environment yielded more and other outcomes than intended, especially regarding the dispositional level and awareness of research. It was possible to attribute dispositional learning outcomes to students bringing the academic disposition into practice and discussing their efforts with their teachers, while awareness of research increased as a result of getting a close look at the teacher's own research.

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5.1 Introduction

The wish to link research and teaching is articulated especially in research universities, although a strong symbiosis is not easily achieved (Boyer Commission, 1998). Zubrick, Reid, and Rossiter (2001) give several reasons for strengthening this nexus. Shifting contexts and expectations lead to uncertainties for universities as organisations and for individual academics. An emphasis on the link between research and teaching stimulates teachers and students to develop a culture of critical enquiry. Other reasons for emphasising this connection include the wish to retain one's status in the competitive field of higher education, to value and reward the diversity of academic work, to improve the quality of both university teaching and research, and to raise the status of teaching as compared to research. Interestingly, only the first reason regards the students; all others are related to academics or the university as a whole. In this chapter we would like to draw attention to both teacher and student perspectives on a strong connection between research and teaching. We will first pay attention to academics' experiences and views and then turn to the students' experiences regarding the research-teaching nexus.

5.1.1 Teacher perspective

On the basis of interviews the studies by Robertson and Bond (2001) and Coate, Barnett, and Williams (2001) report various experiences of the relations between research and teaching. The first study reports a variety of relations, ranging from mutually incompatible activities to sharing a symbiotic relation within a learning community (Robertson & Bond, 2001). The ends of this range coincide with the categories 'independent' and 'integrated' found in Coate and others (2001). Furthermore, Coate and others (2001) add the categories 'negative impact' and 'positive impact' (research to teaching, and teaching to research). Negative influences are related to the higher value assigned to research over teaching. This creates an imbalance not only for some academics, but potentially also for educational programmes, because of conflicts of interest and time. Besides, research might improve teaching. Examples provided by Coate and others (2001) include an increase of the teacher's authority as they are seen as a well-known expert in the field, enthusiasm rubbing off on the students, researchers teaching more relevant and up-to-date, and teaching from their personal experience rather than second-hand knowledge. Coate and others (2001) conclude that is it necessary to distinguish between staff 'teaching their own research' and staff active in research in a relevant field. What types of teacher en teaching yields specific advantages depends on course level and discipline.

5.1.1.1 Goals

From interviews with academics at eight European research-intensive universities Elen and Verburgh (2008) conclude that academics perceive the linking of research and teaching as beneficial for students. A close connection, after all, is expected to result in a specific state of mind. A key element of this state of mind is a critical orientation, or critical thinking. Put more generally, teaching in research-intensive universities is aimed at the development of a mature epistemological disposition in the students. The link between research and teaching is fundamentally based on and directed towards a mature epistemological disposition according to Elen and others (2007). This mature epistemological disposition includes not only critical thinking, but also curiosity and a willingness to take a stance and defend it with reasonable arguments (Elen & Verburgh, 2008). The idea of a mature epistemological disposition resembles the 'scientific research disposition' investigated by Van der Rijst, Van Driel, Kijne, and Verloop (2007) amongst university science teachers. They distinguished six aspects of this disposition, namely an inclination to achieve, to be critical, to be innovative, to know, to share, and to understand. Regarding history McLean and Barker (2004) showed that university history lectures agreeing that becoming a practicing historian is far more desirable than just acquiring transferable skills. The main difference between these two goals is that acquiring an academic disposition, i.e. to be able to form autonomous, well-informed, critical opinions about historians' debates, is an integral part of becoming a historian. Research activity is seen as extremely helpful to pursue this goal. So, linking research and teaching aims at a range of outcomes in the students, but is mostly directed towards their disposition.

5.1.1.2 Learning environment

A wide variety of learning environments in which academics purposefully integrate research into their teaching can be found in the literature. Many studies report some form of inquiry learning. This might entail either a research project in which students work together in a research team, or projects in which individual students carry out and discuss related research activities (Badley, 2002; Clark, 1997; Colbeck, 1998). In these cases students pursuing research is the primary means of learning. Depending on the discipline this might take place in laboratories or in seminars. An individual variation upon this model is the mentor-apprentice relationship in which students operate as research assistants to their professors (Clark, 1997). The Oxford Tutorial might be considered a specific form of this relation (Ashwin, 2006). Another perspective is that of academics bringing

their research and research areas into their teaching and even into the general curriculum (Durning & Jenkins, 2005; Neumann, 1992), with research findings providing the input for the teaching. Yet, another variation were classes focusing mainly on the development of research skills, including modules in which only research methods were taught (Durning & Jenkins, 2005). Several of these distinctions are incorporated in a model proposed by Healey (2005). He distinguishes between a focus on research content versus research process, and students as audience versus participants in research; the former distinction concerns content or curriculum, the latter the approach by which this curriculum is taught to the students.

Several authors mention student level as a serious influence on the potential relationships; at graduate level the ties are usually closer than at undergraduate level (Clark, 1997; Durning & Jenkins, 2005; Neumann, 1992; Smeby, 1998; Zamorski, 2002). However, on the basis of observations of academics Colbeck (1998) found that the purpose of the teaching, i.e., classroom instruction or training students to conduct research, was a far more influential factor. Additionally, she mentions the importance of the discipline. In undergraduate education in the social sciences and humanities the link is easier to realise than in the natural sciences, as the degree of specialisation and the rate of knowledge development are lower in the former (Smeby, 1998). A last aspect that academics consider relevant is class size (Shore, Pinker, & Bates, 1990). This influences a preference for lecturing versus more interactive ways of teaching, and therefore, also implies different possibilities for integrating research and teaching.

5.1.2 Student perspective

Besides the studies on what academics do to enhance the research-teaching nexus, and the advantages and disadvantages they perceive or aim for, several authors have paid attention to how the students experience these research-intensive environments (Healey, 2005; Jenkins et al., 2003; Robertson & Blackler, 2006; Van der Rijst, Visser-Wijnveen, Verstelle, & Van Driel, 2009). Jenkins, Blackman, Lindsay, and Paton-Saltzberg (1998) stressed that the students' voices needed to be heard but was missing in the debate. In recent years the students' voice has come to be heard, although in most studies the focus has been only on final-year undergraduates. Hence, the advantages and disadvantages should be read from that perspective. Among the factors influencing how students perceive the link between research and teaching are nature and level of the discipline, type and purpose of a course, the ability and motivation of the student, and the

opportunity for personal interaction with teachers (Neumann, 1994). Breen and Lindsay (1999) explicitly pay attention to the influence of student motivation. They point out that intrinsically-motivated students appreciate research involvement most, qualification-motivated students are indifferent to research activities; achievement-oriented students approach research negatively. We will discuss both the disadvantages and advantages perceived by the students as reported in the literature.

5.1.2.1 Disadvantages

In the eyes of the students the three main disadvantages of combining research and teaching in the person of the academic are the following.

- Availability is sometimes problematic (Lindsay et al., 2002). Academics are researchers and teachers, which means that they have to divide their time and attention over both activities. In a questionnaire study by Healey, Jordan, Pell and Short (in press) this aspect was reported most often (15% of the students) concerning having a negative impact on their learning.
- A second problem is that staff research sometimes takes priority over teaching (Healey et al., in press; Lindsay et al., 2002). Many academics value research more than teaching, or assume that good subject matter knowledge is a substitute for good teaching. This view is clearly rejected by the students (Neumann, 1994).
- A third disadvantage reported is that the interest of academics might lead to a limited curriculum (Lindsay et al., 2002) or a disproportionate attention paid to teachers' favourite topics, at the expense of the aims of the course (Neumann, 1994) or students' interest (Lindsay et al., 2002).

Another aspect mentioned quite often by students when asked about their experiences with research is that they experience a great distance between themselves and the research being done at university (Lindsay et al., 2002; Robertson & Blackler, 2006; Zamorski, 2002). Robertson & Blackler (2006) indicate that a disciplinary influence can be noticed here: physics undergraduates have far less sense of belonging to a research community than geography and English undergraduates. Zamorski (2002) reports that students perceive both an underestimation and an overestimation of their research abilities: they are expected to be able to write a thesis in their final year, which they often consider an overestimation as they were given little opportunities to practice, while students who would like to participate in their teachers research experience an underestimation because they are often considered 'not good enough'.

5.1.2.2 Advantages

However, students report far more advantages than disadvantages of staff involvement with research (Healey et al., in press; Turner, Wuetherick, & Healey, 2008). The advantages can be summarised as follows:

- Teachers' enthusiasm for their research and henceforth for the subject matter enhances students' motivation (Healey et al., in press; Jenkins et al., 1998). Students enjoy their classes more and are fascinated by activities related to or the outcomes of their teacher's research (Robertson & Blackler, 2006).
- Students see classes taught by teachers who are also researchers as more intellectually stimulating and challenging. This is especially the case if the students are given research assignments, as these are considered different and more challenging than other tasks students get (Neumann, 1994; Robertson & Blackler, 2006).
- Students perceive an increased understanding of and interest in the subject, and an improvement of their own research skills when they are taught or supervised by active researchers (Turner et al., 2008).
- Students value their teacher's expertise (Neumann, 1994). This not only refers to the 'reflected glory of being taught by well-known researchers' (Healey et al., in press), but also raises the credibility of the teacher and hence of the subject matter being taught (Jenkins et al., 1998). Students especially appreciate accurate and up-to-date knowledge, or in other words a solid foundation, which they think these experts provide (Robertson & Blackler, 2006). Other characteristics attributed to these teachers are a competence in supervising project work (Jenkins et al., 1998), using relevant examples (Neumann, 1994), and pointing to useful research methods (Neumann, 1994), all because of the teacher's own experience in research projects.
- The students also appreciate that these kinds of teachers use a critical questioning approach and research findings. Both are thought to enhance students' academic disposition (Neumann, 1994). This leads to the insight that research is still going on and that there is much to be learned by the academic community as a whole too (Turner et al., 2008).

Studies into science students' experiences of undergraduate research summer courses (Hunter, Laursen, & Seymour, 2007; Seymour, Hunter, Laursen, & Deantoni, 2004) show perceived benefits in several spheres: professional and personal gains such as increased confidence and establishing relationships with mentor and peers, thinking and working like a scientist applying knowledge and

skills, gains in various skills such as communication and lab work skills, clarification and confirmation of career plans, enhanced career and graduate school preparation, and a shift in disposition towards learning and working as a researcher.

5.1.3 Research aim

However, in most of these studies the focus has been either on teacher perspective or on student perception, so that it is only partly possible to see relations between the research involvement in teaching and the students' experiences. If we are to better understand the advantages or disadvantages of specific ways of linking research and teaching, there is a need for studies in which attention is paid to both sides: the learning environment that is created, i.e., the way in which research is included, and the students' experience (Neumann, 1996). In our research project we have brought both sides together when we looked in detail at courses from both the teacher and student perspective. In this way we were able to relate certain characteristics of the learning environment as intended and implemented to learning outcomes and student experiences, i.e., the attained learning environment (Van den Akker, 2003). Thus, this research aimed to describe how academics intentionally integrate research in their teaching, and what learning outcomes from these environments their students perceive.

5.2 Method

5.2.1 Sample

Twelve academics in the Faculty of Humanities at Leiden University were willing to participate in this research project (see also Section 6.3.1). This group consisted of academics with a background in (art) history (in some cases of a specific region), linguistics and cultural studies. The group included academics whose field of study was the western world as well as those focusing on the non-western world. Four of them were females and eight males, with ages ranging from 31 – 59, and positions ranging from assistant professor to full professor.

5.2.2 Procedure

During one term all participants were engaged in fostering a stronger link between research and teaching in their courses. The courses ranged from first-year Bachelor's courses to Master's courses. The teachers were encouraged to foster the linkage in the way they thought to be most fruitful. In this way we explicitly refrained from prescribing any direction, but we wanted the teachers to

design their course in a way closest to their view on strengthening the research-teaching nexus. Data were gathered from both the teacher perspective and the student perspective. All activities and data sources for this research project are presented in Figure 5.1. We arranged a varied data collection to ensure a multi-faceted understanding, and included both primary data sources and a few additional data sources in the design of this research project. We will first describe the primary data sources for both the teacher and the student perspective before turning to the additional sources.

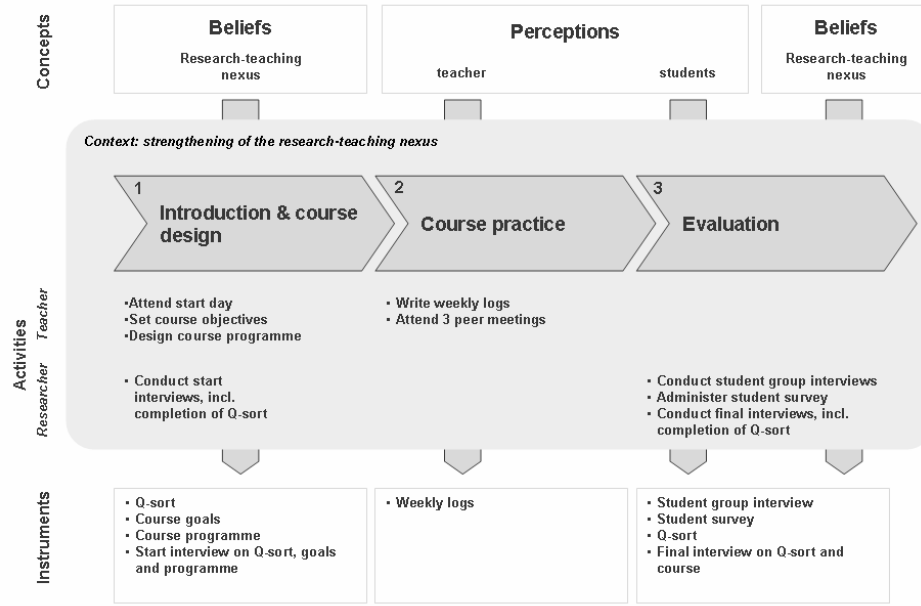

Figure 5.1 Overview of the research project (second study)

5.2.2.1 Teacher perspective

From the teachers we collected course goals, course programmes, and weekly logs. Before the start of the term all teachers were asked to provide course goals in which they explained clearly what they wanted the students to achieve during the course. These course goals needed to be based on a thorough analysis of what the students had already learned in other courses, and what the teacher wanted to achieve by the stronger link between research and teaching. Furthermore, the

teachers were asked to hand in a course programme in which they gave information about what the content of each class would be, what the students were supposed to do in preparation for that class, and how the examination would take place. During the course the teachers kept a weekly log (Clark & Peterson, 1986), in which they reflected on the last class, representing the implemented curriculum, and looked forward to the next class. Their reflection on the last class was based on the following questions: What did you want to achieve? What was the result? In what way did you strengthen the link between research and teaching? What was characteristic for this class? What do you think that the students learned? Their preview of the next class was supported by the following questions: What do you want to achieve? How do you plan to achieve this? In what way will you strengthen the link between research and teaching? What is the rationale behind this?

5.2.2.2 Student Perspective

In order to get to the student perspective, representing the perceived curriculum, we conducted interviews with groups of students of each teacher. These group interviews were conducted at the end of the course, usually just after or just before the last class, to gain insight into what the students learned from the course. The groups consisted of one to six students, depending on the total number of students. The interviews consisted of four parts. The first part focused on the students' backgrounds. In the second part the students were asked individually what they thought were the two most important things they learned during the course: this was then reported and discussed by all participating students. In this part of the interview the students were not made aware of the teacher's goal in order to avoid any influence from that side. Some teachers, however, had stated the learning goals at the beginning of the course, as part of their teaching method. Nonetheless, most students were not able to reproduce the teacher's goals when asked to in the third part. This third part regarded their opinion on whether the goals formulated had been achieved and the contingent difference between this course and other courses. The fourth part focused on the question in what way the students had noticed, either in general or in relation to the specific course, that their teacher was also an active researcher.

5.2.2.3 Additional sources

Several additional sources were deployed to support correct interpretations. Regarding the teacher perspective this included interviews and class visits. Both course goals and course programme were discussed during an interview at the

start of the term; these represented the intended curriculum and were intended to ensure a correct understanding of the two primary data sources by the researcher. Class visits were also conducted; these were additional as we preferred to rely on detailed descriptions in the weekly logs to learn what happened in each class during the whole course. Besides, as many teachers described several stages in their course design the structured observation of classes would need many class visits for every course, and especially since the number of students was rather small in most courses, this would be a considerable intrusion into the established learning environment. However, we did visit most courses once, to improve our understanding of what the teachers wrote. Regarding the student perspective, we also administered a questionnaire in which all students were asked to report on the research intensiveness of their course (Van der Rijst et al., 2009). In this way we were able to gather data from a greater amount of students. These data were less precise and were, therefore, used to verify the results of the group interviews, to see whether there were any discrepancies between the results of the interviews with only a few students compared to the whole class.

5.2.3 Analysis

Like the data collection the analysis consisted of three phases. First, the course was characterised based on the information provided by the teacher. Second, the responses of the students were analysed. Third, the results of these two steps were related to each other.

5.2.3.1 Teacher perspective

For the characterisation of the course we were able to use the code book described in Chapter 3 (see Table 3.1). We relied on the themes *orientation*, *approach*, and *curriculum*, as the *teacher role* was not prominent in our data. All course goals were coded using codes from the *orientation* theme, more specifically the *towards teaching* category. Hence, all goals were characterised as either *academic disposition*, *divulge research*, *train researcher*, or *academic knowledge*. Every teacher had several goals for the course, which might all be covered by the same code or by different codes. The course programme and weekly logs were coded using the categories and codes in the *approach* and *curriculum* themes (see Table 3.1). To cover all variance in the courses a few categories needed to be added in the *curriculum* theme, namely *researcher* and *student research*. First, the course programme was coded as this gave us an overview of the whole course. Next, the weekly logs were coded to obtain a

detailed description of what happened during class, and to note any contingent changes made during the term compared to the original course programme.

5.2.3.2 Student perspective

The heart of our analysis concerned the interview fragments in which students mentioned what they thought were the two most important learning outcomes. This part of the interview consisted of their initial, and therefore most reliable, reactions concerning their learning. To be able to relate the reported learning outcomes to the goals that were set by the teachers, all learning outcomes were coded according to their equivalents in the *orientation* theme. The code *academic disposition* was related to *disposition*, *divulge research* to *research awareness*, *train researcher* to *skills*, and *academic knowledge* to *knowledge*. We will illustrate each code with a quote, as these were not included in the code book developed earlier. The code *disposition*, for example, was given to the quote 'Critical thinking is what I learned most, not to be satisfied too soon'. *Research awareness* was, for example, noted for a quote such as: 'I liked seeing the research process step-by-step, before this course I never thought of where the knowledge came from'. A quote coded as *skills* is, for example 'I learned most about research skills, such as heuristics, the way you search for information'. The learning outcome *knowledge* we found expressed in a sentence like 'and I also learned a lot about the period that was at the heart of the course, in earlier years we did not pay attention to it'.

5.2.3.3 Relationship between course and learning outcomes

Finally, all these elements were brought together to make an overview of every course. The courses were than compared and grouped on the basis of the characteristics of these courses (teacher part) in order to be able to describe the relation between certain features in the course and student learning and experience.

5.3 Results

5.3.1 Characterisation of courses

The courses taught by the participants reflected five ways of linking research and teaching. We will first characterise the course types before we turn to the students' learning. Table 5.1 shows descriptive details of all courses, using fictitious names in order to preserve the anonymity of the participants.

Table 5.1. Course descriptives

Type	Teacher	Area	Year	Students
A	Paula	Cultural studies – Non western	BA 1	10
A	Philip	Cultural studies – Non western	BA 2	7
B	Alexandra	Art History - Western	BA 3	48
B	Charles	History – Non western	MA	6
C	Richard	Linguistics – Western	BA 3	2
C	Sophia	Linguistics – Non western	BA 3	11
C	Harold	History – (Non) western	BA 3	10
D	Henry	History – Western	BA 3	12
D	Diana	Linguistics – Western	MA	8
D	Eric	Cultural studies – Non western	BA 3	3
E	Ian	Linguistics – Non western	BA 3/MA	2
E	Edward	Linguistics – Non western	MA	2

A – Using the teacher's own research to illustrate the subject matter

Two first- and second-year courses were included that focused on the basics of the disciplines in question. The teachers' goals were teaching basic knowledge and in one of the two classes, the basic research skills of that particular domain. Their approach consisted of mainly lecturing about the subject matter during classes with students preparing assignments beforehand, which were discussed during class. Regarding research the focus was on the results, both of research in general, which means referring to other academics in the field, as well as their own research. Some attention was paid to the teacher's own research process and what they encountered while doing research, usually as an illustration of the content.

B – Focusing on the researcher's disposition and position

Two other courses were focusing on teaching academic disposition to their students. The teachers also wanted the students to understand the discipline well, but the most important goal was that the students become critical, and able to independently take and defend their position in a debate. In this approach literature reading had an important place, next to class discussions, during which again specific attention was paid to aspects of an academic disposition. Furthermore, students were asked to write a paper based on secondary literature in the field. The main focus was on the disciplinary research process. Moreover, during class explicit attention was paid to the position of the researcher; this was considered an important part of linking research and teaching.

C – Introducing students to literature, after which students conduct research projects

Three courses can be characterised having a double focus on research skills, and knowledge or disposition. The first part of these courses consisted of classes about the relevant subject matter, while the last part focused on the students' own research projects, as simulations of how research is conducted. Close attention was paid to research methods in the field, as in two courses it was the first time that students did this type of (empirical) research. Because of the twofold design of the course the focus was first on the disciplinary research process, using the teacher's own research theme as a framework, and in the second half the attention switched to the themes and topics of the students' research projects.

D – Follow in the teacher's footsteps

The approach in these three courses has much in common with the courses under C, but here the teacher's own research plays a more central role. The teachers want their students to become independent researchers and therefore provide them with an environment in which they follow in the footsteps of their teacher. This might include coming along to a conference after thorough preparation, commenting on a book chapter written by the teacher, or reproducing the teacher's own research step-by-step. Furthermore, all students were introduced into the relevant literature and conducted their own research project. The focus was on their teacher's ongoing research, by which they were introduced to research results as well as processes. Students' own research projects were related to their teacher's research.

E – Participation in the teacher's research

Two graduate courses were designed as participation in research. A small number of interested students joined the researcher in analysing new research material. The teachers wanted the students to become independent researchers and in this way were able to serve as role models for their students, showing them how they themselves analysed these materials. The students' input was highly valued. Furthermore, the teachers aimed at introducing the students further to the discipline so that they would know all important 'rules' of the discipline. The emphasis was solely on the teachers' ongoing research and especially on the research process, as this was considered the key to come to valuable research results.

5.3.2 Student learning

To stay close to the course characteristics the reported student learning will be described in relation to the course types that produced these outcomes.

A – Using teacher's own research to illustrate the subject matter

The teachers focused on *academic knowledge* and t*raining students to become researchers*, using the example of their own research. The students reported learning outcomes related to these goals. One of Philip's students, whose course was on ancient poetry, explained 'If I needed to give two main lines I would on the one hand emphasise the analytical aspects, like metre and style figures etcetera, and on the other hand literature as a mirror of society and culture' (*skills & knowledge*). One of his fellow students added 'It is not just the poem itself, but also the background (…) you get an idea of how society was at that time, what was going on in their heads (...) so history of literature is also very important' (*knowledge*). In this way they referred to both the main research skill, i.e., analysing, and to knowledge acquisition; i.e., ancient society and poetry as disciplinary source.

B – Focusing on the researcher's disposition and position

The teachers here focused primarily on *academic disposition*, with the use of class discussions. The students in both groups reported that they learned to think critically, such as 'critical thinking, not to be satisfied too soon' (*disposition*), however, one of them said that this was not new to her, as it was a favourite topic of their teacher. In addition to this Alexandra's students became aware of the importance of checking notes and sources 'Always check the notes, many times you might even learn more from the notes than from the text itself' and 'regarding the texts in the textbook, where do they come from, who wrote them', 'and when' (*disposition*) added another student. Furthermore, students learned some practical skills such as where to find what literature, and got an idea about who were the important authors in the field (*knowledge*).

C – Introducing students to literature, after which students conduct research projects

In this type the teachers focused primarily on *research skills*, with *disposition* or *knowledge* coming second, they followed a two-fold approach combining theory and research assignments. All students reported that they learned how to (better) conduct research, such as 'I also learned how to do research, as we saw many different ways of doing research. Furthermore, how to interpret your data, for

example using statistics' (*skills*). Harold's students emphasised that they learned most about doing a research project larger than in earlier years. This included finding more detailed answers to research questions and giving an overview of the topic itself. Related to this were dispositional aspects, as one student explained 'Normally, you are taught "this is the truth", but in this course it was quite clear that is the opposite, it (knowledge) is not finished yet' (*disposition*).

D – Follow in the teacher's footsteps

The teachers here focused primarily on skills and to a lesser extent on knowledge by showing what doing research meant for them. Their students all reported *research awareness*, and some of them also *skills* and *knowledge*. The teacher's research was an important cue for awareness. Diana's students discovered that their teacher also needs to rethink her research several times, and that this is normal in research: 'During her research she had many hypotheses which did not hold after testing. Or that she needed to change tracks, she was very honest about it, how that worked' (*research awareness*). Henry's students reported various outcomes, next to *research awareness*, on *knowledge* 'I learned a lot more about the period, because of the classes, but because of the literature I read for my research project' and on *skills* 'Heuristics. How to search for and order information.'

E – Participation in the teacher's research

The teachers in this type wanted the students to gain *research skills* and *knowledge* by participating in their own research. Their students reported that the classes were very practical and that they learned to do the researchers 'handwork', such as 'preparing a critical edition of a manuscript. Starting with a manuscript and ending with a critical edition and all steps in between' (*skills*). For Edward's students this was neatly interwoven with critical thinking and Ian's student broadened his outlook. Furthermore, awareness was manifest in the importance Edward's students attributed to 'the dialogue between text and a translation'. According to the students the classes were a very good preparation for their future careers as researchers.

5.3.3 Relation between course characteristics and reported learning outcomes

Table 5.2 summarises course characteristics and perceived learning outcomes. In the table we only present characteristics that applied to all courses in the specific type, so that individual differences are not included. Only three of the learning outcomes reported had been aimed at by the teachers. The aim *divulge research*,

which focuses on teaching students what it means to do research, was not incorporated by any of the teachers, while *research awareness* was an important learning outcome for the students in course type D. Furthermore, the students in types B and C report on *disposition*, which was only aimed at by the teachers in type B. The learning outcome *knowledge* was reported by several students, but only in type A all students mentioned this among their two main learning outcomes.

Table 5.2. Overview of course characteristics and student learning

Type	Course			Student
	Orientation	Approach	Curriculum	Learning
A	Academic knowledge & Train researcher	Lecturing & Assignments	Research content	Knowledge & Skills
B	Academic disposition	Literature reading & Discussions & Individual papers	Disciplinary research process	Disposition
C	Train researcher	Literature reading & Discussions & Students' own research projects	Disciplinary research process & Teacher's research content	Skills & Disposition
D	Train researcher & Academic knowledge	Literature reading & Discussions & Students' own research projects	Teacher's current research	Skills & Research awareness
E	Train researcher & Academic knowledge	Participation in teacher's research	Teacher's current research process	Skills

5.4 Conclusion and discussion

5.4.1 The relation between a research-intensive learning environment and student learning

Our aim was to relate the characteristics of courses in which research and teaching were linked to perceived student learning. Five different ways of integrating research and teaching were found: A) using the teacher's own research to illustrate the subject matter, B) focusing on a researcher's disposition and the position, C) introducing students to literature, after which students conduct research projects, D) follow in the teacher's footsteps, and E) participation in the teacher's research. In most courses some form of inquiry learning took place, either by teams or individually. None of the courses focused

only on research methods. Class size in type E, in which participation was realised, was far less than in most other courses, although class sizes were generally small due to discipline and level. Only type A was concerned with first- and second-year students, which definitely influenced the way in which research and teaching were linked. However, in the third and fourth year there still was a variety of ways in which both were linked.

In general the students reported more learning outcomes on academic disposition and research awareness than expected judging from the teachers' goals. However, in the literature the dispositional aspects are considered to be the main benefits of linking research and teaching (Elen & Verburgh, 2008). Especially the students in courses in which the teaching was closely related to the teacher's own research reported research awareness. This means that these students learned what research is about and what it really takes to conduct research. Some students explicitly referred to their teacher as an example of somebody conducting 'real research', and how this changed their view on what research implies. Acquiring an academic disposition was mainly equated with learning critical thinking. The students learned to apply this critical thinking in their own research assignments or projects, and were encouraged by the teacher in dialogues about the students' ability to analyse critically. Hence, our small-scale study indicates that an academic disposition is best learned if students have to apply this in any kind of research assignment, which should also include feedback on their performance, and that awareness of what research entails is best served by a close look at the teacher's own research. This does not necessarily imply students participating in research; real-life stories supported by various ways of introducing students to academic research raises awareness at least as much.

5.4.2 Methodological considerations

This study was characterised by the collection of a variety of data and therefore can be considered a mixed-method approach. Triangulation (P. C. Meijer, Verloop, & Beijaard, 2002) was established by data source (the teachers' perspectives and the students' perspectives), method (individual interviews, group interviews, written materials and additional class visits and a questionnaire), and data type (mostly qualitative, but one additional source was quantitative). The different sources proved to be supplementary to each other and all revealed different aspects of the learning environment and student experience. The intended curriculum was best measured by the course programme and the course goals. The sources offered information on what the teachers intended to do during the

course and to what end. The interpretation of the written sources was simplified by the oral elucidation the teachers gave. These sources provide the bigger picture for the courses. The implemented curriculum was measured by the weekly logs. These provided detailed information on the various classes as perceived by the teachers. So, both types of sources not only provided information on the intended and implemented level (Van den Akker, 2003), but more importantly, provided an overview and its colouring. It appeared necessary for a correct interpretation to interpret the various sources in the light of the others. The weekly logs, especially, could only be interpreted knowing the writers' intentions, as the teachers usually described what happened on a very detailed level without referring to the general picture. For example, the weekly logs often refer to student presentations while the course aim was not in the first place to improve students' presenting skills, but to provide feedback on the students' progress in their research projects. In many cases these projects were not mentioned at all in the weekly logs, while they were an important part of the design of the particular course, as explained in the course goals and programmes. So, this study has shown the strength of combining a set of different data sources.

5.4.3 Discussion

In conclusion we can state that it is worthwhile and important to look in detail at the research-intensive learning environment in which students take part. This reveals interesting relations between learning environment and perceived learning outcomes. Our study revealed some unexpected benefits arising from specific ways of bringing students into contact with research, as the attained learning environment yielded more outcomes than originally intended. Important in that respect is to see that students reported more learning outcomes on the dispositional level than intended by their teachers, although many studies consider this to be the main aim of linking research and teaching, under various labels (Elen et al., 2007; Elen & Verburgh, 2008; McLean & Barker, 2004; Van der Rijst et al., 2007). Further study is needed to see why most teachers are hesitant to bring this up as a course goal. Furthermore, students reported learning on the level of awareness, which was not included in the teachers' course goals at all and only partly discussed by earlier studies (Robertson & Blackler, 2006; Turner et al., 2008); these studies focus mainly on the presence of research rather than the concept of research.

Our study indicates a relation between the development of an academic disposition and courses in which students were stimulated to put this disposition

into practice in research assignments. Feedback on students' performance when putting the disposition into practice proved to be helpful for students. This might be a specific interpretation of the difference in assignments given by research active teachers compared to other teachers, reported by students in earlier studies (Neumann, 1994; Robertson & Blackler, 2006). The students value this kind of intellectually challenging, and disposition-influencing research assignment. Another relationship we found was the link between awareness of research and an encounter with the teacher's research. Awareness of research is enhanced when students observe closely what teachers do when researching. The idea to strive for the 'most integrated' way of relating research and teaching, as put forward by several authors (Brew, 2003; Healey, 2005), is not confirmed for this potential learning outcome. In both course types D and E the students valued the opportunity to get acquainted with their teacher's research and developed an awareness of research. Besides, two major differences between these groups were the number of students, and the fact that especially in group E all students could be characterised as intrinsically motivated (Breen & Lindsay, 1999). Group D (partly) consisted of classes with considerably more students than group E, and not all of them aiming at a research career. Therefore, this approach might be fruitful for teachers of larger classes containing a variety of students, who are willing to stimulate students' awareness of research. It seems that a less integrated way, i.e. not participating in teacher's research (E), but a guided introduction involving 'real research' (D) proved as least as helpful for students in this respect. This might be due to the fact that these teachers designed learning environments which were primarily focused on the students' learning, including a strong introduction into 'real research', while courses in which students participate in research risk focusing too much on the research aspect than on students' learning.

So, this approach of gathering many different data sources on a small number of courses has been fruitful in studying research-integrated teaching, as it exposed interesting relations between the research-enriched learning environment and learning outcomes. Moreover, it thus provided insight into promising ways to integrate disciplinary research in teaching aimed at specific outcomes.