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Gender and learning: Comparing two theories

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Abstract. The research domain of gender and learning seems to develop in two different areas. In one area learning is investigated by using general theories on learning and instruction. In the second area, gender plays a central role in the theoretical frameworks. The present article compares two theories from these areas using a general perspective and a gender perspective. By doing this, we intend to combine knowledge resulting from the two distinct areas and possibly take the research domain of gender and learning a step further. The theories in the comparison concern Vermunt's learning conceptions (1996) and Baxter Magolda's ways of knowing and patterns of reasoning (1992). It turns out that a number of relations seems to exist on a conceptual level between these two theories, but the relations could not be confirmed empirically. In the discussion, the results are elaborated upon and possible future research is suggested.

Introduction

The knowledge domain of gender differences in learning processes seems to involve two distinct areas of theory and research. It appears that these areas develop separately and that each of them uses its own theoretical notions about gender and learning constructs. Knowledge from one area is not used in the other, and vice versa. In the first and largest area, gender differences are investigated from a general perspective on learning and instruction. In the theoretical frameworks used no specific attention is paid to possible gender-related differences between learners (for reviews, see Richardson and King (1991) and Severiens and Ten Dam (1994, 1997a). Learning is usually conceptualized as a result of an interaction between former experiences and the educational context (Kolb 1984; Entwistle 1981; Snow 1996; Vermunt 1996). The fact that former experiences may differ for women and men due to socialisation processes is often acknowledged but not translated into the theoretical frameworks and the research instruments used. In fact, it often seems as if gender is just another background variable. In the second area within the knowledge domain of gender and learning, gender plays a more central role in the theoretical frameworks. Differences between women and men are conceptualized and the role of education in the production of gender

differences is investigated (see e.g., Stone 1994). Often, a specific feminist point of view is taken.

In the present article we intend to take these two areas a step closer to each other by comparing two theories from each of them. This might provide an opportunity to combine knowledge on gender and learning from the area in which *general* theoretical frameworks are used and from the area in which *gender* theoretical frameworks are used. The underlying idea is that both areas might benefit from each other's theories and research. In that sense, investigating the overlap and differences may point at some relevant future developments for the gender and learning knowledge domain. Moreover, investigating learning from different theoretical frameworks will help to further understand student learning in general. The two theories in this comparison concern Baxter Magolda's theory on ways of knowing and patterns of reasoning (Baxter Magolda 1992) and Vermunt's theory on learning styles and, in particular, learning conceptions (Vermunt 1996; Vermunt and van Rijswijk 1988).

Before presenting our study and main research questions, we will elaborate on both theories and indicate why we chose to compare these two theories in light of our goal to take the different theoretical frameworks a step closer. The importance of Baxter Magolda's work mainly lies in the contribution she made by integrating Perry's theory on intellectual development (1970) and Belenky, Clinchy, Goldberger and Tarule's (1986) model on women's ways of knowing. Perry's research on cognitive development (on a mainly male sample) resulted in a model of nine stages of intellectual development. In the first stages knowledge is considered to be known and certain, whereas in later stages students come to realize that knowledge is uncertain and they aim at creating their own perspective. The last stages describe the development of commitment in the contextual world. Taking Perry's model as a starting point, Belenky et al. (1986) performed a study on women to establish a theory on women's ways of knowing. The different ways of knowing can be described as 'silence' (a sense of having no voice), 'received knowledge' (learning by listening to others), 'subjective knowledge' (knowledge is personal and intuitive), 'procedural knowing' (focus on how to learn or obtain knowledge, all knowledge is uncertain) and finally 'constructed knowledge' (all knowledge is constructed and should be judged within its context). The most important difference between the theories of Perry and Belenky et al. concerns the latter's emphasis on the difference between separation/autonomy versus connection in the process of obtaining knowledge. The groundwork for the focus on connection was laid out by the work of Chodorow (1978) and in particular Gilligan (1979, 1982).

Comparing Perry and Belenky et al., Baxter Magolda (1992) concludes that women and men appear to develop in a parallel sense, but that there are also differences. In both studies, students seem to develop towards a stance of viewing knowledge as dependent on the context. But the mainly male sample in the 1950s and the female sample in the 1980s make a valid comparison impossible. Therefore, Baxter Magolda performed a longitudinal study in which both women and men were questioned about their ways of knowing. The results of this study were used to construct the Epistemological Reflection Model.

In the Epistemological Reflection Model, four different ways of knowing are discerned and the concept of patterns of reasoning is used to describe gender differences. Baxter Magolda observed her students developing from an absolute and factual way of knowing to a relative and contextual way. But while going through the stages of this, women appeared to use different patterns of reasoning compared to men. In general terms, the patterns more often used by women can be characterized by a focus on relational aspects. While reasoning about knowledge, women seem to be open to other perspectives and to incorporate other perspectives into their own. The pattern more often used by men includes, generally speaking, an individual focus. Men are more often focused on their own learning processes and perspectives. The theory of Baxter Magolda concerns students' assumptions about knowledge and the process of knowing. Her theory does not include learning processes in terms of strategies of students. In the Epistemological Reflection Model the actual learning *activities* of women and men are lacking.

We chose to use the Vermunt theory (Vermunt and van Rijswijk 1988; Vermunt 1992, 1996) from the general framework on student learning. His theory incorporates the distinction between the reproduction-directed learning and meaning-directed learning. This dimension stems from work by Marton and Säljö (1976a,b, 1984) and it concerns an important construct in the general theoretical framework. Marton and Säljö observed different learning conceptions after asking students about their personal definitions of learning and what learning actually means to them. The resulting five different learning conceptions were divided into reproductive and constructive conceptions. An important difference between these two groups of conceptions concerns 'meaning': playing a central part in the constructive conceptions and being virtually absent in the reproductive conceptions (Marton, Dall'Alba and Beaty 1992). This distinction is used in many different studies (see e.g., Entwistle and Ramsden 1983; Schmeck 1983). Therefore, using Vermunt's theory offers the possibility to connect to other theories on student learning using the same distinction.

The second reason is that, unlike Baxter Magolda's theory, Vermunt's theory on learning styles does incorporate activities of students. Learning styles according to Vermunt are considered in a broad sense: learning styles involve processing strategies, regulation strategies, learning orientations and learning conceptions[1]. How does a student go about studying (processing), what does the student do to keep studying (regulation), what is the reason for studying (orientation) and what is the students' personal definition of learning (conception); these components collectively form students' learning styles. Vermunt's research has shown that four different learning styles can be discerned: the reproduction-directed learning style, the meaning-directed learning style, the application-directed learning style and the undirected learning style. For example, students with a reproduction directed learning style tend to memorise the learning material (processing), they let themselves be directed by study directions (regulation), they are mainly at school for obtaining certificates (orientation) and view learning as taking in the presented knowledge (learning conception). A comparison with Vermunt's theory would offer the possibility to relate Baxter Magolda's ways of knowing and the gender-sensitive construct of patterns of reasoning in particular to the learning activities of students.

Vermunt constructed an inventory with Likert type items (see the section on instruments) which measures the four components of his theory (Vermunt 1992; Vermunt and van Rijswijk 1988). This inventory is not the only instrument available which incorporates the deep versus surface dimension, and student activities. Other instruments are, for example, Entwistle's Approaches to Studying Questionnaire (Entwistle 1981) and Schmeck's Inventory of Learning Proceesses (Schmeck 1983). We preferred to use Vermunt's inventory, however, because it was developed within a Dutch educational context and written in the Dutch language. Given the fact that the research project as described in the present article is conducted in the Dutch educational system, we considered this to be an advantage.

Despite the division of the two areas of research in the domain of gender and learning, there does seem to be a partial overlap. A close reading of the specific theories of Baxter Magolda and Vermunt points at a possible similarity between the concept of learning conceptions (Vermunt) and the concept of ways of knowing (Baxter Magolda). Learning conceptions, or mental models of learning, indicate a student's view on what learning is about. It involves the knowledge, ideas and notions about learning and thinking processes and factors which influence these processes (Vermunt 1992, p. 16). Ways of knowing are defined as: 'Students interpret, or make meaning of, their educational experience as a result of their assumptions about the nature, limits, and certainty of knowledge. Such assumptions, referred to by researchers

as epistemic assumptions, collectively form "ways of knowing".' (Baxter Magolda 1992, 3). By investigating the assumed relations between 'learning conceptions' and 'ways of knowing' we intend to connect the distinct areas of research.

The most important question in the present study concerns the overlap and differences between the learning constructs in the two theories. To what extent do these theories measure related constructs? We hope to answer this question by comparing the two theories on a conceptual and empirical level. After describing both Baxter Magolda's and Vermunt's theory in more detail, they will be compared on a conceptual level. This comparison will result in a description of the possible relations. Whether or not the relations exist empirically will be examined next.

The context of our study is adult secondary education in the Netherlands. This context was chosen because a large variety of students appears in adult secondary education, not just in age, but also in motivation and interests. Both Vermunt and Baxter Magolda developed their theories in the context of higher education. Using their theories in the adult education context with a large variety of students facing a different curriculum provides a possibility to extend the implications of the two theories (see also Severiens and Ten Dam, 1997b, and Severiens, Ten Dam and Nijenhuis, 1997).

Comparing two theories conceptually

Ways of knowing and patterns of reasoning

The Epistemological Reflection Model describes the intellectual development of students and the gender-related elements within this development (Baxter Magolda, 1992). In Baxter Magolda's study, women and men were questioned in five areas: the role of the learner, the role of peers, the role of the teacher, assessment procedures and the nature of knowledge. It was found that the assumptions students make with regard to knowing in these five areas can be divided into four stages. In other words, four different ways of knowing are distinguished. Women and men were observed to go through the same stages, but by using different patterns of reasoning in relation to their knowledge assumptions. The model will be described next (in Figures 1 to 4, the model is outlined).

In the first stage of knowing, Absolute Knowing (see Figure 1), the students' own role as a learner is about obtaining knowledge. These students view knowledge as absolute and true. Peers are handy for sharing materials, but these students claim they do not learn anything from peers. Instead, teachers are expected to provide all knowledge and make sure students understand it.

role of the learner	obtain knowledge	
	receiving pattern	*mastering pattern*
	listening	ask many questions
role of peers	share knowledge	
	receiving pattern	*mastering pattern*
	social contact, create relaxed atmosphere	debating about learning material
role of the teacher	provide knowledge and make sure students understand it	
	receiving pattern	*mastering pattern*
	minimal interaction	use interesting methods
assessment	show teacher the obtained knowledge	
	receiving pattern	*mastering pattern*
	multiple opportunities	provide feedback
nature of knowledge	certain or absolute	
	receiving pattern	*mastering pattern*
	facts and opinions	value depends on degree of detail

Note: Women more often use the receiving pattern, men more often use the mastering pattern

Figure 1. The Epistemological Reflection Model: the stage Absolute Knowing.

The students in this first stage of knowing prefer assessment in which they can show the facts they have learned.

In the second stage of knowing, Transitional Knowing (see Figure 2), students start to question these facts and discover a variety of perspectives. This is associated with a focus on understanding and applying. Teachers are expected to focus on understanding as well, and in tests, understanding instead of the knowledge of facts should be rewarded. Peers become more important in terms of providers of valuable perspectives and knowledge.

In the final stages, Independent Knowing (see Figure 3) and Contextual Knowing (see Figure 4), creating and comparing personal perspectives becomes most important. Knowledge only exists in a context and certainty of knowledge is dependent on context. Teachers should promote independent and contextual thinking and this should be rewarded in tests.

While following these developmental lines, the patterns used by most of the women in the Baxter Magolda's study (the receiving, interpersonal and interindividual patterns) can, generally speaking, be characterized by a relational focus. Students in this pattern of knowing seem to always acknowledge other people's opinions. They want to share perspectives with peers and

role of the learner	understanding and applying knowledge	
	interpersonal pattern	*impersonal pattern*
	collecting ideas	focus on thinking
role of peers	active exchange	
	interpersonal pattern	*impersonal pattern*
	share ideas	challenge, debates
role of the teacher	method aiming at understanding and applying	
	interpersonal pattern	*impersonal pattern*
	stimulate personal involvement	challenge to think
assessment	understanding and applying	
	interpersonal pattern	*impersonal pattern*
	incorporate individual preferences	fair and practical
nature of knowledge	partially certain	
	interpersonal pattern	*impersonal pattern*
	focus on uncertainty	focus on certainty, solving problems

Note: Women more often use the interpersonal pattern, men more often use the impersonal pattern.

Figure 2. The Epistemological Reflection Model: the stage Transitional Knowing.

expect the teacher to provide opportunities to do so. Students in these patterns also want to be tested on these different perspectives. Most men in Baxter Magolda's study, on the other hand, are found in the mastering, impersonal and individual patterns of reasoning. These patterns include, again generally speaking, an individual focus. Students in this pattern state that other perspectives may exist, but their own perspectives seem to be most important. These students expect challenge and debates and focus on solving problems.

Learning conceptions

One of the four components of a learning style as described by Vermunt (1992) concerns learning conceptions. As described in the introduction, in the present article we focus on these learning conceptions because they are most closely linked to Baxter Magolda's ways of knowing. Vermunt distinguishes between five different learning conceptions (Vermunt 1992; Vermunt and van Rijswijk 1988). We will exemplify each learning conception with two items in the inventory which measures the different conceptions.

On the basis of Marton and Säljö's work (1976a,b and 1984) Vermunt distinguishes between reproduction and construction in his learning conceptions

role of the learner	create own perspective	
	interindividual pattern	*individual pattern*
	expressing and sharing opinions	put own opinions first
role of peers	contribute valid knowledge	
	interindividual pattern	*individual pattern*
	exchange opinions	focus on own opinions
role of teacher	stimulate independent thinking	
	interindividual pattern	*individual pattern*
	stimulate exchange of opinions	set own learning goals
assessment	reward independent thinking	
	interindividual pattern	*individual pattern*
	part in content or manner of testing	expanding answers
nature of knowledge	basically uncertain	
	interindividual pattern	*individual pattern*
	everyone interprets their own way	everyone has own beliefs, stick to one's own beliefs

Note: Women more often use the interindividual pattern, men more often use the individual pattern.

Figure 3. The Epistemological Refelection Model: the stage Independent Knowing.

role of the learner	exchanging and integrating perspectives
role of peers	making justified contributions
role of the teacher	providing opportunity to apply knowledge in a context
assessment	determining progress together with peers and teacher
nature of knowledge	value if dependent on context

Figure 4. The Epistemological Reflection Model: the stage Contextual Knowing.

(1992). Students with the Intake of Knowledge learning conception conceptualize learning as simply taking in or absorbing knowledge (see Figure 5). This conception reflects the reproduction side of the distinction. Two items which measure the Intake of Knowledge learning conception are: 'I think learning is about being able to reproduce the facts which are offered in a course', and 'I make myself learn definitions and other facts by heart'.

The construction side is reflected by the Construction of Knowledge learning conception. These students want to hear about different perspectives and

Intake of knowledge	Learning viewed as taking in presented knowledge through memorising, rehearsing and reproducing; other processing and regulation activities are tasks of education
Construction of knowledge	Learning viewed as constructing own knowledge and insights; most of processing and regulation activities are tasks of student; tasks of education are minimal
Use of knowledge	Learning viewed as acquiring knowledge that can be used, by means of concretising and personalising. These activities are tasks of both education and student
Stimulating education	Processing and regulation are tasks of student, but education should continuously stimulate students to use these learning activities
Co-operation	Attach great value to carrying out learning activities together with fellow-students and to sharing the tasks in the teaching-learning process with them

Figure 5. Vermunt's learning conception scales (Vermunt and van Rijswijk, 1988).

form their own opinions. Examples of items are 'Learning means trying to approach a problem from a variety of perspectives', and 'In order to learn, it is necessary to summarise the study material in my own words'.

Apart from this distinction, Vermunt describes the Use of Knowledge learning conception. This conception indicates students' interest in understanding and using the knowledge they obtained. Two items are 'I want to be able to use the things I learn at school for solving practical problems', and 'Learning means acquiring knowledge which I can use in my daily functioning'.

Furthermore, the role students assign to education is included as a learning conception as well. It concerns the Stimulating Education learning conception. Students with this conception view learning as a task of instruction; they expect education to be stimulating. These students think teachers should present all the study material very clearly, and show students how to learn it as well. The Stimulating Education learning conception is measured by, for example, 'The teacher should stimulate me to organise the study material' and 'The teacher should stimulate me to check whether I understand the study material'.

Finally, Vermunt describes the Co-operation learning conception. Some students seem to consider co-operation to be important in case of learning. Working together with peers gives them support and motivation. Two items which measure this conception are 'I prefer to study together with peers for a test', and 'If I don't understand the study material, I prefer to ask peers for help'.

Comparing Baxter Magolda's and Vermunt's theories

Even though these two theories originate in different theoretical frameworks, some elements seem to refer to the same constructs. Baxter Magolda's ways of knowing are constituted by knowledge assumptions in five areas: the role of the learner, the role of peers, the role of the teacher, assessment and the nature of knowledge. The relations with Vermunt's learning conceptions are most obvious if Baxter Magolda's areas are considered separately. Possible relations occur in three areas of knowledge assumptions: *the role of the learner, the role of peers* and *the role of the teacher*. The comparison includes these areas only. A students' preferred mode of testing is not considered to be a learning conception. The nature of knowledge in terms of how certain and absolute students consider knowledge to be is part of students' ways of knowing, but is not considered to be a learning conception in Vermunt's theory, either. Therefore, the areas of assessment and the nature of knowledge are not in the overlap and will not be discussed.

When comparing ways of knowing and learning conceptions, the role of the learner seems to be most important. In this area, Baxter Magolda asks her students about their learning experiences and what learning actually means to them. These questions seem to provoke answers which are quite similar to the answers in Vermunt's interviews. The underlying question in both interviews seems to be: What is learning?

Other researchers have noticed this similarity as well. Entwistle and Entwistle (1992, p. 15) point at parallels between Marton and Säljö's hierarchy of learning conceptions (similar to Vermunt's learning conceptions) and Perry's model, which served as a basis for Baxter Magolda's theory. In Lonka and Lindblom-Ylänne (1996) the relationships between Perry's theory and (among others) Vermunt's learning conceptions are described in detail. The authors expected the dualistic stance of Perry to be closely related to 'non-constructive' conceptions of learning, and on the other hand the relativistic stance was expected to be related to the constructive learning conceptions. The results of their empirical study showed a partial confirmation of these expectations. They performed a factor analysis on, among other things, approaches to studying (Entwistle and Ramsden 1983), learning conceptions (Vermunt and van Rijswijk 1988) and Perry's dualism scale (Perry 1968; Ryan 1984). It was found that both Perry's dualistic scale and Vermunt and van Rijswijk's Intake of Knowledge scale had high loadings on the same 'reproduction' factor. However, the Construction of Knowledge and the relativistic scale (the dualistic scale in the opposite direction) loaded on two different factors. Lonka and Lindblom-Ylänne explained this by pointing out that these factors can be interpreted as a knowledge and a learning factor. The 'knowledge' factor

Baxter Magolda's ways of knowing		Vermunt's learning conceptions
the role of the learner:		
1. Absolute Knowing	⟷	Intake of Knowledge
2. Transitional Knowing	⟷	Use of Knowledge
3. Independent and Contextual Knowing	⟷	Construction of Knowledge
the role of peers:		
4. Absolute Knowing, receiving pattern	⟷	Co-operation
the role of the teacher:		
5. Absolute Knowing	⟷	Stimulating Education

Figure 6. Expected links between Baxter Magolda and Vermunt.

included the relativistic scale and other epistemological standards, while the 'learning' factor included approaches to studying and learning conceptions.

In accordance with these studies, we suppose that three relations exist between ways of knowing as described by Baxter Magolda in the area of the role of the learner and the learning conceptions Intake of Knowledge, Use of Knowledge and Construction of Knowledge as described by Vermunt. In Figure 6, the links are depicted; it concerns the first three relations. First, the Absolute Knowing stage in Baxter Magolda's theory and Vermunt's Intake of Knowledge learning conception seem to involve similar characteristics. Students view their own role as storing knowledge in your head in order to reproduce it later, for example in a test situation. Learning is about taking in the information one is required to learn. According to Marton, Dall'Alba and Beaty (1992) students often use a consumption metaphor to describe their ideas on knowledge and learning.

Understanding and applying are the key words in the second relation we presume between ways of knowing and learning conceptions. Students with a Use of Knowledge conception as defined by Vermunt and students in the Transitional Knowing stage in Baxter Magolda's model both seem to focus on understanding study material in order to use it in (mostly) educational contexts. However, the emphasis might be slightly different. In the Use of Knowledge learning conception the focus seems to be more on application, whereas Transitional Knowers seem to focus more on understanding. But because both concepts of understanding and applying appear in the descriptions of the learning conception and the way of knowing, we do presume a relation between the two.

In the third relation, meaning and the possibility of different truths play a central role. Vermunt's Construction of Knowledge learning conception and Baxter Magolda's Independent Knowing and Contextual Knowing stages (in the area of the role of the learner) deal with the possibility to view knowledge in different ways and the creation of one's own perspective. Students with this learning conception or way of knowing ask themselves questions such as how to interpret study material, what is the meaning of it, or what kind of perspective does it represent.

In the area of the role of peers, Baxter Magolda describes a development in the extent to which peers are considered to contribute to learning. At first, students claim they do not learn anything from peers, but in later stages peers become more important and working together with peers enhances learning. In Vermunt's learning conception on co-operation students describe their preference for working together. On the basis of this description of co-operation, one might expect that students in the higher knowledge stages more often have this learning conception as well. However, a more detailed evaluation of the description of this learning conception shows that it does not reflect Baxter Magolda's construct on the growing importance of peers as valuable sources of knowledge. Instead, what is striking are the similarities between Vermunt's description of students who opt for co-operation and the receiving pattern (Absolute Knowing) in the area of the role of peers. Vermunt states 'Affective functions that students attach to this co-operation are, for example, getting support from others, motivating each other to go on at weak moments, and noticing that other students have the same problems and questions.' (1996, p. 35). In the receiving pattern, 'Peers can make class more comfortable; they make it easier to ask questions, share notes, and help others to acquire information' (Baxter Magolda 1992, p. 91). In the receiving pattern support from peers and social contact is important, just as in the learning conception of co-operation. Therefore, we suggest that the receiving pattern in the role of the learner and the learning conception Co-operation are referring to related constructs (see Figure 6, relation 4).

The last relation that might be expected between Vermunt's and Baxter Magolda's theories concerns the learning conception Stimulating Education and the area of the role of the teacher (see Figure 6, relation 5). Absolute Knowers consider the role of the teacher to be very important: teachers should supply them with all necessary information because knowledge is the domain of the teacher. Vermunt shows that students with a Stimulating Education learning conception want their teachers to 'sum up what students need to and need not know, show very clearly the relations between the different topics covered, and sketch an overview of the learning contents' (1996, p. 34). These students expect teachers to stimulate them to learn. Such a stance seems to be

similar to the views of Absolute Knowers on the role of the teacher. Therefore, we presume a relationship between Absolute Knowers in the area of the role of the teacher and the learning conception of Stimulating Education.

Including five areas of knowledge assumptions results in such a broad 'way of knowing' concept that all learning conceptions as described by Vermunt seem to find a place in the theory of Baxter Magolda. The conceptions of Intake of Knowledge, Use of Knowledge and Construction of Knowledge show an overlap with Baxter Magolda's stages in the role of the learner. The description of the Co-operation learning conception is related to the description of receiving pattern students reasoning about their peers. The Stimulating Education conception seems to connect to student's views on the role of the teacher in Baxter Magolda's model.

Research questions

After the description of the expected overlap between Baxter Magolda's and Vermunt's theories on a conceptual level, we will now proceed with investigating this overlap on an empirical level. The main research question concerns if and to what extent the conceptions of learning according to Vermunt and the model of Baxter Magolda are related to each other. Investigating the relations as depicted in Figure 6 will show to what extent the two theories measure related constructs. Because gender plays a central role in the comparison between these two theories, the observed gender-related differences in Baxter Magolda's model and on Vermunt's learning conceptions will also be discussed.

Methods

Respondents

53 adult secondary education students (17 men and 36 women) participated in our study: they were interviewed and they completed a questionnaire. Their ages range from 17 to 71, with a mean age of 33. All students are in one of the three pre-university years. Generally, students in adult secondary education can be divided into three groups. The largest (and youngest) group consists of 'drop outs' from regular education. These students (around the age of 19) have failed, for whatever reasons, to pass their exams and try again in adult school. Many of these students are solely interested in obtaining the necessary certificates. A second group consists of students who are a bit older (around 30), who have already started their careers but decided to change directions. A high school diploma will provide them with an opportunity to do so. This

group is highly interested in the learning material, and, often due to former experiences, it is easy for them to contextualize the material (an important aspect in the Epistemological Reflection Model). The third and oldest group (around 45) consists of mostly female students who have not had the chance to study earlier on in life, and go to adult school mainly for reasons of personal fulfilment.

The study as reported in this article was part of a larger study into gender differences in learning styles. In this larger study, all students of the three pre-university years in five different schools were approached to participate. In the questionnaire booklet of the larger study, students were asked whether they wanted to be interviewed. Of the 432 students who completed the questionnaire booklet, 53 students agreed to be interviewed. There was no reward for participation.

Materials

The results of a phenomenographical study[2] were used to construct the Inventory of Learning Styles (Vermunt 1992, 1996; Vermunt and van Rijswijk 1988). This instrument has been used extensively in the Netherlands in a variety of educational settings and its reliability is more than reasonable. Therefore, we have used this inventory in stead of a phenomenographical method to measure learning conceptions.

The five different learning conceptions described above are measured in this questionnaire by five scales (see Figure 5). The complete inventory consists of 20 scales (120 Likert-type items). In a sample of adult secondary education students Cronbach's alpha turned out as follows: Intake of Knowledge (alpha = .89), Construction of Knowledge (alpha = .87), Use of Knowledge (alpha = .87), Stimulating Education (alpha = .87) and Co-operation (alpha = .89) (Severiens and Ten Dam, 1997b).

Since Vermunt and van Rijswijk's research in 1988, many studies have used the ILS. These studies were not only conducted in regular higher education, but also in open university (Vermunt 1992) and in regular secondary education (Roosendaal and Vermunt 1997). Adult secondary education is similar to regular secondary education in terms of the curriculum and learning material, and characteristics of the adult education students (such as motivation) are probably similar to the open university students (both 'second chance' students). Therefore, we expect Vermunt's theory to be valid in adult education.

Baxter Magolda indicates that qualitative methods, such as interviews, are most appropriate for measuring ways of knowing and patterns of reasoning (1992). She used interviews to 'make sense of experience but stop short of characterizing it in static and generalisable ways' (Baxter Magolda 1992, p. 17). So unlike Vermunt, Baxter Magolda has not constructed a 'ways of

knowing' questionnaire with Likert type items. Therefore, in order to measure ways of knowing and patterns of reasoning we used the interview method as well.

The interviews were open-ended and we allowed for our students to freely expand their answers and tell their stories the way they wanted to. The interview questions of Baxter Magolda were used as a lead, not as a strict scheme. Two raters coded the interviews. The kappa co-efficient of agreement between raters was calculated to reflect the reliability of the coding process. In our case, the mean kappa co-efficient for coding the stages turned out to be .75, and the mean kappa co-efficient for coding the patterns turned out to be .66. In those instances in which the raters arrived at different codes, the differences were discussed and the final code was decided upon on the basis of consensus.

Baxter Magolda points out that she conducted her study in the context of a mainly white American college and states that the model may not be completely transferable to a different educational setting. In the course of conducting our study in adult secondary education, the model turned out to be largely applicable. Apart from a small number of responses, it was always possible to code the responses of our students in the model (Severiens, Ten Dam and Nijenhuis 1997). We considered this to be an indication of the model's validity.

Results

Gender differences

Before presenting the results of the comparison, we will discuss the observed gender differences. Baxter Magolda claims the patterns of reasoning to be gender-related. In our sample of students, it turns out that the patterns are indeed gender-related, but this is more true for men than for women (see Table 1). More than half of the women use the receiving, interpersonal and interindividual patterns. Nearly all men use the mastering, impersonal and individual patterns of reasoning. Women and men do not differ on Vermunt's learning conceptions, except for the Stimulating Education learning conception (see Table 2). Women score higher compared to men; they seem to expect to be stimulated by education more than men.

The relations between ways of knowing and learning conceptions

On the basis of our interviews, students are categorized in Baxter Magolda's model with regard to their way of knowing. This categorisation will serve

Table 1. Numbers and percentages of women and men in each of the patterns in Baxter Magolda's stages

Stages	Patterns	Women	Men
Absolute Knowing	receiving	9 (56%)	2 (17%)
	mastering	7 (44%)	10 (83%)
Transitional Knowing	interpersonal	13 (68%)	–
	impersonal	6 (32%)	4 (100%)
Independent Knowing	interindividual	1 (100%)	–
	individual	–	1 (100%)

Table 2. Means and standard deviations of women and men, and analysis of variance on the Vermunt learning conception scales

Vermunt scales	Women M (s.d.)	Men M (s.d.)	F (df)	p
Intake of Knowledge	3.84 (.70)	3.51 (.66)	2.66 (1,50)	.11
Use of Knowledge	3.69 (.84)	3.34 (.94)	1.76 (1,50)	.19
Construction of Knowledge	3.46 (.77)	3.29 (.71)	.61 (1,50)	.44
Co-operation	2.25 (.84)	2.21 (.58)	.03 (1,50)	.86
Stimulating Education	3.40 (.68)	2.93 (.72)	5.03 (1,49)	.03

Note: Due to missing values the degrees of freedom vary from 49 to 50.

as a starting point in the comparison with Vermunt's learning conceptions. It turned out that none of the students we interviewed were coded as Contextual Knowers, and the expected relations concerning the Independent and Contextual stages will therefore concern the Independent stage only. In Tables 3a and 3b, the means on Vermunt's scales in the relevant stages and pattern in Baxter Magolda's model are shown.

The first supposed relation between Absolute Knowing (the role of the learner) and the Intake of Knowledge learning conception (see Figure 6) should result in a higher mean score for Absolute Knowers. Checking the means shows that Absolute Knowers do not score higher compared to the Transitional Knowers. On the contrary, Transitional Knowers more often define learning as taking in knowledge. Absolute Knowers score only slightly higher compared to the Independent Knowers. The differences are not statistically significant ($F(2,48) = .55$, $p = .58$).

Scores on Vermunt's Use of Knowledge-scale do not differ according to the three groups in Baxter Magolda's model (relation 2, Figure 6), $F(2,48) = .61$, $p = .55$. Apparently, the Transitional Knowers do not define learning more often as Use of Knowledge than the Absolute and Independent Knowers.

Table 3a. Means and standard deviations on Vermunt's learning conception scales in Baxter Magolda's stages

	Intake of Knowledge *M* (s.d.), *N*	Use of Knowledge *M* (s.d.), *N*	Construction of Knowledge *M* (s.d.), *N*
Absolute Knowing, the role of the learner	3.68 (.82) $N = 21$	3.52 (.88) $N = 21$	3.31 (.83) $N = 22$
Transitional Knowing, the role of the learner	3.85 (.61) $N = 24$	3.76 (.90) $N = 24$	3.55 (.67) $N = 24$
Independent Knowing, the role of the learner	3.57 (.62) $N = 6$	3.47 (.81) $N = 6$	3.41 (.57) $N = 6$
Analysis of variance	$F(2,48) = .55$, $p = .58$	$F(2,48) = .61$, $p = .55$	$F(2,48) = .60$, $p = .55$

Note: Due to missing values the *N* varies in the stage of Absolute Knowing from 21 to 22.

Table 3b. Means and standard deviations on Vermunt's learning conception scales in Baxter Magolda's stages

	Co-operation *M* (s.d.), *N*		Stimulating Education *M* (s.d.), *N*
Absolute Knowing, the role of peers: receiving pattern	2.38 (.76) $N = 11$	Absolute Knowing, the role of the teacher	3.15 (.78) $N = 28$
Absolute Knowing, the role of peers: mastering pattern	2.03 (.71) $N = 16$	Transitional Knowing, the role of the teacher	3.34 (.68) $N = 20$
		Independent/Contextual Knowing, the role of the teacher	3.42 (.47) $N = 3$
Analysis of variance	$F(1,25) = 1.54$, $p = .23$		$F(2,48) = .49$, $p = .61$

Contrary to our expectations as described in the third relationship (see Figure 6), Independent Knowers do not define learning more often as Construction of Knowledge compared to the Absolute and Transitional Knowers ($F(2,48) = .60$, $p = .55$).

The learning conception Co-operation is supposed to be typical of the views of receiving-pattern students (Absolute Knowing) on their peers (relation 4, Figure 6). Because this comparison concerns a pattern within Absolute Knowing, it is interesting to compare scores with the other pattern (master-

ing pattern). It seems that receiving-pattern students do not use this learning conception more often compared to the students in the mastering pattern within the stage of Absolute Knowing ($F(1,25) = 1.54, p = .23$). Apparently, receiving-pattern students are not more often interested in co-operating compared to the mastering pattern in the same stage.

Finally, expecting education to be stimulating does not seem to be related to the importance students grant their teachers in their learning processes (relation 5, Figure 6). This supposed overlap does not seem to exist in our group of students ($F(2,48) = .49, p = .61$).

In sum, in our group of adult secondary education students, none of the expected relationships between the learning constructs in Baxter Magolda's and Vermunt's theories as depicted in Figure 6 emerge empirically.

Conclusions and discussion

In the introduction of the present article we argued that knowledge about gender and learning stems from two different research areas. Most studies on gender differences in learning use a general theoretical framework on student learning. Different dimensions (such as the reproduction-construction dimension) are used to measure gender differences. In the other area, most studies are performed from an explicit feminist point of view and gender plays a central role in the theoretical frameworks. In this article Baxter Magolda's recent contribution to the gender perspective area is compared to Vermunt's learning conceptions in the general perspective area. Baxter Magolda's Epistomological Reflection Model concerns the assumptions of students about knowledge and the process of knowing. From the perspective of developing the research domain 'gender and learning' it is worthwhile to relate ways of knowing and gender-related patterns of reasoning to the actual strategies of students. Such learning strategies are not included in the model of Baxter Magolda. But in Vermunt's elaboration of learning styles, learning conceptions are explicitly connected to processing strategies and regulation strategies. However, his theory lacks detailed attention to gender-related aspects of learning processes. Connecting the different theoretical frameworks and the knowledge resulting from these frameworks becomes possible if an overlap exists between Baxter Magolda's concept of ways of knowing and Vermunt's learning conceptions. Therefore, we conducted a conceptual comparison and investigated the hypothesized relations empirically.

On the basis of the conceptual comparison, it seemed that all learning conceptions as described by Vermunt can be related to Baxter Magolda's theory. Vermunt's learning conceptions seem to be reflected in three areas of Baxter Magolda's ways of knowing: the role of the learner, the role of peers

and the role of the teacher. However, comparing the two theories empirically did not confirm the expected relations. In terms of statistical significance, none of the expected relations were observed. In the area of the role of the learner, it can be observed that Absolute Knowers do not conceptualize learning more often as taking in knowledge. Transitional Knowers do not define learning more often in terms of using knowledge, and Independent Knowers do not define learning more often as constructing knowledge.

Entwistle and Entwistle (1992) remarked upon relations between Perry's theory and the reproduction-construction dimension, and Lonka and Lindblom-Ylänne (1996) investigated these relations empirically. In their study, Perry's dualistic stance was related to the Intake of Knowledge learning conception. Taking into consideration that Perry's dualism is similar to Baxter Magolda's Absolute Knowing stage, we did not find this result in the present study. Besides, in the study by Lonka and Lindblom-Ylänne, Perry's relativistic stance (similar to Baxter Magolda's Independent and Contextual stages) was hypothesized, but not found to correlate with the Construction of Knowledge learning conception. In our study this link was not observed either. At this point, it seems we have to conclude that the ways of knowing according to Baxter Magolda and the reproduction-construction dimension as investigated by Vermunt in the general theoretical framework are not related in our sample of adult education students.

In the area of the role of peers, students in the receiving pattern (Absolute Knowing) value their peers for support and social relations, but they do not value working together with peers as indicated by Vermunt's Co-operation conception more often compared to the mastering pattern students. Finally, in the area of the role of the teacher, Absolute Knowers do not seem to expect to be stimulated by education more than Transitional and Independent Knowers.

An explanation for not finding the expected relations may be that students in the different stages of Baxter Magolda's model interpret the learning conceptions in different ways. For example, using knowledge turned out to be equally important for Absolute Knowers, Transitional Knowers and Independent Knowers. But in each of these three groups using knowledge might take on a slightly different meaning. In the stage of Absolute Knowing using knowledge in daily life might mean being able to conduct a learning task during homework, whereas for Independent Knowers, using knowledge might mean forming a personal opinion on the basis of the learning material. Due to the fact that a questionnaire with Likert-type questions was used, it is not possible to further investigate the interpretation of students considering the learning conceptions. A qualitative interview study from the perspective of the different ways of knowing in which the learning conceptions of students are discussed into detail might uncover such different interpretations.

The results may also be interpreted in terms of external validity. The two theories are developed in a higher education context, but are compared in a different population: adult education (secondary education, but part of the students is older than students in higher education). To our knowledge, the present study is the first to use these theories in the adult education context. The fact that we do not observe the expected relations may indicate insufficient external validity. It is possible that our students interpret the constructs in the two respective theories in different ways. For example, the life experiences of the oldest group (mainly women) in our sample may have a particular effect on the way the constructs as described by Vermunt and Baxter Magolda are interpreted. However, if we perform the same analyses on a subgroup without this oldest group, a similar picture emerges. In other words, even in a group of students similar in age, the theories of Baxter Magolda and Vermunt still do not show the empirical overlap to be expected on the basis of a conceptual comparison.

Besides age differences, other differences between the adult education context and the higher education context (e.g., the learning material, or the teacher-student interactions) may offer a better explanation of why we did not observe the expected relations. It seems necessary to investigate the external validity of each of the theories in more detail. This can be done by, for example, investigating the impact of the context or by using different instruments.

But for now, assuming both theories are sufficiently valid, we have to conclude that the two areas of research into gender and learning appear to show some relations conceptually, but turn out to be distinct empirically. They operate in different theoretical frameworks and use their own set of instruments. Comparing two theories and their instruments originating in the different areas showed no empirical relations between the two of them.

In itself, it may not be surprising that the two theories differ in their emphases in a complex and detailed way. In educational research, it seems common practice that in particular research domains, in our case 'gender and learning', a variety of more or less different theories are used. In fact, alternative view points not seldomly lead to new and unexpected insights. But in an ideal situation, there is a discussion between different theories and empirical studies. Comparative and evaluative discussions between competing research projects and their theoretical frameworks is beneficial to all the projects involved. Moreover, it may prompt the accumulation of knowledge and put forward new and relevant research questions. Such practices, however, assume that theoretical frameworks and their research projects do not merely co-exist. But in the domain 'gender and education' this seems to be the case. We are not the first to notice that mainstream educational research should pay more attention to gender-related processes and findings from a

gender perspective. But the gender perspective could also contribute more to the research area of gender and learning. In their search for gender sensitive constructs, researchers sometimes seem to disregard knowledge from more general learning theories. Considering the constructs and instruments resulting from different theoretical frameworks, a mutual exchange of knowledge and findings could prevent researchers from reinventing the wheel. Our study has shown that this is not an easy undertaking, but whenever possible, it is necessary to use each other's work in order to relate new insights, such as the concept of patterns of reasoning, to knowledge already existing in a particular research area.

Notes

[1] In more recent publications learning conceptions are denoted as mental models of learning (Vermunt 1996). The meaning of this concept, however, has remained the same.
[2] The phenomenographical study published internationally in 1996 is the same study as the one on which the inventory was based, published in 1988 and 1992.

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