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Publication date

1998

Published in

Gender and Education

[Link to publication](#)

Citation for published version (APA):

Severiens, S. E., ten Dam, G. T. M., & Nijenhuis, E. (1998). Ways of knowing and patterns of reasoning: searching for gender-sensitive dimensions. *Gender and Education*, 10 (3), 327-342.

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Ways of Knowing and Patterns of Reasoning: women and men in adult secondary education

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ABSTRACT *Unlike most studies on gender and learning, which use general theoretical frameworks (and instruments) on student learning, this article investigates the Epistemological Reflection Model which has been developed from a gender perspective. This cognitive development model includes four hierarchically ordered ways of knowing, and two patterns of reasoning within each of these ways of knowing. The patterns of reasoning are assumed to be gender-related and can be described, in general terms, by using the concepts of connectedness and autonomy/separation. To extend the model's validity, the authors investigated this model by making use of interviews in one study and questionnaires in another. In the interview study, the patterns of reasoning turn out to be gender-related, especially with the patterns supposedly more often used by men. In the questionnaire study, on the other hand, the patterns of reasoning do not turn out to be gender-related. In the discussion section, these results are interpreted and the model is discussed in detail.*

Introduction

In the last 15 years the question whether learning styles or learning strategies are gender-related has received attention to an increasing extent. One of the results of an extensive review we carried out on this subject (Severiens & ten Dam, 1994) concerned the fact that many studies on gender and learning made use of 'general, research methods and theoretical frameworks. Instruments especially designed to measure gender differences are lacking. For example, Kolb's Learning Style Inventory (LSI) (1984) as well as Entwistle's Approaches to Studying Inventory (ASI) (1981) were used in a number of studies to investigate gender differences in learning styles. These questionnaires, however, were not developed from a theoretical framework specifically dealing with gender issues. The fact that differences between women and men in learning styles and learning orientations are small or non-existent on the average (Richardson & King, 1991;

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Severiens & ten Dam, 1994) may be due to this omission, for it is questionable to what extent the constructs as measured by Kolb's LSI and Entwistle's ASI are sufficiently gender-sensitive. The literature in the area of gender and learning points to a number of constructs which do not appear in these instruments, but which are supposed to differentiate between women and men. One of these constructs concerns the preference for cooperative learning: women—in contrast to men—seem to have less affinity with competitive and individual ways of working (see, for example, Spender, 1987; Hughes, 1995). Another example of a possible gender-sensitive learning construct which is lacking in the questionnaires of Entwistle and Kolb concerns the assumed preference of women of relating the subject matter to personal experiences (see, for example, Belenky *et al.*, 1986; Stone, 1994; ten Dam & Farkas-Teekens, 1997).

We would like to argue that a more valid picture of gender differences in learning can be provided by using instruments which incorporate (supposedly) gender-sensitive constructs. In the present article, the aim of developing such an instrument is described. We join in with the work and theory of Marcia Baxter Magolda (1987, 1992, 1994), who is one of the few researchers who explicitly dealt with 'gender-related' learning processes and who investigated sensitive dimensions. The model she developed is strongly influenced by the work of researchers such as Perry (1970), Kohlberg (1969, 1984), Gilligan (1982) and Belenky *et al.* (1986).

Based on a qualitative longitudinal study on American college students, Baxter Magolda proposes a model in which *ways of knowing* and *patterns of reasoning* are categorised. The ways of knowing are hierarchically ordered and within each way of knowing, two patterns of reasoning emerge. Ways of knowing are defined as follows:

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'. (1992, p. 3)

The concept of patterns of reasoning, based on Frye (1990), is introduced in order to capture the gender differences as observed in the interviews. While reasoning about their knowledge assumptions, women more often talk in terms of incorporating other people's perspectives, of making connections with peers, and they more often 'focus on collective perspectives in collaborative learning settings' (Baxter Magolda, 1994, p. 27). Men, on the other hand, more often seem to prefer to work individually and they focus on their own learning processes. These findings relate to other studies into gender and learning in which a preference for cooperative styles of working is considered to be a gender-sensitive construct. Baxter Magolda stresses that her findings should not be overgeneralised, and throughout her book she reminds her readers that gender plays a role in use of patterns, but other issues (race and class) may play a role as well. Apart from this, she emphasises the variability among women and among men.

The Epistemological Reflection Model (Baxter Magolda, 1992) is promising but needs further investigation. The model is limited to one particular educational context (higher education) and based solely on interviews. Moreover, a number of theoretical questions remain unanswered. For example, how consistent are the distinct patterns of reasoning 'Does one person keep on using similar patterns of reasoning while going through the stages in the model? And, more generally, to what extent does the educational context (in terms of, for example, subject) have an impact on the ways of knowing of women and men? The main goal of this article is to investigate the validity of the model. By doing

this, we intend to develop further her line of thought and in particular the instrument based on it, hoping to take the research domain of gender and learning a step further.

This article presents the results of two studies in the context of Dutch adult secondary education using the Epistemological Reflection Model. Adult secondary education as a research context was chosen because of the variety among the students, not just in age, but also in motivation and interest [1]. The main research question in our two studies concerns the gender-relatedness of the patterns of reasoning. The two studies differ in the kind of method used. One study uses the interview method, while in the other study a questionnaire is used. We constructed this questionnaire in order to measure the ways of knowing and patterns of reasoning as defined by Baxter Magolda.

After describing the origins and theoretical context, the model with its ways of knowing and patterns of reasoning will be presented. The two studies we undertook using the Epistemological Reflection Model will be described in the second part of this article: first, the interview study, and secondly, the questionnaire study. To what extent the observed patterns turn out to be gender-related will be the central focus in the results sections of both studies. In the conclusions, the results of the two studies are compared and reflected upon.

Theories on Gender and Cognitive Development

The model used in the present article has its origins in theories on cognitive development. An important contribution to this field was made by Perry and his associates (1970). Unlike the more traditional theories on cognitive development (Piaget, 1965; Kohlberg, 1984) he included the notion of knowledge as contextual. Taking Perry's model as a starting point, Belenky *et al.* (1986) carried out a study on women to establish a theory on women's intellectual development. Analysing in-depth interviews with 135 American women from different backgrounds, they observed five qualitatively different 'ways of knowing'. Even though, at first sight, the ways of knowing seem to reflect a development, there has been discussion on whether they should be considered as such. The first way of knowing is called 'silence'. Women in this way of knowing describe a sense of having no voice of their own. In the second way of knowing, called 'received knowledge', women learn by listening to others. In the next perspective, 'subjective knowledge', knowledge is seen as personal and intuitive. Women learn from their own experience and do not impose their truth on others. In the fourth way of knowing women focus on how to learn or obtain knowledge. In this stage, 'procedural knowing', all knowledge is uncertain. In the fifth way of knowing, 'constructed knowledge', women believe all knowledge is constructed and should be judged within its context. The most important difference between 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 Nancy Chodorov (1978) and in particular Carol 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, a longitudinal study was performed 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.

The model describes the development of students during the course of their studies. Women and men were interviewed on their assumptions about knowing 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. As in Perry's model, the students develop from viewing knowledge as absolute, to questioning these facts and discovering a variety of perspectives. In the third stage all knowledge is considered to be uncertain, but in the final stage knowledge exists in a context, and certainty of knowledge is context-dependent.

In her longitudinal study, Baxter Magolda observed women and men going through the same stages, but using different patterns of reasoning about their knowledge assumptions. Within each stage of the model, two patterns of reasoning emerge, one more often used by women and one more often used by men. In general terms the patterns more often used by women can be characterised by a focus on relational aspects. While reasoning about knowledge, women seem to be open to other perspectives and 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. Thus, the two patterns seem to reflect the distinction between 'connection' and 'autonomy' as described by Belenky *et al.* (1986).

In the next section, the Epistemological Reflection Model is described in detail.

The Epistemological Reflection Model

The first stage in the model is called the stage of *Absolute Knowing*. Students assume knowledge to be certain; the learning material consists of true facts. Uncertainty only exists in terms of not knowing the right answer. Teachers are considered to be authorities in their subject matter, and are supposed to supply the students with the relevant knowledge. Moreover, they should take care students understand the subject matter. In tests, Absolute Knowers want to be able to show the knowledge (facts) they obtained. Two patterns of reasoning emerge in this first stage of knowing.

Students in the *receiving pattern* (more often women than men) listen and expect to receive information from their teachers in a minimal interaction. Peers are important mainly because of the social contacts and support they offer. Receiving pattern students want to be tested on the knowledge they have learned, preferably in multiple situations [2]. Comments on the nature of knowledge seem to reflect a distinction between facts and opinions: everybody's opinions are equally valid but these different opinions about the true facts do not interfere with these facts.

The students in the *mastering pattern* (more often men than women) express their ideas more frequently in class, look for argument and question authority. Debates with peers are stimulating and the teacher is expected to challenge and entertain students by using interesting methods. Tests should provide feedback and an opportunity to improve. Knowledge of the subject matter is valid, depending on the degree of detail, sound knowledge involves a high degree of detail.

Differences between the two patterns are especially apparent in verbal expression and the role of peers. In the receiving pattern, students do not use their voice as often as students in the mastering pattern. Peers can contribute to a relaxed atmosphere in the classroom in the receiving pattern, whereas in the mastering pattern students prefer to debate with peers.

The second stage is the stage of *Transitional Knowing*. The students in this stage realise

that the authorities do not know everything all the time. Knowledge is partly certain and partly uncertain. Understanding is now more important than obtaining knowledge. Applying knowledge is also important to students in this stage, they want to become involved with the subject. Teachers should use methods providing opportunities for understanding and applying, and tests should focus on these aspects. Peers play a more important role in the learning processes in this stage of knowing, and students actively discuss the learning material with their peers. The two patterns of reasoning in this second stage of knowing can be described as follows.

The *interpersonal pattern students* (more often women than men) focus on the uncertain knowledge domains; openness is important and all beliefs are considered to be equally true. They focus on collecting ideas and sharing thoughts with peers. Teachers are expected to stimulate personal involvement. Tests should incorporate individual differences. The *impersonal pattern students* (more often men than women) tend to be directed towards certainty and solving problems. Uncertainty in knowledge can be solved by experts, logic and research. These students focus on thinking and have command of knowledge, and expect to be challenged by their peers and teachers. Reasoning about tests of impersonal pattern students revolves around fairness and applying the obtained knowledge. A major difference between the two patterns concerns the importance of sharing perspectives in the interpersonal pattern versus the challenge peers can offer in the impersonal pattern.

The third stage in the model is the stage of *Independent Knowing*. To create one's own perspective is the most important issues; knowledge is basically uncertain and you decide for yourself what is true and what is not. The teacher should promote independent thinking and development of perspectives, and tests should reward the ability to think independently. Peers play a very important role in this stage: unlike Absolute and Transitional Knowers, Independent Knowers consider their peers to be able to contribute valid knowledge. In other words, the contribution of peers is considered to be 'learning material' as well.

In the *interindividual pattern* (more often women than men), students construct their perspectives by interacting with peers and expressing their own perspectives. The role of the teacher involves stimulating the exchange of opinions. The students in this pattern want to have a share in the way they are evaluated and personal perspectives should play an important role. Knowledge is basically uncertain, discrepancies exist because everyone interprets knowledge in different ways.

The *individual pattern students* (more often men than women) put their own perspectives first and they sometimes have difficulty listening to other perspectives. These students prefer to set their own learning goals, decide for themselves how to go about it, and the teacher is expected to provide such a situation. The central focus of tests should be the ability to think independently and expand answers. Reasoning about the nature of knowledge involves admitting everyone having their own beliefs and at the same time trying to stick to one's own beliefs.

The most significant difference between the interindividual and individual pattern within this stage concerns the extent to which students incorporate the perspectives of peers while constructing their own.

In the fourth stage, *Contextual Knowing*, independent thinking remains the most important concept. But this independent thinking takes place in a context of knowledge. Knowledge is basically uncertain, but not every idea is equally true or valuable. This depends on available evidence: perspectives should be compared and judged on the basis of this evidence. Only 14 (14%) of the students in Baxter Magolda's study arrived at the

stage of Contextual Knowing and this number provided too little data for discerning the two patterns of reasoning.

The Interview Study

In order to examine to what extent the patterns of reasoning as described by Baxter Magolda are related to gender in the context of Dutch secondary adult education, we carried out an interview study. In this study 53 students (17 men, 36 women) participated. Ages varied from 17 to 71, with a mean age of 33. 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 were used as a lead, not as a strict scheme, but we did make sure all five areas (the role of the learner, peers, the teacher, assessment and the nature of knowledge) were discussed.

In the next section, we will first discuss the results related to the stages. Attention will be paid to age differences and differences according to subject. Secondly, we will focus on the results related to the patterns of reasoning and answer the question whether they are gender-related in Dutch adult education. For details on the coding process, we refer to Severiens (1997). A total of 28 respondents (53%) were coded in the stage of Absolute Knowing across areas. Some 23 (43%) of our students were Transitional Knowers and two (4%) Independent Knowers. None of the students were coded as Contextual Knowers. We observed no gender differences in stages; women and men were equally often Absolute, Transitional or Independent Knowers. It is striking that older students were more often Transitional and Independent Knowers [3]. Despite Baxter Magolda's (1994) claim, in accordance with Belenky *et al.* (1986) and Kitchener & King (1981, 1990) that the development of epistemological beliefs results from educational experience more than from age, we did find a relation with age. Older students displayed a different set of beliefs compared to the younger students. Even though all students experience the same educational context at present, they may have had different educational experiences in the past. Often, it is many years since the older students in adult education last went to school. (see Note 1). On the basis of the present study it is not possible to make a difference between age and educational experience, but it seems interesting to investigate the possible influence of age in further detail.

Do we observe relatively more women in the receiving pattern (Absolute Knowing), interpersonal pattern (Transitional Knowing) and interindividual pattern (Independent Knowing)? And likewise, do men more often reason about knowledge in terms of the mastering (Absolute Knowing), impersonal (Transitional Knowing) and individual (Independent Knowing) patterns?

Absolute Knowing

Across the different areas, women used the receiving pattern as often as the mastering pattern whereas most men used the mastering pattern. Table I shows the results when we look at the five areas separately [4].

In order to draw a more meaningful picture of the data we obtained, we give some examples of the patterns of reasoning in different areas in the stage of Absolute Knowing.

The role of the learner: What do you do during classes?

Sit quietly, drawn back, you think it is kind of scary, the more kids you know

TABLE I. Numbers of women and men in the receiving and mastering patterns (Absolute Knowing), percentages given in brackets

		Women	Men
The role of the learner	Receiving	6 (55)	3 (27)
	Mastering	5 (46)	8 (73)
The role of peers	Receiving	11 (65)	—
	Mastering	6 (35)	11 (100)
The role of the teacher	Receiving	7 (41)	6 (50)
	Mastering	10 (59)	6 (50)
Assessment	Receiving	1 (6)	1 (11)
	Mastering	17 (94)	8 (89)
Nature of knowledge	Receiving	12 (71)	2 (20)
	Mastering	5 (29)	8 (80)
Across areas	Receiving	9 (56)	2 (17)
	Mastering	7 (44)	10 (83)

the more relaxed you get, then you think it is going to be ok and the more you get to know the teachers. (Woman, 18 years old, receiving pattern)

I just think it is easier to say something out loud because then she [the teacher] reacts to it, which makes it more clear whether you understand it. (Woman, 19, mastering pattern)

The role of peers: What do you expect from your peers?

To have a good time, that I feel accepted. (Woman, 37, receiving pattern)

I prefer to do it on my own. (Man, 19, mastering pattern)

The role of the teacher: What do you expect from the teacher?

Otherwise you remain such an unknown person in the classroom. If the teacher never approaches you ... you don't feel involved with the teacher, you're not involved with the lessons and not with school. (Woman, 43, receiving pattern)

The teacher takes control. (Woman, 31, mastering pattern)

Transitional Knowing

Generally, women used the interpersonal pattern of reasoning more often compared to the impersonal pattern. All men who could be regarded as Transitional Knowers across areas use the impersonal pattern of reasoning. Table II presents the use of patterns of reasoning of women and men in the different areas (see Note 4).

Again, we would like to illustrate the way women and men give meaning to the different areas in this stage of knowledge.

The role of peers: What do you expect from your peers?

It is important they are sociable people, even if you have a different opinion, it is considered quite normal, nobody is irritating. (Woman, 47, interpersonal pattern)

TABLE II. Numbers of women and men in the interpersonal and individual patterns (Transitional Knowing), percentages given in brackets

		Women	Men
The role of the learner	Interpersonal	13 (65)	—
	Impersonal	7 (35)	5 (100)
The role of peers	Interpersonal	11 (61)	2 (33)
	Impersonal	7 (39)	4 (67)
The role of the teacher	Interpersonal	11 (65)	2 (50)
	Impersonal	6 (35)	2 (50)
Assessment	Interpersonal	5 (29)	3 (37)
	Impersonal	12 (71)	5 (63)
Nature of knowledge	Interpersonal	13 (72)	1 (17)
	Impersonal	8 (28)	5 (83)
Across areas	Interpersonal	13 (68)	—
	Impersonal	6 (32)	4 (100)

As soon as you understand something, shut up, and don't go on about it. (Woman, 37, impersonal pattern)

The role of the teacher: What do you expect from the teacher?

Taking initiative to ask everybody what they thought about it and not just those who are first to open their mouths, that they are the [only] ones who tell what it was like. (Woman, 39, interpersonal pattern)

I enjoy it if he asks questions from a different angle, to make you use the things you learn in a different way, yeah that's fun, a challenge. (Woman, 54, impersonal pattern)

The nature of knowledge: Do you ever disagree with the learning material? Do discussions take place on these disagreements? What do you think of these discussions?

No, it is not necessary to end up with one opinion after a discussion, everyone is different, with 30 students, it is allowed to have 30 conclusions. (Woman, 22, interpersonal pattern)

If I am convinced that I have the one and only right opinion, I try to convince other people. (Woman, 40, impersonal pattern)

Independent Knowing

Only two respondents turned out to be Independent Knowers (across areas). The female student could be coded in the interindividual pattern and the male student in the individual pattern (see Table III and Note 4). In some of the separate areas a few more women and men could be characterised as Independent Knowers.

The following quotations are exemplary of a learner in the stage of Independent Knowing.

The nature of knowledge: Do you ever disagree with the learning material? Do discussions take place on these disagreements? What do you think of these discussions?

I never think the things I am reading are true, if you want to deeply

TABLE III. Numbers of women and men in the interindividual and individual patterns (Independent Knowing), percentages given in brackets

		Women	Men
The role of the learner	Interindividual	5 (100)	1 (100)
	Individual	—	—
The role of peers	Interindividual	1 (100)	—
	Individual	—	—
The role of the teacher	Interindividual	1 (50)	—
	Individual	1 (50)	1 (100)
Assessment	Interindividual	1 (100)	—
	Individual	—	—
Nature of knowledge	Interindividual	1 (100)	1 (100)
	Individual	—	—
Across areas	Interindividual	1 (100)	—
	Individual	—	1 (100)

understand things then you must read three or four history book writers. (Man, 18, interindividual pattern)

The writer writes from his experience, and I read it from my experience. (Woman, 47, individual pattern)

In sum, it seems that most men indeed use the mastering, impersonal and individual patterns while reasoning about their ways of knowing. In that respect, the theory of Baxter Magolda on the gender-relatedness of patterns can be confirmed. Women use the receiving pattern as often as the mastering pattern, more than half of the women use the interpersonal pattern and the only woman in the third stage, the stage of Independent Knowing, uses the interindividual pattern of reasoning. We conclude that the patterns of reasoning of the Epistemological Reflection Model, investigated in a different educational context by us, turn out to be gender-related. However, the gender-relatedness seems to be stronger for men than for women. Across the stages in the model, two results seem to be remarkable. In the area of assessment, the mastering and impersonal patterns are dominant for both women and men. It seems students in the context of secondary adult education do not reason about tests in terms of preferring multiple opportunities and they do not seem to care for having a say in the way they are tested. Instead, nearly all students, both women and men, emphasise that tests should provide feedback and challenge. In the discussion section we will argue that patterns of reasoning are probably linked to the specific educational context. The second remarkable result concerns men's patterns of reasoning in the role of the teacher. In both Absolute Knowing and Transitional Knowing, men use either pattern to describe their expectations of the teacher. In other words, in the area of the role of the teacher, the mastering and impersonal patterns of reasoning do not seem to be gender-related.

The Questionnaire Study

The main reason for constructing a questionnaire measuring ways of knowing and patterns of reasoning was related to the fact that a standardised questionnaire makes it easier to investigate the constructs in larger and different kinds of populations. In this

case, it provided a possibility to examine the gender-relatedness of the patterns of reasoning in a variety of groups across different educational contexts. The questionnaire was constructed on the basis of Baxter Magolda's model and pilot interviews with students in the educational context of the present study: adult secondary education.

The questionnaire consisted of two parts. The first part contained four stories which represented the four stages in Baxter Magolda's model. Students indicated which of these four stories met their ideas best and thus chose their own 'way of knowing'. Each of these stories then referred to 40 'Likert-type' statements about patterns of reasoning in the second part of the questionnaire [5]. The extent to which students agreed with these 40 statements determined their pattern of reasoning. Here, we will focus on the results only. Construction, format, and psychometric properties of the questionnaire are elaborated upon in Severiens (1997).

The first step in answering our question on the gender-relatedness of the patterns of reasoning was to find out to what extent it was possible to distinguish between the two patterns of reasoning. In our interview study, the answer to this question was already given during the process of interviewing in which we observed our students use either of the two patterns. But in the questionnaire study, we first needed to find out whether students reason according to the two patterns in each area of knowledge assumption [6]. In the next part we will discuss in subsequent order to what extent the patterns of reasoning of the Epistemological Reflection Model emerge and to what extent the observed patterns of reasoning are gender-related.

Five schools of secondary adult education participated in this study. A total of 432 students completed a 'ways of knowing' questionnaire. Of the 432 students in this study 58% were female and 42% were male, thus more or less matching the general ratio for adult education: 62%–38% (CBS, 1991). In our group of respondents 36% recognised themselves as *Absolute Knowers*, 44% as *Transitional Knowers*, and 19% as *Independent/Contextual Knowers* (see Note 5). No gender differences appeared in the choices for one of these stages; there were equal numbers of women and men in each of these stages. There were no age effects in stages either.

In the stage of *Absolute Knowing* there were 147 respondents. The results show that patterns of reasoning emerged in the areas of the role of the learner, the role of peers and assessment. Within the areas of role of the teacher and the nature of knowledge areas on the other hand, the questionnaire did not clearly distinguish between the mastering and receiving patterns.

A total of 180 students described themselves as *Transitional Knowers*. The patterns of reasoning in the area of the role of the learner, the role of the teacher and the nature of knowledge did not emerge. Apparently, according to the questionnaire, students in our sample do not reason in terms of the two patterns as described by Baxter Magolda. In the remaining two areas in this stage of knowing (the role of peers and assessment) the patterns of reasoning did emerge.

TABLE IV. Emergence of the patterns of reasoning in the questionnaire

	Absolute Knowing	Transitional Knowing	Independent Knowing
Role of learner	Patterns emerge	No patterns	Patterns emerge
Role of peers	Patterns emerge	Patterns emerge	Patterns emerge
Role of teacher	No patterns	No patterns	No patterns
Assessment	Patterns emerge	Patterns emerge	Patterns emerge
Nature of knowledge	No patterns	No patterns	No patterns

Seventy-eight students described themselves as either *Independent* or *Contextual Knowers*. In the areas of the role of the learner, the role of peers and assessment the patterns did emerge, but in the area of role of the teacher and the nature of knowledge students do not seem to reason according to the two patterns.

These results are summarised in Table IV.

Gender Differences

Gender differences were investigated by testing the differences in means in the groups of women and men. Gender differences were calculated only in those areas in which the two patterns of reasoning emerged.

Examining the means showed that women and men did not differ significantly in using the receiving and mastering patterns in the different areas in the stage of *Absolute Knowing*. In other words, in our study the patterns in Absolute Knowing did not turn out to be gender-related.

In the *Transitional Knowing* stage, gender differences were considered in the areas of the role of peers and assessment. Gender differences occurred on one occasion, but contrary to the expectation: men scored lower on the impersonal pattern compared to the interpersonal pattern in the area of the role of peers. Women, on the other hand, did not use the interpersonal pattern more often than the impersonal pattern in this area. Considering the area of assessment, the two patterns did not turn out to be gender-related.

In the stages of *Independent* and *Contextual Knowing* the results showed that no gender differences appeared. In all of the areas of knowledge assumptions in this stage of knowing, women and men used the interindividual and individual patterns of reasoning about their knowledge assumptions to the same extent.

In sum, in the questionnaire study the gender-relatedness of patterns of reasoning as found by Marcia Baxter Magolda could not be confirmed.

Conclusions and Discussion

A review of the research area of gender and learning showed that the available standardised learning style and learning strategies instruments were not constructed from an angle explicitly dealing with gender (see Severiens & ten Dam, 1994). In this article the Epistemological Reflection Model of Baxter Magolda was used to investigate gender-related learning processes in a sample of students in adult education. This model, and in particular the concept of patterns of reasoning, is developed from a gender perspective. Within each stage of the model, two gender-related patterns of reasoning emerge. The patterns can be characterised with the concepts 'connection' on the one hand and 'separation/autonomy' on the other (Chodorow, 1978; Gilligan, 1979, 1982; Miller, 1976).

We conducted an interview study and a study using a questionnaire in the context of Dutch adult education. On the basis of the interview study we conclude that the patterns of reasoning are gender-sensitive in secondary adult education. Most men were using the mastering, impersonal or individual patterns, whereas most women were using the receiving, interpersonal or interindividual patterns of reasoning. However, according to the interview study the gender-sensitivity of mastering, impersonal and individual patterns was stronger than the receiving, interpersonal or interindividual patterns.

In the questionnaire study, the first question concerned the extent to which it was

possible to discern the two patterns of the Epistemological Reflection Model. It turned out that in approximately half of the areas of knowledge assumptions the two patterns of reasoning emerge. In those areas it seems that the way students reason about their assumptions revolves around the two patterns. In a number of other areas, though, the patterns did not emerge. Apart from the 'nature of knowledge' area, the areas in which the patterns fail to appear differ for each stage of knowing. In the area of the nature of knowledge, the two patterns did not emerge in any of the stages. If we look carefully at the patterns and consider the students in our sample at the same time, the result can be interpreted in the following way. Many students in adult secondary education in the Netherlands are drop-outs from secondary education for students aged 12–18. For them adult education is a 'second chance' to obtain the desired certificates. The main goal for these students is to pass the examinations as soon as possible in order to continue their educational careers in higher education. Discussing the nature of knowledge and the nature of the learning material with, for example, peers is hardly ever done. Most students do not question the subject matter, or at least they do not articulate their questions. The subject matter should be learned in order to pass the tests and thinking about knowledge stops at that point for most students. It also stops at that point for most teachers, because working in adult secondary education mostly means teaching a great amount of material in a relatively short period of time. The other areas of knowledge assumptions seem to be more relevant. Their own activities as a learner, their peers, the teachers and tests all bear practical implications, and reasoning about these areas is more common in adult education. In this sense, it might be understandable that the patterns of reasoning do not emerge in the 'nature of knowledge' area, but do appear in the other areas of knowledge.

The second question concerned the extent to which the observed patterns were gender-related. The lack of observed gender differences in our questionnaire study is remarkable. Even though the questionnaire was especially constructed to incorporate gender-sensitive constructs, it did not turn out to be gender-sensitive in our sample of students. On the basis of the questionnaire study, one may conclude that gender differences simply do not exist in our sample. In our interview study, however, the patterns did turn out to be gender-related. The interviews and the questionnaire are both operationalisations of Baxter Magolda's model, but it turns out they show a contradictory result. We will elaborate this finding at this point.

The original Baxter Magolda study, our interview study and questionnaire study differ in (at least) two respects: there is a difference in method and a difference in context. The original study and our interview study use the same methods. Our interview study and questionnaire study were performed in the same context. This 'design' makes it possible to consider both the external and convergent validity of the Epistemological Reflection Model. *External validity* refers to the difference in contexts. Comparing the results of our interview study and the original study (keeping the methods 'constant') shows that the model seems to be externally valid. The gender-sensitive dimensions in the context of the American college are also gender-sensitive in the context of Dutch adult secondary education. *Convergent validity* refers to a difference in methods: in case of convergent validity different methods should show similar results. To consider this kind of validity, the interview study and the questionnaire study are compared I (keeping the context 'constant'). First of all, in the questionnaire not all patterns of reasoning emerge (in six of the 15 cases they do not emerge). Secondly, we see a contradictory result: according to our interviews the patterns are gender-related, but according to our questionnaire they are not. Two points can be made which may explain the insufficient convergent validity.

The first point is related to translating 'qualitative stories' into 'quantitative items'. Baxter Magolda used interviews to investigate the concept of patterns to 'make sense of experience but stop short of characterizing it in static and generalisable ways' (Baxter Magolda, 1992, p. 17). While analysing the interview transcripts, themes and categories were defined and developed during the interpretation process. This way of analysing, strongly resembling the method of grounded theory (Glaser & Strauss, 1967), resulted in a model of stages and patterns in areas of knowledge assumptions. In our questionnaire study, the descriptions in this model were translated into Likert-type items. An attempt was made to capture the content of the stages and patterns as precisely as possible, but it is not unlikely that in this process some of its (gender-sensitive) meaning was lost. Even though it should be possible to replicate a study using interviews with a study using a questionnaire, here is no denying it is quite difficult and needs very careful wording.

The second point is related to the flexibility of the interview method. One of the results of our interview study is that the patterns of reasoning do emerge in all areas of knowledge assumptions. Using the interview method seems to make it possible to 'stay closer' to the Epistemological Reflection Model. For example, the difficulty our students seemed to experience in the questionnaire to answer the *nature of knowledge* items also turned up with some of the students in the interviews. But by providing examples or asking the questions in a different way, it was always possible to invite students to reason about the nature of knowledge. The flexibility of the interview method seems to make it possible to accommodate the way our students reason about their knowledge assumptions.

We conclude that, due to the fact that the Epistemological Reflection Model still needs to evolve, it seems that using interviews to investigate ways of knowing and patterns of reasoning is a more appropriate method. Listening to students reasoning about their knowledge assumptions, and being able to ask for further details seems to provide a rich and valid set of data. At the same time, we think it is important to aim at developing a valid questionnaire, mainly because a questionnaire would make it easier to use the model in different settings.

We would like to conclude this article with some theoretical questions with regard to the Epistemological Reflection Model. The first question concerns the notion of *patterns of reasoning*. According to Baxter Magolda, within each stage, or way of knowing, there are two patterns of reasoning. In other words, each stage has its own two *specific* patterns of reasoning. Labelling each of these patterns with different names underlines the specific characteristics of the patterns in the different stages. But at the same time, the author theoretically underpins her model, and the idea of patterns in particular, by referring to the work of scholars such as Gilligan (1982) and Belenky *et al.* (1986) in which the *general* twin concepts of connection and autonomy/separation play an important role. The relation between the receiving, interpersonal and interindividual patterns and the theoretical concept of connection, however, is insufficiently elaborated upon. The same is true for the mastering, impersonal and individual patterns of reasoning and the concept of autonomy/separation. Considering the theoretical strength of the Epistemological Reflection Model, more attention should be paid to the similarities of patterns across stages. Besides, elaborating these similarities might also help in translating the model into a valid questionnaire.

The second question concerns the consistency of *ways of knowing* across the different areas (role of the learner, role of peers, etc.) In our interview study we observed that students were often not consistent across areas. In some areas, for instance, they could be coded Absolute Knowers, but in some other areas Transitional Knowers. The fact

that Baxter Magolda does not mention these inconsistencies seems to indicate that in her study students' knowledge assumptions were consistent across areas. Questioning students in these five areas uncovers their (one) way of knowing. It seems that ways of knowing are like a trait, or an underlying set of perspectives, which emerges in the five areas. On the basis of our empirical data we want to challenge this way of looking at ways of knowing. The responses of our students often went one way or the other, depending on the context. To make these inconsistencies understandable, a way of theorising is needed in which the influence of the educational context is included. For example, in the context of Dutch adult education, the traditional instructional arrangement 'teacher talks and students listen' is quite common. In such an educational setting peers can hardly be seen as valuable sources of knowledge (Absolute Knowing or Transitional Knowing). In the same situation, however, assessment can be about deep understanding and ask for personal perspectives (Independent/Contextual Knowing). The model would be improved if it allows for these kinds of educational influences.

The 'inconsistencies' turning up in the interview study shed new light on the result in the questionnaire study concerning the emergence of the two patterns in all areas. In the interviews it was possible to accommodate these inconsistencies in stages across areas, but in the questionnaire this was not possible. In accordance with the theory, in the questionnaire students choose *one* level. Students had to make an overall decision for one stage after reading about that stage containing all five areas. But as stated above, in the interview study we observed that students are not consistent in their stages across areas. Consequently, students might choose different stages in the separate areas in the questionnaire, too, if given the opportunity. Thus, a number of students may have answered the 'wrong' pattern items concerning certain areas. This may provide a reason for not being able to distinguish between all patterns in the questionnaire study.

The third theoretical question about the Epistemological Reflection Model concerns the consistency across the different areas of the *patterns of reasoning*. The results of our study show that students could both be, for example, receiving in some areas and mastering in some other areas. Such possible inconsistencies are, again, not mentioned by Baxter Magolda. It is suggested that students who reason about their own role as a learner in terms of the receiving pattern will also reason about their peers, their teacher, assessment and the nature of knowledge using that same pattern. This, however, does not seem to be the case by definition. Again, we would like to plead for a more 'contextual' way of conceptualising the two patterns of reasoning [7].

Despite our critical observations, the Epistemological Reflection Model is one of the few models of knowing and learning in which gender-sensitive constructs are explicitly included. This already provides enough reason to continue to use and investigate the model. At the same time, we want to discuss a possible pitfall related to attaching different values to the two patterns of reasoning. In fact, it is not difficult to imagine the teacher's preference for students who ask many questions and are verbally present, compared to students who are quiet in the classroom. Constructions in terms of active and passive, strong and weak, and male and female, are easily made. Moreover, implicit statements such as 'women require a modified method of teaching' are made all too easily. Baxter Magolda made a lot of effort to emphasise that not all women are the same. She did not, however, elaborate this notion by examining differences among women. But in order to avoid these kinds of associations and different values, differences among women and among men should not just be noted, but also investigated. In future research, it is important to look at differences in patterns of reasoning according to other categories (such as ethnicity and class) as well. Another necessary strategy to avoid

sex-stereotyping is to focus explicitly in research on the role of the educational context in the production of gender differences in learning, and the impact on the particular shape they take on.

The most appealing aspect of the model is its invitation to focus both on sameness and difference in learning: students go through the same stages while using different patterns of reasoning. The emphasis on gender-sensitive constructs in learning has led to this perspective. The model encompasses four stages and five areas in which the two patterns of reasoning take on different shapes. This complexity allows for a close and detailed look into the patterns of reasoning as used in the context of education by a variety of groups of students. It offers a worthwhile view on learning which includes gender-related differences without sex-stereotyping.

NOTES

- [1] 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 examinations 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 direction. 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 contextualise 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.
- [2] Baxter Magolda uses two descriptions for the receiving pattern in the area of assessment: 'based on knowledge of material' and 'preference for multiple opportunities'. But students who express something along the lines of 'I want to be tested on the knowledge I have learned', are in our view referring to their knowledge assumption; they do not seem to be *reasoning about* these assumptions. Therefore we used the second aspect instead (preference for multiple test opportunities) to describe the receiving pattern in this area.
- [3] The mean age in Absolute Knowing is 27 compared to a mean age of 40 in Transitional Knowing and 40 in Independent Knowing.
- [4] The numbers in Tables I, II and III in each area do not add up to the numbers in the 'across areas' part of the table, because students could be coded in different stages. For example, a student may feel he does not learn anything from peers and be coded in Absolute Knowing in that area, but at the same time focus on uncertainty in the area of the nature of knowledge and be coded as an Independent Knower in that area.
- [5] In Baxter Magolda's study no patterns were observed in the fourth stage of Contextual Knowing. Because the patterns in the Independent and Contextual Knowing stages might be similar to some extent, it seemed reasonable to ask the Contextual Knowers to answer the items on the patterns in the Independent Knowing stage. In Severiens (1997) it is shown in *post hoc* analyses that the two groups do not differ in the way in which they answer these items.
- [6] If the items in, for example, the receiving pattern correlate highly *among* each other, and the items in the mastering patterns correlate *highly* among each other, and at the same time these two groups of items show low correlations *between* each other, then we conclude that the two patterns can be distinguished. If, on the other hand, the two groups of items correlate highly between each other, the two patterns cannot be distinguished. In order to distinguish between the two patterns, a structural equation modelling methodology was used by means of the program EQS (Bentler, 1989).
- [7] Although not mentioned in this article, we observed effects of the educational context in terms of subject on the stage of knowing in our studies. Questioning students on, for example, certainty of knowledge in mathematics provokes different answers compared to questioning students about Dutch literature. Students' views on the nature of knowledge depend on what kind of subject they are referring to. In the interview study, it was also found that ideas of students on the role of peers and the teacher vary according to the subject they are studying. Our finding of the impact of subject on ways of knowing seems to provide an even stronger case for an improved model which includes the educational context.

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