

Measuring Epistemological Beliefs on History in Secondary Education

Bachelor thesis, Educational Sciences

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Abstract

For this study, a questionnaire was developed to measure epistemological beliefs on history and history education. The purpose of this research was to test whether the designed questionnaire is an accurate instrument for measuring epistemic beliefs on history and history education amongst secondary school students. Data for this study was collected at two schools for secondary education in the district of Utrecht. In total, 131 students from havo and vwo participated in this study. Cognitive interviews served as an initial attempt to validate the questionnaire and detect possible reasons for misinterpretation of the statements. Exploratory factor analysis suggested a three-factor model underlying the questionnaire, with a Cronbach's alpha of .65 for the 19-item scale.

Keywords: epistemological beliefs, history, history education, secondary education

Measuring Epistemological Beliefs on History in Secondary Education

In the past fifteen years, a shift in epistemic thoughts concerning history and history education has taken place (Mesoconsult, 2007). This shift has had a drastic impact on the way history is being taught, particularly in secondary education. The subject of history used to be taught in a more absolute way, in which the teacher explained what happened in the past, leaving little room for discussion. History was seen as certain facts and the job of the teacher was to teach these facts to the student. Nowadays, however, the main target of history education is to help students develop ways of critical thinking (Stichting Leerplan Ontwikkeling, 2006). This recent epistemic change in how history is taught has spurred the interest of the researchers to investigate if and how the epistemic beliefs of students can be measured (e.g., Hofer & Pintrich, 1997; King & Kitchener, 2004; Kuhn & Weinstock, 2002; Lee & Shemilt, 2003; Maggioni, VanSledright & Alexander, 2009). Interest in epistemology also originates from the hypothesis that epistemic cognition may affect the way in which teachers teach and students learn (Hofer & Pintrich, 2002).

What does epistemic mean? Taylor and Medina (2013) explain that subjects are examinable in three ways: ontology, methodology and epistemology. Ontology is the discipline concerning the nature of a particular subject, asking the question: 'What is it?' Methodology examines standards for generating knowledge. Epistemology focuses on how the individual develops conceptions of knowledge and knowing, and utilizes them in developing understanding of the world (Hofner & Pintrich, 2004).

But, what does epistemology mean for history education? The way students approach certain information is dependent on their epistemic beliefs concerning the information (Khine, 2011). The way history is viewed by the students is thus dependent on their epistemic beliefs. These epistemic beliefs affect how students interpreted their surroundings. For education, there is an important role to play to prepare students for functioning in the society and to create active citizenship (Stichting Leerplan Ontwikkeling, 2006; Dekker, 2016). It is therefore important that it is understood how the views of students about history arose and how they develop. In order to understand this, an accurate measuring tool for these epistemological beliefs is essential. The purpose of this research is to test whether the questionnaire designed for this study is an accurate

instrument for measuring epistemic beliefs on history and history education amongst secondary school students.

Both Kitchener (1983) and Gottlieb and Wineburg (2012) state that the foundation of empirically studying the epistemological understanding of people began with Jean Piaget's theory of cognitive development. According to Piaget, only individuals who passed the formal operational stage (around age 16) are able of metacognition. Epistemic thoughts appear to develop in late adolescence: while cognitive and metacognitive processes develop in childhood and are used throughout the lifespan, current research on adult reasoning suggests that epistemic cognitive monitoring develops in the late adolescent and adult years (Kitchener, 1983). Chin- Chung Tsai (2001) states that metacognition shapes one's epistemic commitments. Young individuals without access to metacognitive skills are not aware of their epistemic beliefs. Whether individuals go through actual stages, or whether there is a continuum of development; it seems that the ability of metacognitive and epistemic reasoning develops in late adolescence (Kitchener, 1983), and grows further with age and education (VanSledright, 2002).

Knowledge of the development metacognitive and epistemic reasoning has been utilized in order to create models that try to replicate the way students in their adolescence approach information; in this case history education. Multiple views on epistemic stages of belief have been established over the years (Hofer & Pintrich, 1997; King & Kitchener, 2004; Kuhn & Weinstock, 2002; Lee & Shemilt, 2003; Maggioni, VanSledright & Alexander, 2009). Pioneered by the work of Perry (1970), most researchers in this field have posited models that are to some degree structural, developmental sequences, comparable to Piaget's theory of cognitive development.

Perry (1970) argued that individuals are in an ongoing process of giving meaning to the world. This process is divided into four sequential categories, which he called dualism, multiplicity, relativism and commitment within relativism. The first category, dualism, is characterized by a dualistic right and wrong view of the world (Hofer & Pintrich, 1997). The authority tells the learner what the absolute truth is. The second category multiplicity adds diversity and uncertainty to this absolute view. Individuals in the multiplicity category believe that all views - in the case of history, historical sources

can be seen as views - are equally valid, and that each person has the right to have an opinion. In the third category, individuals begin to see that all views are relative, and that you have to choose your own commitment to certain views. Finally, the fourth category, commitment within relativism, forges commitment by reasoning, reflecting and critical thinking, rather than choosing a commitment due to having an opinion. Individuals in this last category of the process now actually make and affirm commitments to values, careers, relationships, and personal identity.

Various researchers have tried to improve Perry's (1970) model. King and Kitchener (2002) created a model with the assumption that students go through three major periods of epistemic level: the pre-reflective-, quasi-reflective-, and reflective level. Kuhn and Weinstock (2002) concluded that rather than three stages, students go through a continuum of four levels, named: realist, absolutist, multiplist and evaluatorist. This idea of a growing cognition was further enhanced by Lee and Shemilt (2003), who identified six levels in a progression of students' ideas about the evidence for certain knowledge.

Maggioni, VanSledright and Alexander (2009) roughly consolidated these theories in a new, three- stance model. They distinguish three types of cognitive stances a student can equip. The first of these stances is called *copier stance* (Maggioni, VanSledright & Alexander, 2009). Students who embrace this stance have trouble with distinguishing historical sources from what really happened in the past. They naively 'copy' historical sources as the truth. Students embracing the second stance, named *borrower stance*, are aware that historical written sources are of human origin, and therefore susceptible to mistakes. Students tend to struggle with the truthfulness of the historical sources and try to paint a vision of the past by putting together the best, most convincing pieces of testimonies from different sources. Students look for the story they consider best, which they 'borrow' to make it their own. The third students can embrace is called the *criticalist stance*; students embracing this stance are able to reason about the past in its context. This allows them to overcome bias when consulting historical sources (Maggioni, VanSledright & Alexander, 2009). For an overview of the different views on epistemic cognition, see figure 1.

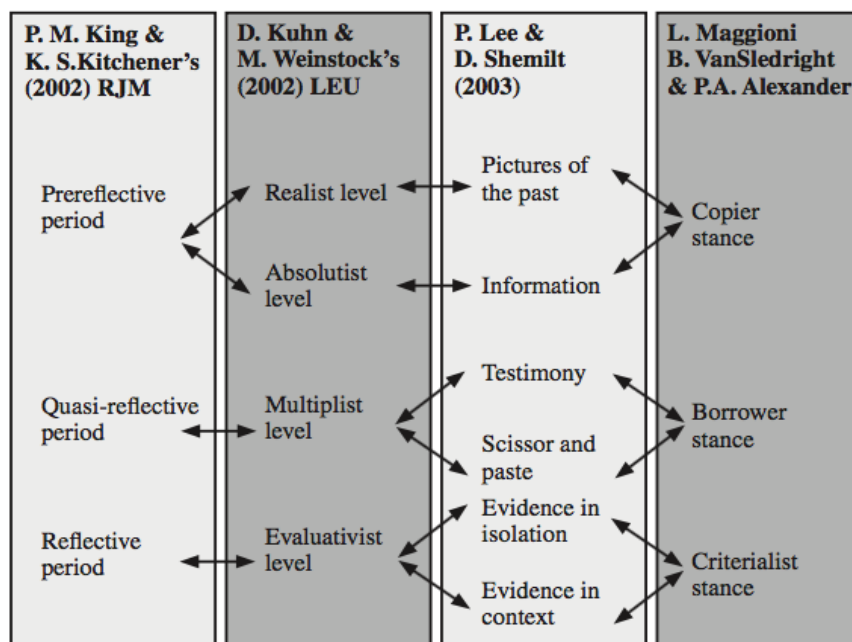


Figure 1: An overview of the relations among the different views on epistemic cognition. Adapted from “Walking on the Borders: A Measure of Epistemic Cognition in History” by L. Maggioni, B. VanSledright and P.A. Alexander, 2009, *The Journal of Experimental Education*, 77(3) p. 196.

It can be concluded that though the theories about epistemic beliefs show overlap, there still is disagreement amongst researchers; specifically concerning the amount of different stances related to epistemic beliefs. An interesting point of note is that most of the research on this topic has been conducted on teachers and professionals, rather than on students who might actually benefit from this research. Also, those who have studied the development of paper-and-pencil measures of epistemic beliefs have encountered several problems with the validity and reliability (Wood & Kardash, 2002). Inspired by the preliminary research from Wansink (oral communication, March 2016), the aim of the current study is to investigate whether and how epistemic beliefs can be measured amongst secondary school students. This is done by investigating if the questionnaire designed for this study is an accurate instrument for measuring epistemic beliefs on history and history education.

It is generally assumed that individuals develop metacognitive skills in late adolescence (Piaget & Inhelder, 1969; Kitchener, 1983; VanSledright, 2002). This raises the question whether epistemic beliefs can be measured reliably amongst secondary school students, as these students are often still in the early stages of adolescence.

Furthermore, when measuring attitudes such as epistemic beliefs, there is always the danger of context effects (Tourangeau, Rips & Rasinski, 2000; Rasinski, 1988). When formulating an answer on a statement, individuals go through four stages: the interpretation of a statement, retrieval of information, judgment of the issue, and the selection of a response to the question. Context effects are present on all these four stages (Tourangeau, 2000; Toepel 2015). First off, when individuals have little knowledge of an issue addressed in a question, they may have difficulty in identifying a relevant attitude structure. This will make it harder for them to interpret the question asked. Students may not have the knowledge required to answer questions measuring epistemic beliefs, which will make it hard for them to answer truthfully. During the judgment process of an issue or question, reliability can once again be affected by context; more specifically, the complexity of the judgment involved. The more complex the judgment, the more likely it is for the measurement to become affected by context. Epistemic beliefs are quite complex and therefore it is a reasonable chance that the judgment by the students may become flawed when answering the questions of the survey.

When taking into account the mentioned remarks, it is doubtful how reliable and valid a survey would be when measuring epistemic beliefs on secondary school students. Maggioni, VanSledright & Alexander (2009) developed a survey, the 'Beliefs about Learning and Teaching in History Questionnaire' (BLTHQ), to measure epistemic beliefs amongst students. The statements of the BLTHQ served as the basis of the survey constructed for this recent study. In this recent study the validity and reliability of this instrument are examined. To do this, the following research question was formed: *'Is the survey constructed for this study reliable and valid to measure epistemic beliefs about history and history education amongst students in the second phase of secondary education?'*. VanSledright (2002) assumed that besides age, education level also has a positive influence on the development of epistemic beliefs. Higher educated students showed epistemic beliefs of a more developed category. A part of answering this question is done by comparing the epistemic beliefs of the different educational levels. The following sub-question was formed: *'Are students from different educational levels in the second phase of secondary education able to report their epistemic beliefs about history and history education?'* It is expected that students from lower educational levels will

have more problems with reporting their epistemic beliefs in comparison to students from the higher educational levels.

It is very important that given education suits the learner. Therefore, being aware of learners' epistemic beliefs becomes crucial to making pedagogical choices that facilitate students' learning and the development of their ability to reason in a historical context (Maggioni, VanSledright & Alexander, 2009). If this study finds support for the notion that epistemic beliefs develop in a developmental manner -or even helps other researchers in finding evidence for this notion- , then there could be benefit for history education. Developmental focused programs have a large effect on positive learning results (Hattie, 2012). Conveying knowledge of a cognitively more advanced stage seems less effective (Inagaki, 1992). Adapting the lesson to the current cognitive phase of the child seems to be beneficial to the learning of the child.

Method

Participants

Participants were Dutch secondary school students from the Oosterlicht College in Nieuwegein ($N = 46$) and the Griffland College in Soest ($N = 84$), both schools in the district of Utrecht. In total 130 participants completed the survey, with an age ranging from 14 to 18 ($M = 15.78$, $SD = 1.01$). Participants are recruited from the havo-level, advanced pre-vocational education, ($N = 69$) and the vwo-level, preparatory scientific education, ($N = 61$). Of the participants 46.9% was female.

In total, six cognitive interviews are conducted. The participants for this part of the study were students from the same two schools as the surveys are conducted. Three students were in their fifth year of vwo, two students in their fourth year of vwo and one student was in the fourth year of havo. The age of the students ranged from 15 to 18 years. Four of the interviewees were female.

Instruments

For this study a survey is developed to measure epistemic beliefs about history and history education. The statements used as basis of the survey are designed by Wansink (oral communication, March 2016), who adapted the 'Beliefs about Learning

and Teaching in History Questionnaire' (BLTHQ) developed by Maggioni, VanSledright and Alexander (2009). Small changes in the formulation of the existing statements are made to make these statements more applicable to secondary school students. These adaptations are made based on a pilot study, in which a student from the vmbo-t level (pre-vocational education) participated in a cognitive interview on the survey. The survey consists of 29 items, an example of a statement is as follows: 'Because the past has passed, it is very difficult to check if a historical story is reliable'. Answer categories are on a six-point Likert scale, ranging from strongly disagree to strongly agree. The option 'I don't know' is added to make it easier to identify incomplete data. Questions concerning background information (e.g., age, level of education, current average grade for history) are added to the questionnaire. Age and current average grade are measured as continuous variables and educational level as a nominal variable. The survey constructed for this study can be found in appendix 1.

Cognitive interviews are conducted after administering the surveys to get diverse and detailed information about the understanding of the statements used in the questionnaire. An interview guide is developed and used for the interviews. The guide consist of a list of questions that need to be asked during the interview, based on the four stages of context effects mentioned in the theory of Tourangeau, Rips and Rasinski (1988) and Tourangeau (200) (e.g., 'Do you think this statement is clear?' and 'Think aloud about the extent to which you agree or disagree with the statement'). Also, a list of tolerable verbal probes is formulated before taking the interviews (e.g., 'Can you explain why?'). The document used during the interviews, can be found in appendix 2.

Design and procedure

For this study, a mixed method design is used. Quantitative data is provided by the data from the questionnaire. The questionnaire is conducted in paper-and-pencil form and distributed through the history teachers working at both schools. The researchers were not present at the schools while the surveys were conducted. The participants signed a letter of consent before completing the survey, declaring they agreed to take part in the research. The participants were told that the items intended to measure their opinions about history and history education. They were given as much time as they needed to complete the survey.

Cognitive interviews provide the qualitative data for this study. All interviews are conducted at both schools on the same day. The interviews were conducted individually by one of the researchers. Before taking the interviews, participants signed an informed consent. The cognitive interviews followed a think-aloud approach, where participants described their thought process for answering each question in the questionnaire (Willis, DeMaio & Harris-Kojetin, 1999). By understanding the response process, one can identify question comprehension problems, difficulties and other factors that impair the accuracy of question answers (Desimore & Le Floch, 2004; Sudman et al., 1996). As the researchers are not allowed to influence the process of the cognitive interviews, a list of tolerable verbal probes is formulated before taking the interviews. By doing this the researchers conducted the interviews in a more comparable way. The cognitive interviews are recorded.

Results

Cognitive interviews

Firstly, the cognitive interviews are analyzed. A matrix-displayed approach is used to construct item summaries and analyze the interviews in a qualitative manner (appendix 3). The qualitative data served as initial attempt to validate the instrument and detect possible misinterpretations of the statements in the survey. The verbalized thoughts from the cognitive interviews are used as input for the indication if a particular item is weak in measuring epistemic beliefs on history.

On basis of in depth analysis on the interviews statements 9, 18, 22, 23 and 27 of the survey are indicated as 'problem items'. These items are red-coded in the matrix. Statement 9 and 27 were not formulated clearly and problems arose during the comprehension and reading of the statement, respectively three of the five students and two of the four students encountered problems with these statements. Statement 18 ('I think my history teacher teaches me to look at history in many different ways') and 22 ('My history teacher gives/ presents mostly one version of a history story') were interpreted in a different way than intended. The students answered these statements on the basis of their experiences with their own history teacher. It was intended that students would focus more on the aspect of the 'more versions' and 'different ways', instead of

assessing their teachers. Items that ask the student to rate the expertise of a history teacher may not reflect the epistemic beliefs of the student by definition. This problem also arose in the interpretation of statement 23 ('When something is written in my history book, you know almost for certain that it is true'). Two of the four students reacted in a way that suggested that they were assessing their teaching materials, instead of the intended focus on the underlying idea that all history books only contain facts, as part of an epistemic belief.

Statement 1, 3, 5, 7, 12, 14, 21, and 29 are coded as 'possible problem items' with an orange code in the matrix. Reasons for these items to be in the danger zone are more variable and ambiguous than the red-coded problem items. No problems with the interpretation of the other statements were indicated based on results of the cognitive interviews.

Data Screening and Descriptives

SPSS statistics version 22 is used to execute quantitative analysis. Prior to analyzing, the data was screened by looking for incomplete data, errors and outliers. Respondent 37 is excluded for analysis because he forgot to complete the second page of the survey. Three participants did not report their sex, one respondent did not report his age and two respondents failed to report their average grade for history. No outliers were detected.

Since VanSledright (2002) assumed that age has a positive influence on the development of epistemic beliefs, it was deemed wise to keep the age of the participants relatively the same across the educational levels. An independent samples *t* test was used to compare the average age reported by havo ($N = 68$) and vwo ($N = 61$) students. The *t* test was statistically non-significant $t(127) = -.117, p = .242$, two-tailed. This indicates that the average age did not differ significant across the educational levels.

Factor Analysis of the Instrument

To investigate the underlying structure of the 29-item questionnaire assessing epistemological beliefs on history and history education, data collected from 130 participants were subjected to an EFA with extraction method 'Maximum Likelihood'. EFA is used because there is not enough agreement for the amount of epistemic constructs to conduct a Confirmatory Factor Analysis (CFA). By using EFA, factors can

be derived from the data. The theory on which the survey is based supposes three factors (the *copier-*, *criticalist-*, and *borrower* stance). If the factors underlying this questionnaire are similar enough to the epistemic beliefs that Maggioni, VanSledright and Alexander (2009) described, then this would be an indication that the survey is measuring these epistemic beliefs.

Prior to running the factor analysis, examination of the data indicated that not every variable was perfectly normally distributed. Items 3, 7, 19 and 25 showed a positively skewed distribution. Given the fairly robust nature of factor analysis, the violations of the Shapiro-Wilk Tests of Normality were not considered problematic. Missingness in one or more values for the variables being analyzed was detected for 12 respondents, these cases are list wise excluded from the analysis. Bartlett's test of sphericity, which tests the overall significance of all the correlations within the correlation matrix, was significant $\chi^2(406) = 800.431, p < 0.001$, indicating that it was appropriate to use the factor analytic model on this dataset. The Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the strength of the relationships among variables was sufficient (KMO = .601), thus it was acceptable to proceed with the analysis. The diagonals of the anti-image correlation matrix showed that item 2 was under the criterion of .5, not supporting the inclusion of this item in the analysis. Given this indicator, factor analysis was conducted with 28 items.

Initially, 11 factors with eigenvalues greater than one were extruded, which explained 67.97% of the variance in total. The scree plot was ambiguous and showed inflexions that would justify retaining either two or three factors. Solutions for two, three and four factors were each examined using fixation on the amount factors to extract. The three-factor solution, which explained 29.89% of the variance, was preferred because of its previous theoretical support.

Since it is reasonable that the epistemic constructs are correlated in a way, an oblique promax rotation is used for further interpretation of the data. A series of factor analyses were conducted to come to a more interpretable solution with a simpler factor structure. During several steps in these analyses, a total of 8 items were eliminated because they did not contribute to a simple factor structure. The standard criteria of having a primary factor loading of .30 was adjusted and set to .25 for this study because a

large amount of items did not meet this criterion. Respectively, items 26, 28, 29, 24, 27, 1, 8 and 9 are removed because they failed to meet a minimum criteria of having a primary factor loading of .25 or above in the pattern matrix. The items did not contribute to a simple structure of the pattern matrix and made interpretation of the factors troublesome. Items 9 and 27 were also indicated as ‘problem items’ in the analysis of the cognitive interview.

The remaining 20 items explained 36.62% of the variance. Factor one was labeled ‘critical’ and consists of items 5, 6, 4, 11, 18 and 17. High scores on this factor represents the view that there is no such thing as the absolute truth in history and that historical sources need to be interpreted with caution. In item 11: ‘In the investigation of historical sources, it is important to ascertain what has been the goal of the writer’ this idea is evident. Students scoring high on this factor think very critically about history. Words such as research and argue match this factor. The idea behind this factor correspondent to the *criticalist stance* as found in the research of Maggioni, VanSledright & Alexander (2009). Factor two consists of items 10, 12, 13, 15, 20, 21, 7, 3, 14, and 16 and. Interpretation for this factor was difficult, possibly because of the large number of items in this subscale. Also, the rather low factor loadings, in comparison to factor one and three, indicate that this factor is difficult to define. High scores on this factor represents the idea that historical stories and sources are influenced by the opinions of people and that interpretation of the information is important. A clear substantive summarizing label is unfortunately not found for this factor. Factor three was labeled ‘copier’ and consists of items 19, 25, 22 and 22. High scores on this factor represent the opposite of the view captured in the items of factor one. This is supported by the fact that factor one and factor three have a negative correlation score. Students who score high on factor three support the idea that there is an objective truth in history. In item 25: ‘If there are two different stories about the past, only one story can be correct’ this idea is clearly represented. This factor corresponds to the *copier stance* as found in the research of Maggioni, VanSledright & Alexander (2009). Students who embrace this stance naively ‘copy’ historical sources as the truth. Factor scores for the three factors are saved using Bartlett’s method. The factor-loading matrix for the final solution is presented in Table 1.

Table 1. Factor loadings for Exploratory Factor Analysis with Oblique Rotation

Item	Factor 1	Factor 2	Factor 3
5. Geschiedenis is een goed vak om algemene onderzoeksvaardigheden te leren.	,810		
6. Het is belangrijk dat je bij geschiedenis leert om argumenten te onderbouwen met bewijzen.	,625		
4. Bij geschiedenis moet je leren omgaan met bronnen die elkaar tegenspreken	,476		
11. Bij het onderzoeken van bronnen is het belangrijk om na te gaan wat het doel van de schrijver is geweest.	,427		
18. Ik vind dat mijn docent geschiedenis mij leert om op verschillende manieren naar het verleden te kijken.	,421		
17. Je kunt niet goed over het verleden schrijven als bronnen elkaar tegenspreken.	-,270		
10. Omdat het verleden voorbij is, kun je niet goed controleren of een geschiedenisverhaal betrouwbaar is.		,575	
12. Geschiedenisverhalen zijn voor een groot deel de meningen van geschiedkundigen.		,543	
13. Geschiedkundigen zullen altijd nieuwe verklaringen voor historische gebeurtenissen blijven geven.		,456	
15. Een goed geschiedenisverhaal bespreekt verschillende opvattingen over het verleden.		,450	
20. Je kunt nooit zeker weten wat er in het verleden is gebeurd.	-,290	,400	
21. Je kunt pas goed over het verleden schrijven als de informatie compleet is.		,388	
7. Geschiedenisverhalen zijn vooral een mening.		,384	
3. Als twee ooggetuigen hetzelfde zeggen over een gebeurtenis uit de geschiedenis, dan weet je dat het waar is.		,289	,241
14. Bij geschiedenis is je eigen interpretatie van geschiedenisverhalen erg belangrijk.		,269	
16. Als ooggetuigen van mening verschillen, dan kun je niet goed achterhalen wat er gebeurd is.	-,254	,266	
19. Alle geschiedenisprofessoren geven waarschijnlijk hetzelfde antwoord op vragen over het verleden.			,657
25. Als er twee verschillende verhalen over het verleden zijn, dan kan er maar één de juiste zijn.			,587
23. Als iets in je geschiedenisboek staat, dan weet je vrijwel zeker dat het waar is.		-,277	,533
22. Mijn docent geschiedenis geeft/presenteert meestal één versie van een geschiedenisverhaal.			,277

Note. Factor loadings >.30 appear in boldface. Factor loadings <.25 are suppressed.

Reliability of the Instrument

A reliability analysis is conducted to calculate the Cronbach's alpha of the whole instrument and for the subscales of the three factors. Cronbach's alpha for the 20-item scale was .65. The Cronbach's alphas for the first subscale, 'critical', was .55. A closer examination of the item-total statistics indicated that alpha would increase to .68 if item 17 were removed. This item also had a low factor loading (.270) and did not contribute to

a clear interpretation of factor 1. Consequently, this item was excluded from the questionnaire. The second scale was not reliable with an alpha of .64. The 4-item subscale, concerning factor 3, was also not reliable with an alpha of .55. Closer examination indicated that the alpha would increase .010 if item 28 were removed. This increase was not substantial enough to exclude this item from the survey. Additionally, a subscale of only three items was not preferred because of the minimum requirement of at least three items per factor (Froman, 2001).

Exclusion of item 17 did not increase the Cronbach's alpha for the final 19-item instrument, the alpha remained .65. Considering COTAN criteria the instrument and the subscales are not reliable enough to test for either research based on group level, important and less important decisions on individual level (COTAN, 2010).

Differences in reporting Epistemological Beliefs as a function of Educational Level

To answer the sub-question: 'Are students from different educational levels in the second phase of secondary education able to report their epistemic beliefs about history and history education?' two analyses are conducted.

Firstly, the amount of the selected 'I don't know'-option is compared across the different educational levels. This is done by creating a sum score for the amount of 'I don't know'-option chosen by the respondents. This sum score served as the dependent variable in a one-way between groups analysis of variance (ANOVA), where the different educational levels are the independent variables. Before analyzing, the data file is weighted by the grouping variable 'level of education' because the groups were not the same size and this influenced the sum score. Because is expected that students from lower educational levels will have more problems with reporting their epistemic beliefs in comparison to students from the higher educational levels, a significant in difference between educational levels is hypothesized. Inspection of the skewness, kurtosis and Shapiro-Wilk statistics indicated that the assumption of normality was not supported for the havo group. Levene's statistic was nonsignificant, $F(1, 128) = .209, p = .648$, and thus the assumption of homogeneity of variance was not violated. The ANOVA was statistically non-significant, indicating that sum score were not influenced by the level of education. This suggests that there seems to be no relation between level of education and the ability to report about epistemic thoughts based on the results of this data.

In item 1, 8, 9, 13, 24, 26 and 14, the option ‘I don’t know’ was chosen the by more than 5% of the respondents. In Table 2 all the percentages are presented. The fact that this items are answered with the option ‘I don’t know’ can be an indication that these items were probably difficult to interpret or hard to answer.

Table 2. Percentages of ‘I don’t know’ option chosen by respondents

Item	Level of Education		Total
	havo (<i>N</i> =61)	vwo (<i>N</i> =69)	
1	10.9%	7.8%	18.6%
2	0.8%	0.8%	1.5%
3	0.8%	0.0%	0.8%
4	1.5%	0.0%	1.5%
5	1.5%	0.8%	2.3%
6	0.8%	0.0%	0.8%
7	1.5%	0.8%	2.3%
8	9.4%	3.9%	13%
9	3.9%	5.4%	9.3%
10	1.5%	0.8%	2.3%
11	1.5%	0.8%	2.3%
12	2.3%	1.5%	3.8%
13	3.1%	6.2%	9.2%
14	3.8%	2.3%	6.2%
15	0.8%	0.8%	1.5%
16	0.8%	0.8%	1.6%
17	0.8%	0.8%	1.6%
18	2.3%	0.8%	3.1%
19	0.8%	0.0%	0.8%
20	0.0%	0.8%	0.8%
21	0.8%	0.0%	0.8%
22	3.1%	1.5%	4.6%
23	0.8%	0.0%	0.8%
24	3.8%	3.8%	7.7%
25	3.1%	0.0%	3.1%
26	2.3%	4.7%	7.0%
27	6.9%	3.1%	10%
28	0.0%	1.6%	1.6%
29	2.4%	1.6%	4.0%

Note. Percentages >5.0 appear in boldface.

The second part of answering the second sub-question is done by comparing the epistemic beliefs of the different educational levels. VanSledright (2002) assumed that besides age, education level also has a positive influence on the development of epistemic beliefs. In previous studies, higher educated students showed epistemic beliefs of a more developed category. As all underlying assumptions were supported by the data, a MANOVA (multivariate analysis of variance) was conducted to examine the effect of the

grouping variable 'level of education' on the Bartlett factor scores. Findings showed there was no significant effect of the level of education on the factors cores.

Discussion

To answer the question 'Is the survey constructed for this study reliable and valid to measure epistemic beliefs about history and history education amongst students in the second phase of secondary education?' a qualitative examination of the understanding of the statements in the questionnaire was followed by a factor analysis on the quantitative data to get a grip of the underlying structure of the latent variable 'epistemic beliefs about history'. Cognitive interviews are conducted and used as initial attempt to validate the instrument and detect possible reasons for misunderstanding of the statements amongst the students. The information derived from the analysis of the interviews served as input for the decision to delete items in the further analysis of the survey.

The survey constructed for this study is found not to be accurate for measuring epistemic beliefs about history and history education amongst students in the second phase of secondary education. Results from the EFA showed that, although factor one and factor three showed relatively clear and explainable underlying dimensions, factor two seemed ambiguous and no clear interpretation could be made. The underlying structure of the questionnaire could not be detected without ambiguity. Additionally, factor loadings stayed relatively low ($<.30$) for item 17, 3, 14, 16 and 22 (see table 1), indicating that these items do not contribute substantially to the factors. Item 3 and 16 load to more than one factor, these split loadings which also suggest that the questionnaire does not represent the three factors found in former research by Maggioni, VanSledright and Alexander (2009).

In total, 10 items are deleted from the questionnaire based on various reasons. Item 1, 8 and 9 are deleted based on their low factor loadings and the high percentage of respondents who have chosen the 'I don't know'-option for these items. Also, these items were indicated as possible 'problem items' during the analysis of the cognitive interviews. Because the results from both the qualitative part of the research as well as the quantitative part suggest that students experienced difficulties in the same statements, this can be an indication that these items are possibly not contributing to an accurate

measurement of epistemic beliefs on history. As a criterion items with a factor loading $<.25$ are excluded from the analysis. In total, 8 items are deleted in the process of the factor analysis due to this criterion. For items 24, 26, 27, 28 and 29 a possible explanation for the low factor loadings and high percentage of the chosen 'I don't know'-option can be the effect of item order. The position of the items at the end of the questionnaire could cause decreased willingness of the respondents to complete the questionnaire.

When looking at the results of the reliability analysis, it can be concluded that the instrument as a whole and the subscales are not reliable. The Cronbach's alpha for the 19-item instrument was $.65$, the alpha for the three subscales were respectively $.68$, $.64$ and $.55$. Although these alpha levels are quite low, the findings in this study are in line with the reported alpha in former research. Maggioni, VanSledright and Alexander (2009) found alphas between the $.6$ and $.7$ for their questionnaire. Based on the results of this study, it can be stated that, the questionnaire designed for this study is not an accurate instrument for measuring epistemic beliefs about history and history education amongst students in the second phase of secondary education.

A possible explanation for this finding can be that the students are not capable of reporting their epistemic beliefs due to a lack of metacognitive skills, as these students are often still in the early stages of adolescence and metacognitive skills are developed in late adolescence. Also, the fact that the questionnaire is based on self-report can cause bias in the given responses. When measuring attitudes such as epistemic beliefs, there is always the danger of context effects (Tourangeau, Rips & Rasinski, 1988). Epistemic beliefs are quite complex and therefore it is a reasonable chance that judgment by the students has become flawed when answering the questions of the questionnaire. This seems particularly reasonable in epistemology research given that reasoning about this topic may be complex.

Since VanSledright (2002) assumed that besides age, education level also has a positive influence on the development of epistemic beliefs, the following sub-question was formed: 'Are students from different educational levels in the second phase of secondary education able to report their epistemic beliefs about history and history education?'. It was expected that students from lower educational levels would have more problems with reporting their epistemic beliefs in comparison to students from the

higher educational levels. In this study no substantial difference is found when comparing the amount of the selected 'I don't know'-option is across the different educational levels. This suggests that there seems to be no relation between level of education and the ability to report about epistemic thoughts based on the results of this data. These results should be interpreted with caution because the researchers assumed that the participants chose the 'I don't know'-option when they cannot answer the question because they do not understand. However, the participant could also use this option because they do not feel like expanding the cognitive energy required to answer a difficult question. Another potential explanation for choosing the 'I don't know'-option is that few participants will use this option, because they do not want to admit that they cannot answer the question. Both of these scenarios harm the validity of the study.

Findings showed that there was no significant effect of the level of education on the factors cores. These results indicate that students from havo and the vwo level do not differ in their epistemic beliefs. Higher educated students did not showed epistemic beliefs of a more developed category ('critical') based on the data of this study. When taking into account the low reliability of the scale and the rather low factor loadings for some items it is doubtful if the epistemic beliefs are measured in an accurate manner. Therefore the results, based on the factor scores, have to be interpreted with caution.

Limitations of the Present Study and Recommendations for Future Research

First of all, several practical limitations can be identified that potentially affected this study. Overall, the recruitment of participants was difficult because of the four weeks available to gather data, two weeks were a school vacation. Due to this limited timeframe for the collection of the data, the vmbo-t level could not participate in this study. Unfortunately, students from this level of education already started their final exams in this period. For this reason, the teachers at the schools who distributed the survey did not see an opportunity to include this group in the study. Ideally, the cognitive interviews should have been conducted before the surveys were administered. In this way, the results of the cognitive interviews could have been used as input to improve the questionnaire. Unfortunately, the limited timeframe for this study made it very difficult to conduct this study in such a way. Also, cognitive interviews are labor intensive and

therefore limited to small samples. This has also been a problem in the current study. Relatively little qualitative information has been collected. As a result, this information may serve only as an indication.

Besides the practical limitations some limitations concerning the EFA should be noted. A commonly cited limitation of EFA is its level of subjectivity, because of the many methodological decisions a researcher must make to complete an analysis. The accuracy of the results is largely dependent upon the quality of these decisions (Preacher & MacCallum, 2003). To improve the quality of the decisions taken in this study, literature about the proper use of the EFA is studied and the options available for each decision are examined thoroughly.

Given the rather limited scope of this study, some considerations of third-variable explanations are appropriate. Any correlation between epistemology and level of education could be due to third variable explanations. For example, both constructs could be related to general verbal ability. Therefore, it seems important that in future research these possible third variable explanations are examined and taken into account when drawing conclusions about a correlation between epistemology and level of education. Researchers should take care to measure as many of these relevant variables as possible. Given that cross-sectional research can be criticized based on third variable explanations, associated with the comparison of groups, longitudinal studies would provide a stronger basis for conclusions about the development of epistemic beliefs.

Since all data for this study have been gathered at two secondary schools in the district of Utrecht, there are limitations on the extent to which we can generalize the results of this study. For further research it is necessary to examine the questionnaire in a random, more general and larger sample. The reader should bear in mind that this research is exploratory in nature and this study can therefore be used as input for future research, focusing on developing accurate instruments to measure epistemic beliefs on history.

Additionally, future studies should focus on confirming the underlying dimensions of the exploratory studies on epistemic cognition. Structural equation modeling (SEM) should be used as a confirmatory technique to establish more advanced

assessments of the proposed models in the literature and to test the viability of these proposed models.

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