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# Political knowledge of 14- to 15-year-old students – Results of the TEESAEC intervention study in Germany

*Valentin Eck & Georg Weissenö*

## 1. Theoretical framework and state of research

Of particular importance for the development of knowledge in a specific content area (domain) the acquisition of terms (concepts) as well as insight into the networks between them (conceptual knowledge) (e.g., Byrnes & Wasik, 1991, p. 777; Rittle-Johnson & Siegler, 1998, p. 77; Rittle-Johnson, Siegler & Alibali, 2001). Theories on conceptual change (see Vosniadou & Brewer, 1992) are grounded in the assumption that learning processes are influenced by the pre-existing concepts of the learner. Inadequate or false concepts are described as misconceptions, prior beliefs, or alternative frameworks. During the learning process, knowledge is actively constructed and networked on the basis of these pre-existing concepts (Duit, 1995).

Empirical political-science studies on knowledge elaborate in particular upon factual knowledge focusing on the association between knowledge and attitudes (Delli Carpini & Keeter, 1996; Galston, 2001). There is evidence to suggest that knowledge level has particularly positive effects on attitudes towards migrants as well as on readiness to participate (Popkin & Dimock, 1999). Moreover, an association has been found between the duration of politics education in school and the development of pro-democratic attitudes (Nie, Junn & Stehlik-Barry, 1996). In contrast, studies conducted by Biedermann (2006) and the International Association for the Evaluation of Educational Achievement (IEA) Study (Torney-Purta et al., 2001) both demonstrated that state of knowledge hardly correlates with political attitudes and convictions.

Regarding teaching methods and knowledge acquisition, an intervention study has demonstrated increased effectiveness of learning with the internet-based self-instructional teaching method of WebQuest (Manzel, 2007).

The current study pursues this question, too, with a different methodical design. Does the use of WebQuest as a self-instructional tool lead to a greater increase in knowledge as compared with a purely teacher-controlled teaching environment?

## 2. Factors influencing students' political knowledge

In the current study, predictors of knowledge on the European Union are theoretically derived from results of previous empirical studies. Prior knowledge represents the starting point for the current intervention and must later be taken into account when assessing increases in knowledge. The aim of the study is to determine which student characteristics help to predict the degree of conceptual knowledge possessed by the students before the series of teaching lessons was conducted (see the article of Weissenro & Eck, Concepts on the European Union in the present volume). The study accordingly focuses on the effects of these characteristics on students' (1) prior knowledge and (2) increase in knowledge. In the following sections, the variables which are assumed to influence political knowledge and which were employed in the present study are presented and the expected effects of these variables are outlined (see Table 1).

Numerous political-science studies have generally found that women have a more distant relationship to politics than men. Women participate less in politics and display a lower degree of both political interest and knowledge. Institutional and socio-economic factors as well as factors of political culture and socialisation are assumed to be responsible for this difference between the sexes (Westle & Schoen, 2002).

Since students from both year 9 of *Realschulen* (lower-track secondary high schools) and year 10 of *Gymnasien* (higher-track secondary high schools) participated in the present study, differences in performance were controlled for by including this variable in analyses. Age can be expected to influence political knowledge in connection with differing levels of cognitive development and varying durations of education (Walter, Senkbeil, Rost, Carstensen & Prenzel, 2006).

School-performance studies (PISA, IGLU, IEA) have also found that students with a migration background have lower competences in mathematics, the natural sciences, and reading (Baumert, Stanat & Watermann, 2006). Migration background can thus be expected to have a negative influence on prior knowledge and the acquisition of knowledge.

The number of books at home serves as a proxy measure of the cultural capital of students' parents and has proven useful in numerous school-performance studies. In the tradition of Tocqueville, associations/clubs can be seen to represent "schools of democracy"; social capital theory postulates that social networks foster trust and democratic standards and values among their members from which advantages arise for the individual and for the co-habitation of people (Putnam, 1994, 2001; Gabriel, Roßteutscher, Kunz & van Deth, 2002).

Interest in politics as a dispositional characteristic is a key prerequisite for learning success in this specialist domain. Intrinsic interest leads to a self-determined

approach to the subject and promotes self-instructional learning beyond the classroom (Schiefele, 1996).

Academic self-concepts as personal psychological features are also known to foster performance at school (Köller & Baumert, 2001). This effect is conveyed through the student's performance: only students who are principally convinced that they are able to solve a task sum up the necessary endurance and cognitive resources for successful task completion, whereas individuals with a low self-concept tend to avoid task engagement (Helmke & Weinert, 1997).

According to the findings of research on educational approaches to democracy, democratic behaviour in schools increases competence in politics and respective knowledge components (McDevitt & Kiouisis, 2006).

The concept of latent learning assumes that knowledge is automatically and unintentionally obtained through the consumption of certain media. Students who exclusively examine the sports section of a newspaper or solely watch entertainment programmes on television can nevertheless passively or unconsciously obtain politically relevant information. It can therefore be presumed that media use results in greater prior knowledge. In the face of the empirical findings presented above the following effects are expected in the current study.

*Table 1*

*Summary of predictors and expected effects on the criterion variables*

Predictor	Theoretical background	Expected effect on prior knowledge	Expected effect on increase in knowledge
WebQuest	Manzel, 2007		+
Sex	Westle, 2002	–	
School year	Walter, Senkbeil, Rost, Carstensen & Prenzel, 2006	+	
Migration background	Baumert, Stanat, & Watermann, 2006	–	–
Number of books	Bourdieu, 1979	+	+
Membership in associations/clubs	Putnam 1994, 2001; Coleman, 1988	+	+
Interest in politics	Rössl & Beckert-Zieglschmid, 2002	+	+
Self-concept	Köller, Schabel & Baumert, 2000	+	+
Democratic class climate	McDevitt & Kiouisis, 2006	+	+

### 3. Design of the intervention study

The TEESAEC project contains an intervention study in which teaching with WebQuest was compared with a teacher-controlled teaching unit in year 9 of the *Realschule* and year 10 of the *Gymnasium* (22 classes). With respect to the study sample, the data set used here solely included students who had taken part in both the pre-test and the post-test in order to allow for the measurement of individual changes. The first measurement occasion included data on a total of 572 students, 502 of whom also provided data on the second measurement occasion. This corresponds to an attrition rate of approximately 12%, which can be seen as rather low. This attrition results from the fact that some students were not present for the post-test or the pre-test or from difficulties assigning the observations to a certain person. The sample comprised 292 boys (58%) and 210 girls.

Data regarding knowledge on the European Union was acquired using a standardised questionnaire which was completed in written form. The questionnaire contained a knowledge test with questions in a traditional multiple-choice format. Students were required to select one of four answer options in response to each question. In order to check the comprehensibility and solvability of the questions, a pilot test was conducted. Besides the knowledge test, the questionnaire also contained questions on socio-demographic background variables as well as on further characteristics of the respondents. Questionnaires were to be completed within 45 minutes on both measurement occasions.

### 4. Construction of the measurement model

When measuring knowledge, appropriate scaling is required because it is not the specific response behaviour to single questions which is of interest. Instead, personal ability is to be determined on the basis of responses to all questions and in a way which allows inter-individual comparisons. The ability of an individual cannot be directly observed and is therefore regarded as a latent variable. In line with traditional test theory, a latent personal characteristic comprises the total score of a test plus measurement error. No distinction is made here between latent and manifest (observable) variables. The characteristic of the person is therefore equal to the response behaviour; special emphasis is attached to estimation of the measurement error.

According to item response theory, latent personal ability is estimated on the basis of probabilistic assumptions. Decisive for correct responses to a question is the ability of the person (person parameter) on the one hand and the difficulty of the question (item parameter) on the other. The probability that a person with a cer-

tain ability level provides the correct answer is estimated for each question. The probability of solving a question is therefore a function of the person parameter and the item parameter. In our case, dichotomous answer variables were employed (correct vs. incorrect answer).

In selecting the measurement models, we drew upon three assumptions: (1) All knowledge questions measure the same characteristic and load onto the general factor “knowledge on the EU”. From the outset, questions which were correctly answered by more than 95% or less than 25% of the students were omitted. The first assumption of one-dimensionality was examined with the help of two-parametrical IRT models for each of the two measurement occasions and items were excluded which did not significantly load onto the general factor. The selected model showed good data fit for the pre-test and the post-test.

(2) The measurement model is independent of group membership. To test this second assumption, sex and migration background were investigated (group-specific measurement invariance) using a multi-group model. Parameters were estimated separately for boys and girls as well as for persons with and without a migration background. We excluded items for which group-specific factor loadings differed from the overall model by more than .30. We were thus able to constrain item parameters to be equal across groups. Accordingly, the probability of solving a specific question is equally high for boys and for girls with the same ability and does not depend on migration background.

(3) The scale for knowledge measurement can be used in both the pre-test and the post-test. Item parameters are therefore identical in both tests (time-specific measurement variance). In order to ensure that knowledge on both measurement occasions can be measured using a standardised scale, item parameters were equally set, with knowledge on both occasions being conceived of as two-dimensional. Item parameters from this joint scaling were compared with separately scaled parameters, and items with standardised item parameters which deviated from the joint scaling by more than 0.30 were excluded. The measurement model with equally set parameters accordingly did not significantly differ from a non-restrictive model and shows good data fit. The latent correlation between the two tests was strikingly high, amounting to  $r = .87$ . Figure 1 illustrates the final measurement model with 34 indicators (Figure 1).

As an indication of the external validity of the measurements, students provided their last school grade in the subject of social studies. In addition, respondents were asked to estimate how much they knew about the European Union using a 10-point scale. The correlation between last school grade and knowledge was  $\rho = -.206$  at pre-test and  $\rho = -.225$  at post-test (Spearman’s Rho, resp.  $p < .001$ ; the negative coefficient is due to the reciprocal scaling of the school grades.) This association is not especially high. As mentioned above, however, the applied test clearly represents a

different type of knowledge test than class work, so that a high association was not expected.

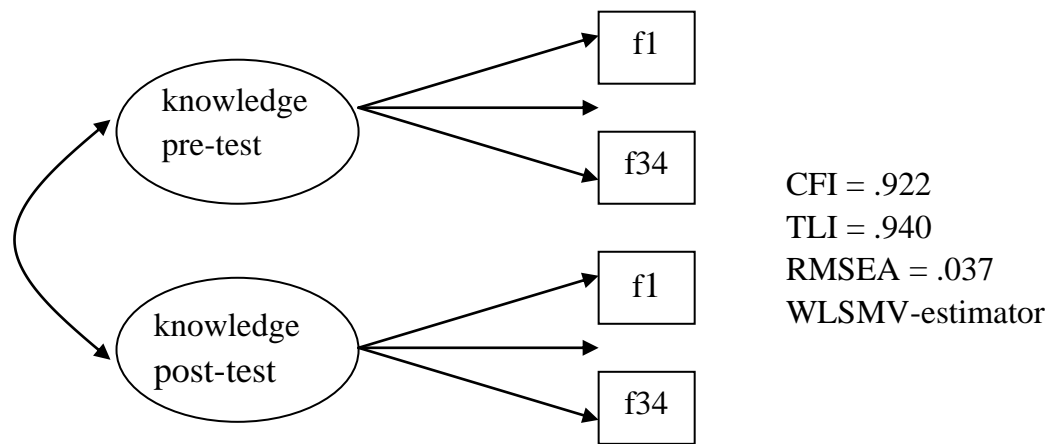


Figure 1. Measurement model for knowledge at pre-test and post-test with item parameters constrained to be equal across both occasions, as indicated by identical numeration. The variance of the latent variable was fixed to 0.

## 5. Results of the regression analysis for prior knowledge

The following results were obtained using multivariate latent regression analyses with maximum-likelihood estimation and prior knowledge as dependent variable. Adding the independent variables in a step-by-step manner allows insight into the causal structure between the factors of influence.

Model 1 contains sex, migration background, school year, and experimental group. Here, students in WebQuest classes show significantly higher pre-knowledge on the EU than students in controlled classes. This effect becomes insignificant in model 2 (see Table 2). As expected, classes from the higher-track *Gymnasium* also show more prior knowledge than those from the lower-track *Realschule*. No significant difference is found between girls and boys.

Migration background, as measured by language spoken at home and parents' country of origin has a weak influence which disappears in model 2. When country of origin is controlled for, no significant effect of language is seen. Effects of migration background on pre-knowledge on the EU thus can not exclusively be explained by a lack of language competence; other integration aspects associated with the country of origin are also likely to play a role. When comparing countries of origin, students with at least one parent who was born in Turkey or Eastern Europe fare a little worse than fellow students with German parents. For Eastern Europe, however, this effect is no longer significant in model 2 and 3. Disadvantages related to migration background seem to take effect rather indirectly via cultural capital and political interest.

Table 2

DV: Pre-test knowledge	Model 1	Model 2	Model 3
School year: 10	<b>.385***</b>	<b>.366***</b>	<b>.352***</b>
Experimental group: WebQuest	<b>.156*</b>	.112	.098
Sex: female	-.107	-.016	-.023
Parents' country of origin (Reference category: Germany)			
Turkey	<b>-.129*</b>	<b>-.090*</b>	<b>-.099*</b>
Southern Europe	-.065	.003	-.062
Eastern Europe	<b>-.147*</b>	-.081	-.007
other	-.059	-.043	.010
Languages spoken at home (Reference category: only German)			
German and other	.071	.014	.008
only other	.031	.020	.006
Number of books at home		<b>.133*</b>	<b>.095*</b>
Membership in			
youth organisations		.062	<b>.115**</b>
political & social organisations		.020	.028
sport clubs & cultural organisations		.024	.013
Interest in politics			
regarding Germany		<b>.400***</b>	.069
regarding the EU		.000	.059
Self-concept for talent			<b>.297***</b>
Democratic classroom climate			-.048
Use of media			
TV			-.061
daily newspaper			<b>.114*</b>
magazines			-.034
radio			-.012
Internet			<b>.107**</b>
R <sup>2</sup>	<b>.237</b>	<b>.401</b>	<b>.436</b>



In model 2, interest in politics, the number of books at home, and membership in associations/clubs are included (Table 2). The more books the parents have in their household, the higher students' prior knowledge on the EU. This effect becomes insignificant in model 3. With respect to interest in politics, a positive influence is found for interest in German politics, while interest, in particular in European politics, does not explain any additional variance. Membership in different types of associations/clubs has no statistically significant impact.

The most important factor of influence is self-concept for specialised talent (model 3). If pre-test knowledge is held constant, students with more positive self-concepts regarding talent in social studies are found to achieve higher knowledge scores at post-test. Motivation and self-confidence play a key role in this explanation model. When self-concept is controlled for, the effect of interest in politics persists. The consumption of other media has a tendentially negative but non-significant effect.

A democratic teaching climate does not significantly contribute to an explanation of the variance in pre-knowledge when other variables are controlled for.

The proportion of explained variance almost doubles from model 1 (22.7%) to model 3 (43%) and is, on the whole, rather high. Nevertheless, a downward correction must be considered owing to the large number of independent variables.

## 6. Results of the regression analysis for knowledge increase

In order to examine the influence of the examined predictors on knowledge increase, an autoregressive model was used in which pre-test knowledge was also employed as an independent variable in the model. Regression coefficients can accordingly be interpreted as effects on knowledge change. The results are residuals which express how high increases in knowledge would be if students had all produced the same pre-test results (Prenzel, Carstensen, Schöps & Maurischat, 2006, p. 43f.).

In particular when the increase between pre- and post-test knowledge is low, pre-test performance as a control variable explains an enormous share of post-test knowledge, as a result of which interpretation of  $R^2$  in such an autoregressive model becomes difficult (Table 3). Overall, the regression models contain very few significant effects. Girls attain better results than boys in the post-test when their prior knowledge is controlled for. However, this difference disappears in model 3. Students from the higher-track *Gymnasien* (year 10) show greater increases than those from lower-track *Realschulen* (year 9).

Table 3

DV: post-test knowledge	Model 1	Model 2	Model 3
Pre-test knowledge	<b>.630***</b>	<b>.605***</b>	<b>.631***</b>
School year: 10	<b>.188**</b>	<b>.193**</b>	<b>.126*</b>
Experimental group: WebQuest	.018	.035	-.044
Sex: female	<b>.127*</b>	<b>.130*</b>	.078
Parents' country of origin (Reference category: Germany)			
Turkey	-.043	-.029	-.039
Southern Europe	.032	.049	-.042
Eastern Europe	<b>-.122*</b>	-.114	-.019
other	-.045	-.044	-.024
Languages spoken at home: (Reference category: only German)			
German and other	-.041	-.036	-.007
only other	.039	-.037	.045
Number of books at home		.048	<b>.095*</b>
Membership in			
youth organisations		-.049	.014
political & social organisations		.057	.011
sport clubs & cultural organisations		<b>.157*</b>	<b>.084*</b>
Interest in politics			
regarding Germany		.088	-.005
regarding the EU		.036	-.052
Self-concept for talent			<b>.156**</b>
Democratic class climate			-.048
Use of media			
TV			-.012
daily newspaper			-.025
magazines			.002
radio			-.011
Internet			-.005
R <sup>2</sup>	<b>.472</b>	<b>.480</b>	<b>.555</b>

The WebQuest variable has no significant effect. Therefore, the working hypothesis cannot be confirmed. No significant difference is found in knowledge increase between the experimental groups. The WebQuest method is thus not superior to the teacher-based methods with respect to the individual's increase in knowledge and the results therefore provide no evidence to suggest added value of self-learning stressed in education programmes.

Students who are members of sport clubs or cultural organisations seem to benefit more from the series of teaching lessons. This finding is in unison with the theory of social capital, which states that relevant information is better disseminated through integration in social networks.

The strongest influence on knowledge increase is also exerted by self-concept for specialised talent. When holding pre-test performance constant, individuals with greater confidence in their individual talent in the area of social studies attain higher scores at post-test. This supports the considerable influence which affective motivational factors have on school performance.

Use of media, political interest, and democratic climate do not independently contribute to the variance in knowledge increase.

## 7. Summary and discussion

Empirical evidence for superiority of the self-learning concept remains rather low and was not supported by the data of the present study. This may be due to a sub-optimal mixture of self-learning and adapted learning (p. 15ff. in this volume). Alternatively, it may be due to the fact that teachers' feedback behaviour was not controlled for and that instructions required by students were not adequately provided. From a scientific point of view, the validity of these hypotheses must be subjected to more intensive investigation.

A uniform influence of sex was not found in the present study. While girls clearly benefited more from the series of teaching lessons, sex had no large effect on pre-knowledge. The findings thus support the general discussion on the importance of sex variables in research on learning while not allowing for clear conclusions. Non-uniform results with respect to the effect of sex are likely to be found according to school subject and research design.

Results regarding the influence of migration background are in line with general findings from educational research and statistics on social affairs. Youths with a migration background perform only slightly weaker than those without such a background. In our study, migration background was ascertained based on the languages spoken at home and the parents' country of origin and was found to have a rather small overall influence. Controlling for country of origin led to a non-

significant effect of the language spoken at home. These findings are problematic if one assumes that knowledge on politics and the EU is a precondition for successful participation in the political life of the community at large. The task of teaching politics and stimulating an expansion of knowledge in this domain appears to be insufficiently fulfilled here.

Self-concept for specialist talent plays a key role in the acquisition of political knowledge. The results of the study suggest that motivation and subjective specialised talent constitute factors which have a greater influence on teaching efficiency than selection of the teaching method itself. It would appear that this finding is not sufficiently taken into account in everyday teaching practices.

While social features of origin may be stable and can hardly be externally modified, there are other areas which are changeable and which may potentially influence students' acquisition of political knowledge. The results of the study indicate that the following issues warrant particular attention when it comes to didactics and teaching in social studies: the promotion of students with a migration background. In this context, the general concepts of intercultural education which have so far been employed appear to have had little effect on teaching. The development of a subject-related concept of intercultural education is still to come. Students with a weaker self-concept for the specialised talent have hitherto not been focused upon in the didactics of social studies and have not been adequately strengthened in the teaching of politics. Concepts for the promotion of subjective specialist talent in politics must be developed. Even if such a self-concept effect is subject to socialisation, teaching can surely make a difference.

Furthermore, follow-up studies should examine whether teachers' behaviour is sufficiently geared toward fostering learning. So far, there has been no valid study on teachers of politics. Such a reasearch project may also help to further elucidate the predictors of learning, which have been investigated in the present study. A further goal should be the development of more subject-specific activities which promote learning.

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