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The importance of controlling for socioeconomic factors when determining how vocational training and a secondary school economics class influence the financial knowledge of young adults in Germany

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Abstract

In public debate in Germany, it often is criticized that financial knowledge is insufficiently developed at secondary school. To determine the extent to which learning opportunities at secondary school influence young people's financial knowledge we administered a German adaptation of the Test of Financial Literacy (TFL-G) to 984 students aged 17 to 25 beginning their higher education study programs in Germany and controlled for socioeconomic factors. We compared the content of the TFL-G to the curricula of selected regular and vocational secondary schools and found significant differences across federal states. Our results indicate that attending an economics class at a regular secondary school had a moderate effect on the development of financial knowledge of the participants in our sample whereas completing a vocational training program at the secondary school level had a much greater effect. In view of our results, the question arises as to whether more importance should be given in the curriculum of regular secondary schools in Germany to developing financial knowledge.

1 Introduction

Over the past few years in Germany, the need for young adults[1] to learn about personal finance has gained increasing interest in education policy debate. Results of surveys in which young adults rated their knowledge of personal finance have added to the discussion. In a recent study conducted by the Federal Association of German Banks (BdB) and the Association for Consumer Research, approximately 75 % of the respondents expressed the wish for greater coverage of finance-related topics at school (BdB 2015, 30). The overall results of the study indicate that young adults in Germany feel highly insecure when dealing with insurances, and saving and planning income (Barry 2016; Piorkowsky 2011, 31). Due to recent government cutbacks in social benefits in Germany, young people have become expected to assume more responsibility for their own retirement savings (Erner et al. 2016, 95). Furthermore, as the range of financial products available on the market expands, making financial decisions has become increasingly complex for individuals. However, the extent to which schools can prepare young adults to deal with such issues remains unclear.

Many studies have been conducted in which the effects of including various basic principles of finance in secondary school curricula on young adults' financial knowledge have been investigated (for the United States, see e.g., Peng et al. (2007); Mandell/Schmid-Klein (2009); Walstad et al. (2010); Asarta et al. (2014), and Tang/Peter (2015); for New Zealand see e.g., Cameron et al. (2014)). However, the findings are inconsistent. While Walstad et al. (2010, 353), Asarta et al. (2014, 49), Cameron et al. (2014, 17) and Tang/Peter (2015, 129) found a positive effect of attending finance classes on the financial knowledge, Mandell/Schmid-Klein (2009, 21) and Peng et al. (2007, 277) did not find a significant relationship between the two. Scholars who not find a positive effect of attending financial classes on financial knowledge discuss possible reasons for this result. Mandell/Schmid-Klein (2009), for example, suggest that students may lack motivation to acquire or retain financial knowledge. Cameron et al. (2014) believe student-related characteristics may lead to better learning outcomes in financial classes. Among these characteristics are language skills and mathematical abilities which support the acquisition of financial knowledge. Tang/Peter (2015, 120) point out that in addition to formal education family and personal experiences outside of the school may contribute to

[1] In our study we focus on students aged 17 to 25 who are beginning their higher education study programs (see section 4.2). This age group is comparable to the "young adults" group (ages 15 to 24) defined by the United Nations (1982, 3).

students' development of financial knowledge.[2] Lyons et al. (2007) emphasize the importance of considering *what* exactly was measured in the studies and *how* exactly it was measured when interpreting results (for the test instrument and design of our study, see in section 4). For example, there are important differences between self-reported financial knowledge and financial knowledge assessed using validated test instruments.

In Germany, very few studies have been conducted of how young adults' financial knowledge is influenced by secondary school curricula and vocational training. While Germany participates in the Programme for International Student Assessment (PISA) study, it does not participate in the part on financial literacy (for participating countries' results on the financial literacy part of the PISA, see Organisation for Economic Co-operation and Development [OECD] 2014; 2017). There are only a few studies conducted in Germany in which focus is on the financial knowledge and competences of young adults (see Aprea/Wuttke 2016; Bender 2012; Börsch-Supan et al. 2009; Driva et al. 2016; Erner et al. 2016; Frühauf/Retzmann 2016; Kaminski/Friebel 2012; Remmele 2016; Schlösser et al. 2011; Schuhen/Schürkmann 2014). Not all of these studies focus on the influence of curricula and learning opportunities at school on the financial knowledge of young adults. In some studies – especially those conducted by large banking institutes in Germany (Commerzbank Think Tank 2003; ING-DiBa 2013; Sparda-Bank Hessen eG 2011) – quality criteria and validity measures (see AERA et al. 2014) were not disclosed. Studies which do not analyze the influence of learning opportunities on financial knowledge or do not report quality criteria are not in the focus of this paper.

Hofmann et al. (2014, 135) analyzed the curricula of various vocational training programs and found significant differences in content. In Germany, in vocational secondary schools specializing in business and economics (Wirtschaftsgymnasium) more financial content is covered than in vocational secondary schools specializing in technical (Technisches Gymnasium) (for more information on differences in the curricula of vocational training programs, see section 3). Erner et al. (2016) found the financial knowledge of young adults (i.e., between the ages of 15 and 17) was connected with the type of secondary school (Hauptschule, Realschule, or Gymnasium)[3] they had attended. In Germany, secondary school tracks are reflected in the

[2] In this paper we refer to formal education and the influence of attending a vocational training program and a secondary school economics class on financial knowledge (see section 3). In the paper by Happ et al. (2017) the influence of parents and of the personal experience of young adults are analyzed through cognitive interviews with the young adults during which they respond to items on the TFL-G.

[3] These are three types of secondary school in Germany. For more information on the three-tier secondary school system in Germany, see Erner et al. (2016, 97).

type of school students attend: Gymnasium (highest rank), Realschule (average rank), and Hauptschule (lowest rank). Students usually attend the type of school which best suits their intellectual abilities and scholastic performance, both of which need to be assessed keeping in mind various non-academic influences such as socioeconomic background and migration background. The financial knowledge follows this general performance differences that are structurally inherent in the German school.

In the literature, researchers in Germany often criticize the education system for not covering financial topics sufficiently and not offering students enough learning opportunities in this area (Aprea et al. 2015, 11; Kaminski/Friebel 2012, 45; OECD 2005, 12-13). In this paper, we investigate the opportunities that the three types of secondary school, some of which have a stronger orientation towards economic topics (Brückner et al. 2015, 439), and the dual vocational education system in Germany offer students to learn about personal finance issues (for more details, see section 3). We investigate beginning students in various study programs in higher education in Germany because during this phase of life young adults need to make many important financial decisions independently often for the first time in their lives (Förster et al. 2017). For example, they need to decide whether to take out a student loan (see Middendorff et al. 2013, 21), whether to remain living at home, live in student residence, or set up their own home, and whether to have a part-time job.

The qualification to enroll in a university program in Germany is obtained by the great majority (86 %) of young adults at either a regular secondary school (German Federal Statistical Office 2015, 85) or a vocational secondary school specializing in business and economics.[4] It can be assumed that regular schools differ from vocational schools in the degree to which they provide opportunities to learn about personal finance (for more details, see section 3). While financial knowledge can be influenced by opportunities to learn about the topic at school, another influencing factor is work experience (Chen/Volpe 1998). Students beginning university studies may have completed a vocational training program (Middendorff et al. 2013, 60)[5] during which they had the opportunity to gain experience as apprentices in companies (see section 3). For this reason, former students of the dual vocational education system in Germany are investigated in this paper.

[4] In this paper, we focus on vocational secondary school specializing in business and economics because attending such a school is expected to have effects on financial knowledge. However, in Germany there are further types of vocational schools, for example schools specializing in the field of technology.
[5] In 2012, approximately 20 % of the students had obtained vocational training (Middendorff et al. 2013, 57).

The performance of 984 young adults in Germany who completed the German adaptation of the American Test of Financial Literacy (TFL-G; for the American version, see Walstad/Rebeck 2016; for the German version, see Förster et al. 2017) in fall 2015 or spring 2016 was analyzed in relation to the opportunities they had had to learn about personal finance issues before beginning their studies. The participants took the TFL-G during an orientation phase before their study programs began to ensure that none of the participants had prior university education.

In section 2 we describe the construct of financial knowledge. In section 3 we analyze the content of selected curricula of regular and vocational secondary schools and vocational training programs in Germany and compare it to the content of the test instrument (Council for Economic Education [CEE] 2013), which serves as a basis for the formulation of our hypotheses. In section 4 we describe the sample and analyze the data set with a view to the hypotheses. In section 5 we interpret the results and offer a conclusion.

2 Conceptual framework

In the literature, many approaches have been taken to define the constructs of financial literacy and of knowledge and understanding of personal finance (e.g., Antonietti et al. 2016; Henchoz 2016; Schuhen/Schürkmann 2014). We focus on the cognitive component of financial literacy, that is, on the knowledge and understanding of financial issues because they enable people to cope with financial issues in their daily lives. The financial knowledge is also the common factor in most of the definitions (see CEE 2013, V; OECD 2017, 49). Although affective components of personal finance such as motivation and attitude and other cognitive aspects such as metacognition are important for making sensible financial decisions (Weinert 2001), we do not explore them in this paper. It seems reasonable to assume that a higher level of financial knowledge will correlate with better decision-making and sound financial behavior; however, other factors such as attitudes, beliefs, motivational components as well as situational associations also play an important role. Therefore, there are limitations to the conclusions to be drawn from the results regarding the participants' behavior. Nonetheless, it can be assumed that knowledge is a necessary – but often not sufficient – precondition for making "good" financial decisions (Förster/Happ in press).

The financial knowledge component of the ability to manage personal finances can be broken down into content areas (CEE 2013; Huston 2010; Lusardi 2015; Remund 2010; Schuhen/Schürkmann 2014). The CEE's National Standards for Financial Literacy (2013) describe a certain degree of knowledge concerning personal finance that students should have gained by various ages and identify six content areas of such knowledge: *earning income, buying goods and services, saving, using credit, financial investing*, and *protecting and insuring* (Walstad/Rebeck 2016; Walstad/Rebeck 2017).[6] In this paper, we adhere to the operationalization and measuring of financial knowledge as outlined in these standards.

To identify the finance-related contents outlined in the CEE's standards (2013) in the curricula of regular and vocational schools and vocational training programs in Germany, keywords for each content area were generated by Jungbluth (2016; see Table 1).

Content area	Keywords
Earning income	Unemployment, labor market, types of income, sources of income, cost-benefit ratio, market value of labor, government actions regarding income, income tax
Buying goods and services	Purchasing decisions, demand, government's role regarding consumer protection in providing information, economic well-being, concepts of scarcity, choice and opportunity cost, payment methods
Saving	Saving for retirement, incentives for saving, financial institutions, inflation, saving decisions, present versus future value, the value of a person's saving over time, interest rates
Using credit	Banks and financial institutions, credit scores, loans, mortgages, inability to repay debt, bankruptcy, credit card, credit options, collateral
Financial investing	Stocks, financial institutions, fiscal policy, monetary policy, investments, types of investment, market price of investments, nominal rate of return, reactions of financial markets towards changes, rate of return on an investment, assets
Protecting and insuring	Disability insurance, identity theft, health insurance, life insurance, government security measures, insurance, insurance premiums, insurance coverage, insurance agreements

Table 1: Key Words for the Six Content Areas of the CEE (2013)

In this paper, we employ these keywords to conduct our analysis of the curricula in relation to the CEE standards and to develop our hypotheses.

[6] For a more detailed description of the content areas, refer to CEE (2013).

3 Analysis of curricular content and hypotheses

While investigating whether the content outlined in the CEE's standards is addressed in the curricula of regular and vocational full-time secondary schools in Germany, we expected to find differences across federal states due to the autonomy of the federal states regarding education (Erner et al. 2016, 97; Frühauf/Retzmann 2016, 264) and previous research findings (Müller et al. 2007, 28). Graduation from both types of secondary school (regular and vocational) results in the qualification to enroll in academic study programs. Unlike regular secondary schools, vocational secondary schools may specialize in specific professional areas, for example business and economics (Wirtschaftsgymnasium) or technology (Technisches Gymnasium; Hippach-Schneider et al. 2007, 29).

Germany is well-known for its dual vocational education program (Euler 2013; Solga et al. 2014)[7], which combines learning time in a school (approximately 20 %) and gaining hands-on experience in a company (approximately 80 %; Federal Institute for Vocational Training 2013; Solga et al. 2014) and lasts two to three and a half years. In a paper published in 2012 by the European Commission, the importance of connecting theory with practice in secondary vocational education was stressed.[8] Apprentices in a vocational training program receive payment for their work by the company. The majority of graduates of such a program find employment upon completion of their training program (Federal Institute for Vocational Training 2013). However, a considerable number of students in the dual vocational education system also pursue academic studies upon completion of their training program (see section 1).[9] In our analysis vocational education programs for students who wish to do clerical work in a bank, industry or office are investigated because these three fields rank among the top 10 most chosen commercial vocational training programs[10] in Germany and a large number of apprentices in these fields obtain university entrance qualification (Federal Institute for Vocational Training 2015).

[7] The education system in Germany offers various educational programs: full-time vocational schools, dual vocational educational training programs, and vocational preparation. Whether vocational training takes place while attending school full time or part time depends on the chosen profession (Solga et al. 2014). In this paper, the dual program is in focus because all beginning students in the sample who completed a vocational educational training program graduated from the dual program.

[8] The dual vocational education system can be found in Austria, Denmark, and Switzerland, as well as in Germany (Eichhorst et al. 2015).

[9] It is possible to pursue academic studies after completing a training program only if a passing grade is obtained on a university entrance exam.

[10] There are three main types of vocational education programs in Germany: commercial, technical, and social care. The focus of the analysis of curricula in this study is commercial vocational training (clerical work in a bank, an office, or industry). Issues related to personal finance are not expected to be addressed substantially in technical or social care vocational training.

The content of each curriculum under investigation was analyzed separately by two independent investigators. A comparison of the curricular bases was conducted according to the keywords listed above (see Table 1). Using an evaluation scheme, we assessed the extent to which the content outlined in the CEE's standards (2013) were covered in the content of the curricula (see Table 2):[11]

		School			Commercial vocational training		
		Regular secondary school		Vocational secondary school			
CEE's Financial Standards (2013)		**Regular secondary school Rhineland-Palatinate** (MBWWR 1998; 2011)	**Regular secondary school Hesse** (HK 2010a,b)	**Vocational secondary school Rhineland-Palatinate with specialization in business and economics** (MBWWR 2012)	**Clerical work in a bank** (KMK 1997)	**Clerical work in industry** (KMK 2002)	**Clerical work in an office** (KMK 2013)
I)	Earning Income	+	+++	+++	+++	++	++
II)	Buying Goods and Services	+	++	++	+	++	++
III)	Saving	+	+	++	++	+	+
IV)	Using Credit	0	+	++	+++	+	+++
V)	Financial Investing	+	++	++	+++	++	+
VI)	Protecting and Insuring	0	0	0	+	0	0
Total		**4**	**9**	**11**	**13**	**8**	**9**
	0 = not taught; + = taught to a small extent; ++ = taught to a large extent; +++ = taught thoroughly To obtain a rough quantitative orientation of the extent to which the financial content outlined in the CEE's standards is covered in the curricula of the different education programs under investigation, count the plus signs as points.[12]						

Table 2: Identification of the CEE's Standards in the Curricula

[11] Contents covering the finance of companies were taken into account as well because students might be able to transfer it to their own life and develop a deeper understanding of financial issues.

[12] It should be borne in mind that in practice, the curricular basics are not necessarily being taught in the classroom.

We found students at vocational secondary schools offering a class in business and economics had the most opportunity at school to learn about personal finance (columns 2-4 in Table 2), which enhanced their financial knowledge. Accordingly, our first hypothesis was as follows:

H1: Young adults who graduated from a vocational secondary school specialized in business and economics will have greater financial knowledge than young adults who graduated from a regular secondary school.

The analysis of curricula was limited to regular secondary schools in Hesse and Rhineland-Palatinate to limit the effect of differences in curricula across the federal states on our findings. Comparison of the regular secondary school curricula in just these two neighboring federal states revealed that the curricula differ significantly in terms of financial topics covered (for the limitations of this study, see section 5). In Hesse, topics surrounding business and economics are addressed in the curricula of various school subjects and business, economics and politics are offered as school subjects. In Rhineland-Palatinate, economic and financial topics are only minimally addressed in subjects such as history, social studies, and geography (see also Frühauf/Retzmann 2016; Standing Conference of the Ministers of Education 2008, 8). In summary, financial topics are better integrated in, and a more important part of, the curricula of regular secondary schools in Hesse. These differences also were reflected in the financial knowledge of the beginning students in this study, which leads to the second hypothesis:

H2: Young adults who attended a business and economics class at a regular secondary school will exhibit greater financial knowledge than young adults who did not.

Finally, in vocational secondary schools, as part of the dual vocational education system, personal and business finance is taught. In the curricula of the vocational training programs the profession-related competences students should acquire during the program are formulated. In addition to developing the knowledge component of competence (see Weinert 2001), students in these programs are expected to develop competences needed to solve problems and perform activities specific to jobs in the profession. As Frühauf/Retzmann (2016, 266) pointed out, the degree of embedment of personal finance in the curricula differs according to vocational training program. The greatest amount of financial content outlined in the CEE's standards was found in the curriculum for vocational training for clerical work in a bank. This confirms the finding of Frühauf/Retzmann (2016, 266) that education in finance has a high status in professions in the commercial sector and especially in the banking and finance sector. With some limitations – particularly in the depth of treatment – the content outlined in the CEE's

standards also can be found in the curricula of the two other vocational training programs under investigation (for clerical work in an office and for clerical work in industries). Additionally, in the dual vocational education system trainees are provided with opportunities to enhance their financial knowledge through their work in a company and other practical experiences, for example, when handling their income (see section 1). Hence, the third hypothesis is as follows:

H3: Young adults who completed a commercial vocational training program will show greater financial knowledge than young adults who did not.

4 Test Instrument, Sample and Empirical Results

4.1 Test Instrument

The original TFL was designed to assess young adults' financial knowledge of personal finance (Walstad/Rebeck 2016; Walstad/Rebeck 2017), which they need to be able to manage their personal finances throughout their lives. The items on the test feature short cases embedded in the social, economic, and political context of the United States. The test instrument, which was made available to the project team at the University of Mainz in 2015, comprised 50 questions in total, which can be assigned to the six content areas as follows (Table 3):

I.)	II.)	III.)	IV.)	V.)	VI.)
Earning Income	**Buying Goods and Services**	**Saving**	**Using Credit**	**Financial Investing**	**Protecting and Insuring**
7 items	6 items	7 items	10 items	10 items	10 items

Table 3: Number of Items in Content Areas in TFL-G in First Pretest

The items on the TFL are in multiple-choice format. After a brief description of a situation, the respondent must choose the one correct answer from four alternatives presented (Walstad/Rebeck 2016).[13] The items on the TFL were adjusted to the German context over a

[13] After a pretest in the United States, the 50 items on the TFL were reduced to 45. In the final version of the TFL (Walstad/Rebeck 2016) two items from the area of saving, two items from the area of financial investing and one item from the area of protecting and insuring were omitted. The reason for this was to remain within the testing time of approximately 45 minutes, including the distribution and collection of the test and completion of a questionnaire about demographic details about the respondents, so that teachers can administer the test within one school lesson (Walstad/Rebeck 2017). In our study, we analyzed the results for all 50 items on the TFL-G (for the adaptation process, see Förster et al. 2017).

six-month translation and adaptation process (for more information on the adaptation and validation process, see Förster et al. 2017). However, after a preliminary analysis of the data and consultation with experts and respondents, it became evident that one item from the area of financial investing was linguistically unclear (Förster et al. 2017). Therefore, this question was eliminated in our final analysis and the results for the remaining 49 items on the TFL-G are described. In Table 4 a sample item of the test is presented. The parts of the item on the original American version which were adapted for the German version are in bold.

22. What does a **credit bureau** do? A. makes decisions about credit applications **B.** matches banks to applicants **who qualify for a loan** C. explains to consumers why they have been denied credit D. provides creditors with reports of consumers' credit-paying histories*	22. Welche Aufgabe hat die **Schufa**? A. Sie trifft Entscheidungen über Kreditanträge. B. Sie bringt **interessierte** Banken und Antragsteller zusammen. C. Sie erklärt Verbrauchern, warum ihr Kreditantrag abgelehnt wurde. D. Sie informiert Kreditgeber über die **Rückzahlung bisheriger Kredite des Kreditnehmers.***

Table 4: Sample item of the TFL and TFL-G (for more sample items, see Förster et al. 2017, 126)

The reliability of the TFL-G can be declared as very good with a Cronbach's Alpha value of 0.824. For TFL-G, a one dimensional model reached very good fit indices in a confirmatory factor analysis (Chi2 = 1475.78, df = 902, RMSEA = 0.02, 90 % confidential interval of RMSEA = [0.22; 0.26], see Förster et al. 2017). Therefore, a one-dimensional model is suitable for the data.

On the questionnaire the respondents specified the type of school from which they had obtained their university entrance qualification, whether they had completed a vocational training program, and whether they had attended a business and economics class at secondary school[14], and if so, whether it was a basic or advanced level class.[15]

[14] In 14 of the 16 federal states a course entitled Business and Economics can be found in the regular education sector. Only in Rhineland-Palatinate and Saxony-Anhalt was this not the case. A comparison of the titles clearly shows that in the federal states many different titles are used for the courses.
[15] The curricular analyses show that, in general, the taught content areas in a basic or advanced course do not differ. But in an advanced course much more time for the single content areas is available, so that the depth of the topics' treatment is thus different in an advanced course.

4.2 Sample

At the beginning of the winter term 2015–16, the TFL-G was administered to beginning students enrolled in an economics, business education, law, educational sciences, sociology, psychology, or translation program at one university in Germany. Of this sample, respondents who were guest students who had come to Germany to study and therefore did not have a similar education background to the other respondents were omitted from the analysis. Because comparability of the opportunities to learn about personal finance before studying at university cannot be guaranteed, we believe omitting the guest students from analysis was necessary. Moreover, respondents with more than 20 missing values on the test, which had 49 items,[16] and only six respondents with missing values at the variables *vocational training program* and *secondary school business and economics class*, were omitted from the analysis. Overall, the sample to be studied was reduced to 984 respondents.

Of the respondents 58.7 % were female and 27.03 % had a migration background.[17] The average age of the respondents in the sample was 19.95 years (SD: 1.53) (only respondents between the ages of 17 and 25 were considered for analysis). The average school leaving grade was 2.32 (SD: 0.56). In Tables 5 and 6 an overview of the respondents' education background is given.

	Frequency	Percentage
Regular secondary school	793	80.6
Vocational secondary school with specialization in business and economics	67	6.8
Other type of school	124	12.6
Total	984	100.0

Table 5: Type of School Where University Entrance Qualification was Obtained

Of the respondents 80.6 % claimed to have obtained their university entrance qualification at a regular secondary school, only 6.8 % from a vocational secondary school with a specialization in business and economics, and 12.6 % had obtained their university entrance qualification in another way. The last group served as a reference group for the following analyses.

[16] In how far respondents, who have more than 20 unanswered questions, can be considered as having seriously attempted to fill in the questionnaire, is critically questioned.
[17] The migration background is assessed by the two indicators "origin of parents" and "home language": If the origin of one parent and/or the home language of a participant are not German, a person is considered to have a migration background.

Moreover, the young adults were asked whether they had attended a business and economics class at secondary school (see Table 6). This can be seen as an indicator of the extent to which business and economic topics were taught systematically and substantially.[18] The majority of beginning students, at 60.4 %, had not attended a business and economics class. Approximately 20 % of the respondents had attended either a basic level or advanced level business and economics class (21.1 % and 18.5 %, respectively).

	Frequency	**Percentage**
No business and economics class attended	594	60.4
Basic business and economics class attended	208	21.1
Advanced business and economics class attended	182	18.5
Total	984	100.0

Table 6: Business and Economics Class Attended at Secondary School

As can be seen in Table 7 the two variables *business and economics class attended* and *type of school* where the university entrance qualification was obtained are not independent of each other. Evidently, all students from a vocational secondary school specializing in business and economics had to choose an advanced economics course while only approximately 11 % of the students from a regular secondary school attended an advanced class and approximately 23 % a basic business and economics class. The two criteria are not independent of each other according to the Chi-square test (p = 0.000). The value for Cramer's V was 0.408 (p = 0.000).

[18] Here it can exemplary be referred to the curricula from Hesse (subject politics and business and economics) and Rhineland-Palatinate (subject social sciences).

			Business and Economics Class			
			Advanced business and economics class	Basic business and economics class	No business and economics class	Total
Type of school where university entrance qualification was obtained	Regular secondary school	N	86	181	526	793
		%	10.8%	22.8%	66.3%	100.0%
	Vocational secondary school with specialization in business and economics	N	67	0	0	67
		%	100.0%	0.0%	0.0%	100.0%
	Other type of school	N	29	27	68	124
		%	23.4%	21.8%	54.8%	100.0%
Total		N	182	208	594	984
		%	18.5%	21.1%	60.4%	100.0%

Table 7: Type of School and Business and Economics Class

Of all the respondents only 10.8 % had completed a vocational training program before studying (see Table 8). Of these 107 respondents, 79 had obtained commercial vocational training and 28 non-commercial vocational training (i.e., technical or social care):

	Frequency	Percentage
Completed commercial vocational training (clerical work in a bank, industry, office)	79	8.0
Completed non-commercial vocational training (technical or social care)	28	2.8
No vocational training program completed	877	89.2
Total	984	100.0

Table 8: Respondents Who Completed Vocational Training

4.3 Results

First, the three indicators (type of school, business and economics class, and completed vocational training program) were examined in relation to financial knowledge. The indicators were considered separately, before being combined with other variables in a regression analysis.

Considering the relationship between the type of school where university entrance qualification was obtained and financial knowledge, the one-way analysis of variance (ANOVA) and the paired comparisons[19] showed no significant difference among the young adults who had obtained their university entrance qualification at a regular secondary school, a vocational high school, or another way. Even though the graduates from a vocational secondary school could respond correctly to approximately 1.1 or rather 1.7 items on average, the difference was not significant, possibly due to the small sample size and thereby the high standard errors that occurred.

	N	Mean value (SD)	Standard error	ANOVA
Regular secondary school	793	28.90 (6.97)	.24767	F (2) = 1.302
Vocational secondary school with specialization in business and economics	67	30.03 (7.31)	.89245	p = 0.273
Other type of school	124	28.30 (7.59)	.68190	
Total	984	28.90 (7.08)	.22569	

Table 9: One-way ANOVA of the TFL-G Score Obtained and Type of School

Students who had attended an advanced level business and economics class responded correctly to approximately 1.9 more items than students who had attended no business and economics class (see Table 10). Similarly, the respondents who had attended an advanced level business and economics class responded correctly to 2.9 items more than the students who had attended a basic level course. The ANOVA also indicates a significant difference and considering the paired comparisons confirms that having attended an advanced level business and economics class led to significantly better performance on the TFL-G. Surprisingly, the beginning students who had attended no business and economics class performed better on the TFL-G than those who had attended a basic level business and economics class. However, this difference cannot be perceived as systematic.

[19] The mean values were compared to those on the Student-Newman-Keuls test, the Tukey-HSD and the Hochberg test. No significant results emerged.

	N	Mean value (SD)	Standard error	ANOVA
Advanced level business and economics class	182	30.68 (7.20)	.53367	F (2) = 8.704 p = 0.000
Basic level business and economics class	208	27.75 (6.93)	.48073	
No business and economics class	594	28.76 (7.00)	.28733	
Total	984	28.90 (7.08)	.22569	

Table 10: One-way ANOVA of the TFL-G Score Obtained and Business and Economics Class Attended

Finally, the relationship between financial knowledge and completion of a vocational training program is analyzed (see Table 11). The 79 students who had obtained commercial vocational training responded correctly to approximately 7.5 more items than their fellow students who had had no vocational training. Also, the students who had had commercial vocational training responded correctly to 5.8 more items than respondents who had had non-commercial vocational training (technical or social care). The results of the one-way ANOVA and the paired comparisons indicate that the beginning students who had had commercial vocational training (clerical work in a bank, industry, office) performed significantly better on the TFL-G than those who had had non-commercial vocational training or no vocational training at all.

	N	Mean value (SD)	Standard error	ANOVA
Completed commercial vocational training (clerical work in a bank, industry, office)	79	35.97 (5.60)	.62977	F (2) = 48.182 p = 0.000
Completed non-commercial vocational training (technical or care professions)	28	30.17 (6.87)	1.27603	
No vocational training program	877	28.22 (6.85)	.23155	
Total	984	28.90 (7.08)	.22569	

Table 11: One-way ANOVA of the TFL-G Score Obtained and Vocational Training Program Completed

Next, we investigated whether all the effects continued to be present if all the variables (type of school, business and economics class, and vocational training program) were combined in

a regression analysis (see Table 12; model 1).[20] Socio-economics factors such as gender (Atkinson/Messy 2012; Chen/Volpe 2002; Erner et al. 2016; Happ/Förster 2016), age (Finke et al. 2016; Gamble et al. 2015), and native language (Ali et al. 2016; Cameron et al. 2014), which are considered relevant according to recent research, were incorporated into the regression model (model 2).[21]

	Model 1			Model 2		
	Coefficient B	**Beta**	**Standard error**	**Coefficient B**	**Beta**	**Standard error**
Constant	28,326***		,815	21,335***		3,389
University entrance qualification from a regular secondary school	1,976***	0,110	,672	1,779***	0,100	0,673
University entrance qualification from a vocational secondary school	0,602	0,021	1,124	-0,294	-0,010	1,152
No business and economics class attended	-1,933***	-0,133	0,678	-2,257***	-0,159	0,680
Basic level business and economics class attended	-2,813***	-0,163	0,768	-2,732***	-0,163	0,762
Completed commercial vocational training	7,831***	0,299	0,805	5,790***	0,261	0,921
Completed non-commercial vocational training	2,764**	0,65	1,309	1,408	0,034	1,370
Gender (male)				2,894***	0,204	0,440
Age				0,331**	0,073	0,165
Native language (not German)				-4,750***	-0,223	0,656
Corrected R-squared	,102			,193		

**p < .1; **p < .05; ***p < .01*

Table 12: Multiple Linear Regression of the TFL-G Scores

[20] In type of school “other type of school”, in business and economics class “advanced level business and economics class” and in vocational training program “no vocational training program” were the reference groups.

[21] With gender, age, and native language, the socioeconomic information about the respondents we gathered is limited. Also, we do not know whether the students in the sample represented “typical” graduates from the respective school types.

As can be seen in model 1 (Table 12, columns 2-4), when controlling the other socio-economic variables, the effect of graduating from a vocational secondary school decreased in absolute terms. While graduates from this type of school did not perform significantly better than the rest of the respondents, the effect of graduating from a regular secondary school gained importance. This can be explained by the incorporation of the business and economics class into the model. In the one-way ANOVA it appeared that having attended an advanced level business and economics course had a positive effect on financial knowledge and that all students from a vocational secondary school had to attend such a class. Thereby, it becomes clear that the difference between students from a regular secondary school and those from a vocational secondary school is, among other things, influenced by attending an advanced level business and economic class, and when controlled for, the graduates of a regular secondary school performed even better. Furthermore, the strong relationship between completion of a vocational training program and financial knowledge remains unchanged. In addition to the continually very strong effect of a commercial vocational training, non-commercial vocational training also became significant compared to no vocational training. Approximately 10 % of the variance in the TFL-G-scores can be explained by means of the variables.

The newly included variables in model 2 (Table 12, columns 5-7) all had a significant effect on the financial knowledge and increased the value of the explained variance to 19.3 %. The male respondents responded correctly to 2.9 more items than their female counterparts[22] and beginning students with German as a native language achieved on average 4.75 more points than students with a native language other than German. Finally, with each year between the ages of 17 and 25, the beginning students had approximately 0.33 points more on their TFL-G score. By controlling these variables, the effect of graduating from a vocational secondary school again decreased slightly. The effect of having had a commercial vocational training in general is significant, and the effect of having received a non-commercial vocational training no longer is significant. This can be made plausible, among other things, by the higher age of the respondents after completing vocational training and beginning academic studies. Therefore, it can be assumed that in addition to content-related basics (see analysis of curriculum for commercial vocational training programs in section 3), especially the higher age and the

[22] There is no consensus in the literature as to why male respondents seem to have an advantage over female respondents. One reason could be that men differ from women in their interest in economic topics, which could influence their financial knowledge (Beal/Delpachitra 2003; Cameron et al. 2014). Another could be the task format (Biggs 1999; Bridgeman/Lewis 1994).

experience gained, for example with handling money, account for the relationship between financial knowledge and students who had completed vocational training.

5 Discussion

When discussing the results of this study it must be kept in mind that the sample was drawn from one university only. Even though a wide variety of study programs was considered in the sample, the extent to which the results of the study are representative of young adults who start to study across the entire Federal Republic of Germany is debatable. Admittedly, the aim of this study was not to report on the manifestation of financial knowledge of young adults in the entire country, but rather to investigate the relationship between selected learning opportunities and the financial knowledge of secondary school graduates, which usually can be assessed more accurately in non-representative samples. However, the following explanations shall be seen under these limitations of representativeness. With regard to the sample, some groups of the students were small. For example, in the sample there were only 79 students who had obtained commercial vocational training.

First, it seems the type of school where university entrance qualification is gained is not very important. In our study, beginning students who had graduated from a vocational secondary school specializing in business and economics did not perform significantly better per se than students from a regular secondary school (Hypotheses 1).[23] The small advantages of graduating from a vocational secondary school are completely neutralized if completion of a vocational training program and attending a business and economics class also are considered (see regression models in Table 12). In further studies it should be investigated why no additional effect is achieved in the case of vocational secondary schools. Thus, it could be assumed that students from vocational secondary schools who specialize in business and economics have a greater interest in financial and economic topics, which likewise should influence financial knowledge positively (Aprea/Wuttke 2016; Lalonde/Schmidt 2009). Within the scope of this study other factors such as cognitive abilities which could influence knowledge and learning outcomes were not controlled. In future studies, cognitive abilities should be measured to determine whether differences according to type of school exist. Scales from intelligence tests could be employed to assess the cognitive abilities of respondents. This result should be considered in view of the limited sample in our study.

[23] In our study we did not investigate whether teachers adhered to the curricula during their lessons.

A significant influence was found of attending a business and economics class (Hypothesis 2). The relationship, however, has to be differentiated: While attending an advanced level business and economics class with extensive economic content was accompanied by much better performance on the TFL-G, the students who attended a basic level business and economics class performed slightly worse than the students who did not attend any business and economic class at all. This might be explained by the fact that students with great interest in business and economic topics and who also achieve better grades in this field more often choose an advanced level business and economics class, meaning specific effects occur through the decision to attend an advanced level class. Moreover, in advanced level business and economics classes, single topics are dealt with in more detail. However, in our study it became evident that attending a class covering business and economic topics alone did not automatically lead to better test performance or to enhanced financial knowledge. The aim of this study was not to explain all the differences among groups but rather primarily to explore and uncover differences among groups of beginning students. The focus of further studies shall be the school sector and cause-effect relationships appearing there.

Completion of a vocational training program had the greatest influence on financial knowledge (Hypothesis 3; see also Förster et al. 2017). Here the effects can be differentiated as well: Commercial vocational training had a very large positive effect and its great significance remained, with 5.79 points, when including more socio-economic factors such as age, gender, and native language. Non-commercial vocational training (technical or care professions) had a significant positive effect; however, this effect was no longer significant when other personal variables were controlled (model 2). It can be assumed that perhaps an effect arises due to the increase in individual experience with financial topics (curricular basics from commercial vocational training programs). Furthermore, it can be assumed that this effect stems from professional learning opportunities (including the earning of income). Here micro studies also should be conducted to explore the extent to which a school, company, or private experience, and teaching-learning processes and their interaction lead to an increase in financial knowledge. The positive effect of the respondents' age could be a possible indicator supporting the assumption that personal experience increases with age; however, it can explain only a part of the effect of completing vocational training programs.

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