Article

Can We Shape Trait Professional Skepticism through University Accounting Programs? Evidence from Polish University

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Abstract: This paper examines whether it is possible to shape trait professional skepticism of accounting students through undergraduate and graduate university programs. Using Hurtt's Professional Skepticism Scale (HPSS), we surveyed 432 students of the Poznań University of Economics, who follow either one of the accounting programs or the management program. Comparing the mean scores of first-year undergraduates from each program, who have been studying only for two weeks (initial level of skepticism), with the mean scores of the final-year students as proxies for the entry-level auditors (audit assistants), we calculated the change in the mean scores of students' trait skepticism over four years of study. The results show that only the ACCA-accredited (Association of Chartered Certified Accountants) accounting program significantly increased the level of trait skepticism of the accounting students in comparison to the control group and students who followed the standard accounting program. The robustness analysis shows that independent variables, such as age, the future job that subjects wish to occupy, and the length of professional experience, have no significant impact on the results obtained. However, that both gender and professional experience have a significant impact on the mean scores may be considered as variables supporting the change of professional skepticism within the four years of study.

Keywords: professional skepticism; HPSS; auditing; audit education; university education; accounting education

1. Introduction

Although sustainability reporting is still voluntary for most companies, its acceleration in recent years is indisputable. For example, 85% of the S & P (Standard & Poor's) 500 companies in 2017 issued a sustainability report in some form, compared with just under 20% in 2011 [1]. However, as this type of reporting grows in popularity, it also becomes more complex. The metrics published in CSR (Corporate Social Responsibility) and ESG (Environmental, Social and Governance) documents increase in numbers and become more critical than ever, both for companies and the business environment in which they operate. Information gathered during the sustainability reporting process are used to evaluate risk, make investment and business decisions, drive PR (Public Relations) policies, shape reputation, and influence internal processes. They also play a crucial role in how companies are recognized by societies. Powerful business institutions are considered to be a decisive factor in stimulating sustainable economic development [2]. Therefore, it is not surprising that the growing demand for assurance on such information is being observed. KPMG (KPMG International—one of "Big 4" auditing firms) reports that 67% of the top 250 global companies that report on sustainability

invest in external assurance [3], as "only 29% of investors are confident in the quality of the ESG information they're receiving from companies" [4]. Research also shows that such external assurance provided by CPA (Certified Public Accountant), aside from reducing uncertainty about sustainability information, reaps greater benefits for companies [5]. The growing demand for sustainability attestation induced the reaction of regulatory bodies, such as AICPA (The American Institute of Certified Public Accountants), to issue documents that provide detailed guidance to CPAs performing examinations and reviews relating to sustainability information. However, as regulators emphasize, when the goal is to maximize confidence in the credibility and reliability of information provided, professional skepticism remains the foundation of any auditing procedure [6].

Within the last few years, auditing regulatory bodies have begun to remind auditors to maintain their professional skepticism when they conduct audits. In 2012, the PCAOB (The Public Company Accounting Oversight Board) published "Staff Audit Practice Alert No. 10: Maintaining and Applying Professional Skepticism in Audits", as the board observed continued instances in which auditors did not appropriately apply professional skepticism [7]. The document also states that a lack of professional skepticism was "at least a contributing factor" to some of the audit deficiencies. A year later, the Global Public Policy Committee (GPPC) (comprising BDO (BDO International—global auditing and consulting company), Deloitte, Ernst & Young, Grant Thornton, KPMG, and PricewaterhouseCoopers) issued "Enhancing Auditor Professional Skepticism", in order to "provoke further thought and discussion, with the objective of enhancing the consistent, appropriate application of professional skepticism in practice, and, ultimately, improving audit quality" [8]. The authors point out that one of the reasons why the publication was issued is that "reports from regulators around the world often express concern with the application of professional skepticism by auditors". In 2015, the International Forum of Independent Audit Regulators (IFIAR) published a report on a survey of inspection findings from the previous year [9]. The results of the survey indicated that "a factor underlying many audit deficiencies is insufficient exercise of professional skepticism during performance of the audit".

There is a common agreement among regulators that enhancing the professional skepticism of audit staff is a main challenge for both audit firms and regulatory bodies [10]. In particular, it is important when it comes to auditing fair value measurements, nonrecurring transactions, financing activities, related-party transactions, or in general, all of the areas that include significant management judgment with great measurement uncertainty [7,9]. As the global economy becomes more and more complex, the number of such areas is expected to increase in the future, which makes the case of applying a sufficient level of professional skepticism in auditing procedures even more significant [11,12]. Although leading audit firms make efforts to enhance the professional skepticism of their auditors either by formal training or environmental factors [13,14], such actions do not apply to audit assistants [10], even though the regulators point out that "building in professional skepticism from the outset is key" [15]. In this paper, we focus on enhancing the professional skepticism of accounting students, as after graduating, some of them are being hired by top auditing firms and become audit assistants. Although it is not formalized anywhere, the leading auditing companies expect graduates who start working in the audit department to show an attitude that, at least to some sufficient level, fits with the definition of professional skepticism provided by the auditing standards [16]. The question of whether it is possible to shape professional skepticism through accounting programs offered at the university level has been largely ignored in prior studies.

In this paper, we show that students attending undergraduate and graduate accounting programs that focus more on solving "real life" accounting and auditing problems exercise a significantly higher level of professional skepticism than their counterparts in other fields of economy. Using Hurtt's Professional Skepticism Scale (HPSS), who defines professional skepticism as "a multi-dimensional construct that characterizes the propensity of an individual to defer concluding until the evidence provides sufficient support for one alternative/explanation over others" [10], we examined the change in its level within four years of studies in accounting students and management students (control group). We selected first-year undergraduate students who have been studying for only two weeks

to measure their initial level of professional skepticism. Then, consistent with prior studies [17–20], we selected final-year students as proxies for entry-level auditors (audit assistants). The results we obtained show that the change in the level of professional skepticism in the students attending an ACCA (Association of Chartered Certified Accountants)-accredited accounting program is positive (+3.2%) and significantly different ($p < 0.05$) to that of students attending a standard accounting program (−2.6%), as well as to management students (−4.6%). We also performed a robustness analysis, controlling for gender, professional experience, the length of professional experience, age, and the future profession that subjects wished to practice after graduating. From the selected independent variables, only gender had a partial impact on the obtained results; however, that was only the case for the control group.

Prior researchers examined the impact of academic accounting programs on professional skepticism only to a small degree. The most closely related study was made by Liu [21], who surveyed Chinese students with Hurtt's questionnaire to determine whether ethics education and accounting education were positively related to professional skepticism. She found that ethics education was correlated with professional skepticism; however, she was not able to control students' levels of ethical awareness and professional skepticism before ethics education. Thus, the validity of her finding may be limited. Carpenter et al. [22] examined the impact of the Forensic Accounting Course on skepticism. Their study shows that trained students provided significantly higher initial risk assessments and higher relevancy ratings to fraud risk factors than did a panel of experts. The performance of the trained students, measured seven months after the course, remained the same. Although the authors showed in their study that was possible to shape professional skepticism through accounting education, their study only focused on one very specific course. Therefore, it is difficult to say whether university accounting education in general affects this feature in a positive way. It should also be noted that the authors did not use any of the conventional measures of professional skepticism, such as HPSS. Therefore, the results they obtained are difficult to compare with the results of other studies. Fatmawati et al. [23] surveyed 227 Indonesian accounting students from both undergraduate programs and professional programs with HPSS, and found that the latter was "likely to have higher levels of trait skepticism" compared to the former. Similar to this study, the results they obtained show that the level of professional skepticism may be gender dependent. The authors of this study attempted to measure the effect of formal accounting education on both the situational skepticism level and trait professional skepticism level using a case-based questionnaire. As this approach is relevant for measuring situational skepticism, which is defined as a temporary condition that exists because of the circumstances and contextual features in a given situation [24,25], it is questionable whether it can be of any use when it comes to measuring the trait skepticism level. The problem also occurs when the results are analyzed, as the authors did not use any control group in their study. It is hard to conclude whether university accounting education has a significant impact on the level of the examined characteristic, as the study did not have any reference point in the form of a control group. It should also be noted that the authors measured the professional skepticism level of the final-year students and did not provide any information on the initial level of that trait at the beginning of their university education. Therefore, it is impossible to state that formal accounting education had any impact on the professional skepticism level.

The main goal of our study was to identify whether the university accounting programs had any significant impact on students' trait professional skepticism, as defined by Hurtt [10]. According to some previous studies, it is possible to raise the level of professional skepticism, both through accounting education [22] and training that is not directly related to accounting or auditing [12]. However, these findings do not apply to standard academic programs in accounting. As the requirements regarding the level of professional skepticism demanded from graduates by the audit firms are high, it is important to determine whether university accounting education develops this trait, along with knowledge and skills. Our findings provide some evidence that accounting programs

oriented on solving "real-life" accounting problems may be benefited with an increase in students' trait professional skepticism when compared to other programs in the field of economy.

The remainder of this paper is structured as follows. Section 2 develops the research hypotheses and elaborates the research method. The empirical results are presented in Section 3. Section 4 concludes the paper.

2. Materials and Methods

2.1. Hypothesis Development

Although regulators require that auditors exercise professional skepticism [26] or maintain professional skepticism [27], they do not provide any detailed guidance to auditors on how to do it. Auditors, then, are not being properly instructed in a cognitive process that would lead them to apply an attitude of "a questioning mind" and not to be "satisfied with less-than-persuasive evidence". Some of the most recent research shows that it is possible to effectively train or shape auditors' professional skepticism in a manner consistent with the attitude described in auditing standards. For example, Plumlee et al. [12] showed that training auditors in divergent thinking "increases both the number and quality of explanations generated, and receiving both divergent and convergent-thinking training leads to the likelihood of choosing the correct explanation more than four times that of divergent-thinking training alone". These results provide evidence that it is possible to effectively increase the level of professional skepticism in auditors by the specific kind of training applied. Regulators also suggest that auditors' professional skepticism can be influenced by some business environmental factors. The Professional Skepticism Working Group, which is comprised of representatives from the International Auditing and Assurance Standards Board (IAASB), International Ethics Standards Board for Accountants (IESBA), and the International Accounting Education Standards Board (IAESB), published a report in which the group indicates several observations that enhance the exercise of professional skepticism in an audit [15]. These include business acumen, deadlines and resource constraints, incentive systems, and the firm's culture, as well as awareness of personal traits and biases. Both formal training and workplace environment stimuli are usually provided by the auditing firms. However, this is not the case when it comes to audit assistants. Most audit firms prefer to train them on the job, under the supervision of senior auditors. According to Hurtt et al. [10], this way of developing skepticism may be ineffective, since the training is heavily affected by the demands of supervisors who are under the pressure of clients, where this pressure is then transferred formally or informally to the audit staff [28], who mainly focus on meeting deadlines while leaving their assistants' on-the-job training aside. This is the main reason that the problem of audit assistants' insufficient level of professional skepticism exists. The Professional Skepticism Working Group 2017 report indicates that this is a serious issue that should not be marginalized. The report suggests that "instilling professional skepticism starts at the beginning of one's career" and that "building in professional skepticism from the outset is key" to achieving a sufficient level of it by future auditors.

Generally, audit firms require graduates who start to work as audit assistances to be eminently skeptical, or to at least represent some sufficient level of skepticism that can be developed in the future. However, not all auditors are skeptical by nature and behave according to standard requirements [29,30]; thus, by analogy, we can conclude that not all graduates are equally skeptical. Therefore, if the audit firms do not attach much importance to the training of audit assistants, then the question that must be asked is whether universities are able to shape professional skepticism through accounting and auditing programs or courses. There are very few research results published on this topic. The most closely related one is Carpenter et al. [22], who examined the impact of a forensic accounting course on students' skepticism and fraud-related judgments. They found that students who completed the course provided with significantly higher initial risk assessments than those enrolled in the forensic accounting course and those students from the control group. In their opinion, this suggests that the specialized course may have led to increased skepticism. Additionally, students who

completed the course assigned somewhat higher relevancy ratings to fraud risk factors than did a panel of experts. In contrast, the control-group students ascribed significantly less relevance to these same facts. The study also shows that the effects produced by taking a fraud-specific forensic accounting course persist, as seven months after the course, the trained students' performance was found to be sustained. However, the authors of the study did not use any commonly known professional skepticism scales, such as the Hurtt Professional Skepticism Scale (HPSS) or Rotter Interpersonal Trust Scale (RIT) [31]. This causes two types of problems. Firstly, it becomes questionable whether they really measured the level of professional skepticism and not something else, like for example, professional judgment, as these two notions are often mistakenly equalized. Secondly, it is hard to compare their findings for student groups with other studies. It seems reasonable, then, that the Bachelor's and Master's academic programs in accounting should raise a student's level of skepticism. However, to the best of our knowledge, no empirical evidence exists on the effects of academic programs on professional skepticism. In the hypothesis, we tested whether a university accounting program provided a statistically sufficient increase in professional skepticism measured with HPSS over a nonaccounting program in the field of economy. Thus, the following hypotheses were tested:

Hypothesis 1 (H1). *The level of professional skepticism (measured with HPSS) does not increase significantly in accounting-program students compared to students of other programs in the field of economy.*

Hypothesis 1a (H1a). *The level of professional skepticism (measured with HPSS) does not increase significantly in standard accounting-program students compared to students of the ACCA-accredited accounting program.*

Hypothesis 1b (H1b). *The level of professional skepticism (measured with HPSS) does not increase significantly in ACCA-accredited accounting-program students compared to students of other programs in the field of economy.*

2.2. Data Collection

We collected data to test the hypotheses using a questionnaire developed by Hurtt [29], supplemented with a demographic data form (see Table A1). The researched subjects were first-year undergraduate and final-year graduate accounting students at the Poznan University of Economics and Business. As a control group, we used management students enrolled in a separate program within the same faculty. The selected university is one of the oldest, most prestigious schools of economics in Poland, and was classified in 2017 as the "Top Business School with significant international influence" by the Eduniversal rating agency.

The university offers an undergraduate and two graduate accounting programs, among which one is accredited by the Association of Chartered Certified Accountants, and the second is a standard academic program. Graduates are usually targeted by accounting and auditing firms (including the Big 4). It is worth mentioning that students enrolled in the ACCA-accredited program are exempt from 9 out of the 14 exams required to obtain an ACCA certificate. In most cases, they are certified within one year after graduating. It is also important to mention that there are differences in the course materials and teaching methods used in both graduate accounting programs. Within the accredited program, around 60–70% of the course materials, as well as the final exam tests, are provided by ACCA. This implies that they are applying consistent teaching methods, which are somehow different from the ones being used in the standard university graduate accounting courses. Hence, the students enrolled in the ACCA-accredited program are occasionally separated as a subgroup in the results section.

To ensure that all subjects received the same information, all relevant instructions were provided in a written format as part of the form. The surveying process was conducted between 15 November 2017 and 30 November 2017, after authors were granted permission to use Hurtt's questionnaire from the AAA (American Accounting Association). We personally administered most of the surveying processes, which were performed during the first or last 30 min of the selected lectures. The survey

took approximately 20–25 min to complete. However, there was no specified time limit. All of the students were instructed that taking part in the research was voluntary and that their refusal would meet no consequences for them.

2.3. Research Instrument

The survey form used in the research, developed by Hurtt [29], along with the instructions, was originally designed in English. In order to ensure the accuracy of translation of the research instrument into Polish, consistent with prior studies [20,32], recursive translation procedures were used. The original questionnaire and instructions were initially translated into Polish. A translated version was then retranslated back into English by a certified language lecturer proficient in both English and Polish (native language). After this procedure, identified discrepancies between the English and the Polish versions were discussed jointly within a group of three certified English language lecturers. This process was replicated recursively three times, until all discrepancies were eliminated. The final version of the translated questionnaire and instructions (Appendix B) were then supplemented with the demographic data form (Appendix A). This research instrument was pretested by a group of 12 academics from the Department of Finance and Accounting of Poznan University of Economics and Business.

Appendix A of the questionnaire form collected the demographic data of the researched subjects. The demographic data were further used as control variables in the analysis of the responses provided by the students in Appendix B. The subjects were asked to provide information on age, gender, nationality, professional experience, the profession they wished to pursue after graduating, the type of program they were actually enrolled in (Bachelor's/Master's), and the program field (accounting/management). The professional experience form consisted of four possible choices: the accounting firm/accounting department, auditing company, financial department of a company, and other professional experience. The students marked their area of work experience and provided information about the length of it (years). Additionally, they were instructed not to include any summer jobs, odd jobs, or part-time jobs into the "other professional experience" category. The question about the future profession they would like to pursue after graduating was supplemented with only three possible choices: accountant, auditor, or other. In Appendix B of the questionnaire, participants were asked to answer 30 questions on a six-point Likert scale, which measured the dependent variable with Hurtt's Professional Skepticism Scale.

The students who agreed to take part in the research were asked to provide all the demographic data in Appendix A and provide answers to all the statements in Appendix B. However, questionnaires filled in incompletely were not automatically excluded from the study; they were included into the analyses if the data provided were sufficient for partial testing. For example, if the subject answered only 29 out of the 30 questions in Appendix B, then the data provided in such a questionnaire were included into the test of the six traits and states measured with Hurtt's scale. Such a questionnaire provided data that could be included into an analysis of five traits and states. The pilot test suggested that the translation of the questionnaire was accurate, as the preliminary results were similar to the ones obtained by Hurtt [29] with Professional Auditors (6 out of 12 academics from the Accounting Department who agreed to take a part in the pilot test were actually CPAs).

3. Results

3.1. Responses and Descriptive Statistics

The researched subjects consisted of two main groups: first-year undergraduate accounting students and final-year graduate accounting students. There were also two control groups: first-year undergraduate management students and final-year graduate management students. A total of 432 responses to the questionnaire were received: 146 (at the response rate of 90 percent) and 95 (at the response rate of 84 percent) from the accounting students and 84 (at the response rate of 93 percent)

and 107 (at the response rate of 88 percent) from the management students. The demographic details of the respondents are reported in Table 1.

Table 1. Demographic data of the researched subjects.

	1st Year Undergraduate				2nd Year Graduate				Total	
Demographic Variables	**Accounting Students**		**Management Students**		**Accounting Students**		**Management Students**			
Gender	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Female	92	63.0%	42	50.0%	79	83.2%	64	59.8%	277	64.1%
Male	54	37.0%	42	50.0%	16	16.8%	43	40.2%	155	35.9%
Total	146	100.0%	84	100.0%	95	100.0%	107	100.0%	432	100.0%
Age	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
19 and Under	123	84.2%	69	82.1%	0	0.0%	0	0.0%	192	44.4%
20	17	11.6%	12	14.3%	0	0.0%	0	0.0%	29	6.7%
21	4	2.7%	2	2.4%	0	0.0%	0	0.0%	6	1.4%
22	1	0.7%	0	0.0%	5	5.3%	1	0.9%	7	1.6%
23	1	0.7%	1	1.2%	66	69.5%	63	58.9%	131	30.3%
24 and Over	0	0.0%	0	0.0%	24	25.3%	43	40.2%	67	15.5%
Total	146	100.0%	84	100.0%	95	100.0%	107	100.0%	432	100.0%
Mean	19.2		19.1		23.2		23.6		21.1	
Standard deviation	0.7		0.8		0.6		0.9		2.3	
Professional Experience	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
in accounting	2	1.4%	1	1.2%	41	43.2%	3	2.8%	47	10.9%
in auditing	0	0.0%	0	0.0%	3	3.2%	0	0.0%	3	0.7%
in other areas	30	20.5%	21	25.0%	30	31.6%	82	76.6%	163	37.7%
no experience	114	78.1%	62	73.8%	21	22.1%	22	20.6%	219	50.7%
Total	**146**	**100.0%**	**84**	**100.0%**	**95**	**100.0%**	**107**	**100.0%**	**432**	**100.0%**

Regarding the first-year undergraduate studies, most of the researched subjects were female (63.0%), mostly at the age of 20 or younger (95.9%), with no work experience (78.1%). Comparable demographic statistics were identified for the control group, in which 50% of the respondents consisted of females, mostly at the age of 20 or younger (96.4%) who had no work experience (73.8%). For both groups, approximately 1% had professional experience in accounting or auditing.

The second researched group was the final-year graduate accounting students. It was highly dominated by females (83.2%), which is not unusual, as around 90% of the certified accountants in Poland are women [33]. Most of the researched subjects in this group were 23 years old or older (94.7%), with work experience (77.9%). Note that about half (46.4%) of the final-year graduate accounting students had professional experience in accounting or auditing. In contrast, the control group was not as dominated by females (59.8%); had a similar age structure, with most subjects being 23 years old or older (99.1%); and had a comparable percentage of subjects with work experience (79.4%). However, only very few subjects from the control group had any professional experience in accounting (2.8%), which makes for the biggest difference, in contrast to the final-year graduate accounting students. To control for the effects of the demographic variables, gender, age, work experience (length and profile), and target profession after graduating were included as independent variables in the hypothesis robustness testing.

We calculated Cronbach's alpha for a given number of 432 responses, regardless of the fact that Hurtt [29] preliminarily tested the scale with this coefficient. However, the researched subjects differ from the ones Hurtt surveyed, and more importantly, the questionnaire had been translated into Polish. Although the translation process was realized with great diligence and according to the commonly accepted standards, there may still be some doubt as to whether the context of the statements was delivered appropriately. The internal consistency measured with Cronbach's alpha is 0.81 for all 432 completed questionnaires, which is similar to the values received by [29,31,34]. In Table 2, we report the complete results for Cronbach's alphas for each construct in comparison with Hurtt's [29] results.

Table 2. Internal consistency.

	Cronbach's Alpha	Cronbach's Alpha
Constuct	n = 432	n = 200 (Hurtt 2010)
Search for Knowledge	0.84	0.88
Suspension for Judgment	0.84	0.83
Self determining	0.63	0.76
Interpersonal understanding	0.76	0.90
Self confidence	0.82	0.91
Questioning mind	0.53	0.67
For the whole scale (30 items)	0.81	0.86

There is a large dispute over the acceptable or desirable ranges of Cronbach's alpha for research studies in the social sciences. For example, Nunnally [35] and Carmines and Zeller [36] suggest .80 as a minimum level of reliability for "basic research". In contrast, DeVellis [37], Bland and Altman [38], and Hair et al. [39] suggest a value ranging from 0.70 to 0.80 for comparing groups as satisfactory. Furthermore, Aron and Aron [40] and Field [41] proposed that, for research in psychology, Cronbach's alpha of 0.60 or even lower could be adequate. On the other hand, high values of alpha are not desired, either. Steiner [42] states that a value higher than 0.90 often indicates redundancy and points to an excessive number of items in the scale. Generally, values of alpha between 0.80 and 0.90 are considered to be reliable by most researchers. Therefore, tree constructs of HPSS (Hurtt's Professional Skepticism Scale), do not fall within the given range. There are a couple of possible reasons why lower values of this coefficient were obtained. If the questionnaire is translated or used in a country that is culturally dissimilar to where the scale was developed, it might have a lower reliability [43]. This negative impact on reliability is even greater when some items of the translated questionnaire are written in the opposite direction [44]. As all of these factors took place, such a negative impact should be taken into consideration.

Although the value of the Cronbach's alpha coefficient for the interpersonal understanding construct of 0.76 falls out of the most desirable range, it can still be interpreted as respectable. Researchers agree that a value of this coefficient over 0.75 for social sciences is acceptable [45,46]. However, values of 0.63 and 0.53 calculated for the self-determining and questioning mind constructs show very limited, or poor reliability. Even though some authors, such as Aron and Aron [40] and Field [41], give some credibility to the results with Cronbach's alpha of 0.60, it should be mentioned that every value of alpha lower than 0.70 confirms a random error in at least 50% of the scores. It should be mentioned, however, that other authors who use HPSS also report alphas lower than .70 [29,34] for at least one of the constructs.

3.2. Results for H1, H1a, and H1b

In H1, it is stated that there is no statistically significant difference in the change of professional skepticism level measured with HPSS between students enrolled in the accounting programs and students enrolled in other programs in the field of economy. The descriptive statistics on professional skepticism measured with HPSS are reported in Table 3.

Table 3. Descriptive statistics and test results of trait professional skepticism measured with HPSS.

H1		Accounting Students			Management Students			Significance	
Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
1st year undergraduate	141	121.4	14.2	78	123.8	13.2	1.23	1.97 *	Confirmed
2nd year graduate	95	120.2	13.9	106	118.1	12.1	1.15	1.97 *	Confirmed
Mean Score change		−1.2			−5.7				
Mean Score % change		−1.0%			−4.6%				
H1a		**Accounting Students (standard)**			**Accounting Students (ACCA)**			**Significance**	
Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
1st year undergraduate	141	121.4	14.2	141	121.4	14.2	-	-	-
2nd year graduate	69	118.3	13.4	26	125.3	14.1	2.24	1.98 *	Rejected
Mean Score change		−3.1			3.9				
Mean Score % change		−2.6%			3.2%				
H1b		**Management Students**			**Accounting Students (ACCA)**			**Significance**	
Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
1st year undergraduate	78	123.8	13.2	141	121.4	14.2	1.23	1.97 *	Confirmed
2nd year graduate	106	118.1	12.1	26	125.3	14.1	2.63	2.61 **	Rejected
Mean Score change		−5.7			3.9				
Mean Score % change		−4.6%			3.2%				

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

The mean scores achieved by the first-year bachelor (undergraduate) accounting students and the control group (management students) are statistically indifferent ($p < 0.05$). Table 3 also shows that, consistent with the expectation, the mean score of the final-year master students enrolled in the accounting program does not differ from the mean score of the control group ($p < 0.05$). Although the mean levels of professional skepticism measured with HPSS in both groups have changed during the four years of education, the two accounting programs have, on average, no significant impact on the relative change compared to the control group. Therefore, we can acknowledge H1 to be confirmed.

With H1a, we distinguish between students of two different master programs in accounting. We also predict that neither of these two programs has a significant impact on the change in the students' professional skepticism level, comparing one to another. As there is only one accounting program at the undergraduate level, and both groups have an equal initial mean score, the hypothesis is confirmed if there is no statistically significant difference in the mean scores of these two groups at the final-year graduate level. Table 3 shows that H1a must be initially rejected, as the mean score differs significantly ($p < 0.05$). What is also interesting is that students of the ACCA-accredited accounting program increased their initial mean score by 3.9 points (3.2%), while their colleagues enrolled in the standard academic master program in accounting decreased their mean score since being a first-year undergraduate by 3.1 points (-2.6%).

With H1b, we expect that the impact of the master-level accounting program accredited by ACCA had no significant impact on the change in the professional skepticism level measured with HPSS compared to the control group. As the mean scores of these two groups differ significantly ($p < 0.01$) at the final-year master level and are statistically indistinguishable ($p < 0.05$) at the first-year bachelor level, the hypothesis is initially rejected.

3.3. Robustness Analysis

We performed a robustness analysis to confirm or disconfirm the impact of independent variables on the test results of hypotheses H1, H1a, and H1b. Firstly, we analyzed whether gender significantly affected the mean score and standard deviation of the collected questionnaire results. We expected there to be no relation between gender and the level of skepticism measured with HPSS and, in consequence, that the gender structure of the researched groups did not significantly affect the test results of H1, H1a, and H1b. The mean score of males at the first-year undergraduate level was significantly ($p < 0.01$) higher than the mean score of females. At the final-year graduate level, such significance in the difference of the mean scores did not occur. In order to control for gender, we equalized the gender structures of the first-year undergraduate groups and respective final-year graduate groups. The first time, we recalculated the mean scores and standard deviations of the final-year graduate accounting group and control group, according to the gender structure of the adequate first-year undergraduate groups. The second time, we did it the opposite way, recalculating the mean scores and standard deviations of the first-year undergraduate group and control group according to the gender structure of the adequate final-year graduate groups. The results show there are no significant differences in the mean scores of the accounting groups and control groups with equalized gender structures. Therefore, the gender of the researched subject has no significant impact on the test results of H1. Detailed results of the above analysis are presented in Table 4.

Table 4. The impact of gender on Hypothesis 1 (H1).

			Females			Males			Significance	
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
	1st year undergraduate	128	119.6	13.7	91	126.0	13.3	3.45	3.33 **	Rejected
	2nd year graduate	143	118.7	13.9	58	120.1	10.3	0.69	1.97 *	Confirmed
	Mean Score change			−0.9			−5.9			
	Mean Score % change			−0.8%			−4.7%			
			Accounting Students			Management Students			Significance	
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
Gender structure as in 1st year undergraduate	1st year undergraduate	141	121.4	14.2	78	123.8	13.2	1.23	1.97 *	Confirmed
	2nd year graduate	95	120.9	13.6	106	118.3	11.7	1.46	1.98 *	Confirmed
	Mean Score change			−0.5			−5.5			
	Mean Score % change			−0.4%			−4.4%			
			Accounting Students			Management Students			Significance	
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
Gender structure as in 2nd year graduate	1st year undergraduate	141	120.4	14.1	78	123.1	12.6	1.41	1.97 *	Confirmed
	2nd year graduate	95	120.2	13.9	106	118.1	12.1	1.15	1.98 *	Confirmed
	Mean Score change			−0.2			−5			
	Mean Score % change			−0.2%			−4.1%			

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

The robustness analysis of the gender impact on H1a and H1b was performed with the same procedures as for H1. Under H1a, we compared the accounting students following the standard academic program and the ACCA-accredited program. Controlling for gender, we equalized the gender structure threefold, using female and male shares occurring in the first-year undergraduate accounting students, final-year graduate accounting students enrolled in the standard program, and final-year graduate accounting students enrolled in the ACCA-accredited program. The results in Table A2 show that, under one of the above equalizations of female and male shares in the researched groups of subjects, gender has a significant ($p < 0.05$) impact on H1a. For the other two, such significance does not occur. For H1b, we analyzed the impact of gender structure on the main result, with two equalizations of female and male shares in the researched groups, and found it to be insignificant. The details of the analysis are reported in Table A3.

In the next stage, we measured the impact of work experience on the professional skepticism level. We predicted that such an impact existed, but that it did not significantly affect the PS (Professional Skepticism) level measured with HPSS. The results show that professional experience does not have a significant ($p < 0.05$) impact on the mean score for first-year undergraduate students, but that it does for the final-year graduate groups (Table 5).

Further analysis shows that the impact of professional experience on the final-year students' mean scores applies only to the control group, and that it is significant at $p < 0.01$. Detailed results are presented in Table A4. We also disaggregated professional experience into four components, which were given to the researched subjects as possible choices, in order to verify whether significant differences in mean scores for the final-year control group applied to any professional experience, or only to a particular type of it. However, we decided to re-aggregate the data collected for professional experience in the Accounting Department or Accounting Office, Auditing Firm, and Financial Department into one category (Experience in Accounting or Finance), as only eight subjects out of 219 for the first-year undergraduate groups claimed to have such work experience, and eight subjects out of 201 for the final-year graduate students declared to have worked in an Auditing Firm or Financial Department. We recalculated, then, the means and standard deviations for the new aggregated item, "Experience in Accounting or Finance", and compared it with the mean scores of the subjects with no professional experience or with other professional experience. The dependence identified earlier for the control group at the final-year graduate level was significant ($p < 0.05$ and $p < 0.01$) for both groups with professional experience, in comparison to the group with no work experience. The detailed results of the significance tests for the mean comparisons of the three extracted groups of subjects are reported in Table A5.

In order to control for professional experience, which was the independent variable, we adopted a procedure identical to the case of gender. The mean scores and standard deviations were recalculated under the assumption that the professional experience structure would remain static. The results reported in Table 6 show that professional experience has a significant ($p < 0.01$) impact on H1.

Table 5. The impact of professional experience on trait professional skepticism level.

Subjects and Means	No Experience			With Experience			Significance		
	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
1st Year Undergraduate	165	121.4	13.4	54	124.9	14.6	1.63	1.98 *	Confirmed
Accounting Dept./Office				3	118.0	16.6			
Auditing Firm				-	-	-			
Financial Department				5	136.0	17.6			
In Other Areas				46	124.1	14.2			
2nd Year Graduate	46	115.2	12.3	155	120.6	13.1	2.49	1.97 *	Rejected
Accounting Dept./Office				41	120.9	13.6			
Auditing Firm				3	138	19.5			
Financial Department				5	121	15.2			
In Other Areas				106	120	12.7			
Mean Score change		−6.2			−4.3				
Mean Score % change		−5.1%			−3.4%				

* Significant at $p < 0.05$ (two-tailed).

Table 6. The impact of professional experience on H1.

	Subjects and Means	Accounting Students			Management Students			Significance		
		n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Professional experience structure as in 1st year undergraduate	1st year undergraduate	141	121.4	14.2	78	123.8	13.2	1.23	1.97 *	Confirmed
	2nd year graduate	95	119.0	13.8	106	114.3	10.7	2.69	2.60 **	Rejected
	Mean Score change		−2.43			−9.48				
	Mean Score % change		−2.0%			−7.7%				
		Accounting Students			Management Students			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Professional experience structure as in 2nd year graduate	1st year undergraduate	141	123.7	17.0	78	126.6	11.7	1.34	1.97 *	Confirmed
	2nd year graduate	95	120.2	13.9	106	118.1	12.1	1.145	1.97 *	Confirmed
	Mean Score change		−3.51			−8.5				
	Mean Score % change		−2.8%			−6.7%			1	1

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

If the work experience structure of first-year undergraduate groups persisted in the final-year graduate groups, then the result of the H1 test is opposite to the one initially obtained. The same procedure was applied in order to test H1a and H1b. For all equalized professional experience structures of first-year undergraduate groups and their corresponding final-year graduate groups, H1a and H1b were rejected. These results support the expectation that work experience does not significantly affect the professional skepticism level of the researched subjects (measured with HPSS). The detailed results of the H1a and H1b tests controlled for the work experience factor are provided in Tables A6 and A7, respectively.

Aside from the area of professional experience, subjects were asked to provide information on their length of service (years). We expect that this independent variable would have no significant influence on the skepticism level of the researched subjects measured with HPSS during their university years. One-way ANOVA ($p < 0.05$) was carried out to test the significance of such an impact. The mean scores of the researched subjects were divided into six groups, with respect to the length of service that subjects provided in a questionnaire. Each of the six dependent variable sets was examined for significant outliers with InterQuartile Range (IQR), tested for normality with Shapiro-Wilk ($p < 0.05$), and tested for homogeneity of variances with Levene's test ($p < 0.05$). All the required assumptions to run one-way ANOVA were met. The results reported in Table 7 show that the length of service did not significantly ($p < 0.05$) affect the level of professional skepticism measured with HPSS in the researched subjects.

Table 7. The impact of length of service on trait professional skepticism level.

Length of Service (years)	n	Mean Score	Standard Deviation			
0	211	120.0	13.2			
(0, 1]	82	122.2	15.5			
(1, 2]	66	121.6	12.5			
(2, 3]	31	119.7	12.4			
(3, 4]	13	125.1	14.0			
>4	17	120.8	12.0			
	420					
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Test F**
Between Groups	731.7	5.0	146.3	0.8489	0.5157	2.2359
Within Groups	70,853.0	411.0	172.4			
Total	71,584.7	416.0				

A similar analysis was additionally implemented two more times, for undergraduate subjects and graduate subjects separately. As all sets of dependent data met the assumptions required to run ANOVA (no outliers, positively tested for normality, and tested for homogeneity of variances), the analysis was carried out in order to verify whether there were statistically significant differences of mean scores between the groups of subjects with various lengths of service. The results of both analyses reported in Tables A8 and A9 support the expectation that length of service is insignificant at ($p < 0.05$) for the professional skepticism level. It should, however, be mentioned that, for the final-year graduate group, the scores of subjects with no professional experience were removed from data set carried out with ANOVA. As it was reported in Table 5, there is a statistically significant difference in the mean scores between groups of subjects with and without professional experience. The impact of the absence of professional experience was already tested (Table 6, Table A6, and Table A7), and there was no point in replicating this analysis all over again. As all the results reported in Table 7, Table A8, and Table A9 do not show a statistically significant impact of the length of service on the mean scores of the subjects, further analyses controlled for this independent variable were not carried out.

We predicted that the age of researched subjects would have no significant impact on the average professional skepticism level measured with HPSS. In order to verify this expectation, one-way ANOVA ($p < 0.05$) was carried out for the mean scores of the subjects divided into age groups, as in Table 1. Similarly to the previous uses of ANOVA, we pretested the data sets for outliers, normality, and homogeneity of variances to confirm the possibility of using the one-way analysis of variances. The

obtained results show that there are no statistically significant differences in the mean score between the groups of subjects of different ages. The detailed results are reported in Table 8.

Table 8. The impact of age on trait professional skepticism level.

Age	n	Mean Score	Standard Deviation			
19 and Under	182	121.5	13.7			
20	29	125.6	14.8			
21	6	127.7	16.1			
22	6	118.7	10.6			
23	131	119.0	13.6			
24 and Over	66	119.7	11.9			
	420					
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Test F**
Between Groups	1571.6	5.0	314.3	1.7339	0.1256	2.2358
Within Groups	74,866.0	413.0	181.3			
Total	76,437.6	418.0				

We also ran a one-way ANOVA ($p < 0.05$) separately for the undergraduate and graduate student groups. The initial pretests showed that all data sets met the assumptions required for such analysis. The results of both analyses are reported in Tables A10 and A11. No statistically significant differences in the mean scores between the groups of different ages was found. Consequently, the controlled analysis was unnecessary.

We also expect that subjects' predictions of the future profession they wish to follow has very limited influence on the professional skepticism level measured with HPSS. Therefore, we predict that it provides no statistically significant impact on the subjects' mean scores. To analyze if there is a relation between this independent variable and the mean scores, we used one-way ANOVA ($p < 0.05$), dividing subjects into three independent groups with respect to the future profession they wished to follow. We pretested the data sets for outliers, normality, and homogeneity of variances. All the assumptions required for implementing ANOVA were met. The results presented in Table 9 support the previously made expectation, as there is no statistically significant relation between the dependent and independent variables.

Table 9. The impact of the kind of profession which subjects wished to obtain on trait professional skepticism level.

Ideal Future Profession	n	Mean Score	Standard Deviation			
Accountant	110	119.4	13.4			
Auditor	27	120.9	14.5			
Other	283	121.2	13.4			
	420					
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Test F**
Between Groups	248.9	2.0	124.5	0.6865	0.5039	3.0174
Within Groups	75,423.6	416.0	181.3			
Total	75,672.5	418.0				

In the next stage, we carried out a one-way ANOVA ($p < 0.05$) separately for both the first-year undergraduate students and the final-year graduate students after pretesting the assumptions. The results, reported in Tables A12 and A13, also show that there is no statistical significance of the impact of the future profession subjects wished to follow on mean scores. Therefore, controlled analyses were not performed.

In the final stage of analysis, we decomposed the mean scores obtained by each of the researched and control groups into six characteristics that comprise the HPSS. In respect to H1, we expected that the level of at least one of these characteristics in the researched subjects, measured with HPSS, would significantly change over four years of education, compared to the control group's scores. In Table 10, we provide detailed results for the decomposed means, which confirms the expectations. The mean

score for the "search for knowledge" characteristics changed significantly in comparison to the control group during the four years of university education. However, it should be noted that the significance of this change results exclusively from the fact that the average value of this feature for the group of management students has fallen from 24.8 in the first year of undergraduate studies to 22.9 in the final year of graduate studies. If only the group of accounting students is considered, the change in this characteristic within four years of studies is positive but statistically insignificant.

We also performed a similar analysis that extends the informative content of the results obtained for H1a and H1b. The detailed statistics are reported in Tables A14 and A15. The comparison of accounting students following a standard academic program with those following an ACCA-accredited program shows significant changes in the mean scores during their four years of education for the following two characteristics: search for knowledge, and a questioning mind. When the ACCA-accredited accounting program group is compared to the management students, 4 out of 6 characteristic levels measured with HPSS changed significantly over the four years of education in favor of the former: search for knowledge, interpersonal understanding, self-confidence, and a questioning mind.

Table 10. Test results for decomposed HPSS.

	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
		Accounting Students			**Management Students**			**Significance**		
1st year undergraduate	Search for knowledge	143	24.0	5.1	83	24.8	4.6	1.10	1.97 *	Confirmed
	Suspension of judgment	145	22.4	4.7	83	21.1	4.7	1.93	1.97 *	Confirmed
	Self determining	146	22.2	3.8	84	21.9	3.9	0.54	1.97 *	Confirmed
	Interpersonal understanding	146	22.7	4.4	83	23.5	4.1	1.25	1.97 *	Confirmed
	Self confidence	146	20.2	4.8	84	22.7	4.5	3.85	3.3 ***	Rejected
	Questioning mind	145	10.2	2.6	81	9.9	2.7	0.68	1.97 *	Confirmed
		Accounting Students			**Management Students**			**Significance**		
	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
2nd year graduate	Search for knowledge	95	24.3	5.1	107	22.9	4.8	2.11	1.97 *	Rejected
	Suspension of judgment	95	21.9	4.7	107	20.9	4.0	1.53	1.97 *	Confirmed
	Self determining	95	22.1	3.6	107	22.6	3.2	1.00	1.97 *	Confirmed
	Interpersonal understanding	95	21.6	4.8	106	20.8	4.2	1.31	1.97 *	Confirmed
	Self confidence	95	20.0	3.6	107	21.0	3.5	2.02	1.97 *	Rejected
	Questioning mind	95	10.3	2.5	107	10.0	2.2	0.99	1.97 *	Confirmed

Components	Change of Mean	% Change of Mean	Mean Score	Standard Deviation
	Accounting Students		**Management Students**	
Search for knowledge	0.3	1.4%	−1.9	−7.6%
Suspension of judgment	−0.5	−2.3%	−0.2	−0.9%
Self determining	−0.1	−0.6%	0.6	2.9%
Interpersonal understanding	−1.1	−5.0%	−2.7	−11.5%
Self confidence	−0.2	−0.8%	−1.6	−7.2%
Questioning mind	0.1	1.1%	0.0	0.5%

4. Conclusions

This paper contributes to the auditing and accounting literature by providing empirical evidence showing that it is possible to effectively develop professional skepticism in students through a university accounting program. We compared the change of professional skepticism level measured with HPSS over a four-year period, with students enrolled in a standard accounting program, ACCA-accredited accounting program, and management program (control group). We found that the change in mean score for students enrolled in the ACCA-accredited program is positive and significantly higher compared to the changes in mean scores of their counterparts from both the control group and the standard accounting program group. The robustness analysis shows that independent variables, such as age, future jobs that subjects wish to occupy, and length of professional experience, have no significant impact on the results obtained. However, both gender and professional experience have a significant impact on the mean scores of the researched subjects, and may be considered to be variables supporting the change of professional skepticism within the four years of study. Furthermore, we find that students enrolled in the ACCA-accredited accounting program gain an advantage in the change of professional skepticism level through two out of six characteristics that comprise HPSS when compared to their counterparts enrolled in the standard accounting program (Table A14), and four out of six when compared to students from the control group (Table A15). All of these provide some evidence that it is possible to efficiently shape the professional skepticism of students through proper university accounting programs that are oriented to solve "real-life" accounting and auditing problems.

This study also revealed that, for two out of the three researched groups of students, the mean score measured with HPSS decreased during the four years of study, which may be considered surprising. Additionally, Cronbach's alphas for two out of six constructs comprising professional skepticism under HPSS fell out of the meaningful range. Similar problems with low alpha values were reported in prior studies in which HPSS was a basic research instrument [21,34,47,48]. These findings suggest that something may be wrong with the research instrument, and that HPSS as a whole should at least be reconsidered.

To our best knowledge, this is the first study that shows the impact of university accounting education on trait professional skepticism in dynamic terms. Unlike other studies, we do not only show a definite final level of mean professional skepticism in a chosen group of students, but we also show a change in its level over the four-year period of university education. Moreover, our study compares the impact of two different accounting programs on examined trait and compares the results with the control group, which, to the best of our knowledge, has not been shown in the published research. We also provide very detailed robustness analysis results, which makes our study more valuable in terms of their interpretation and gives a deep insight into detailed partial findings for the significance of independent variables.

The implications of these results are important to standard setters, audit firms, researchers, and auditing educators. First, they may benefit global standard setters, such as the International Accounting Education Standards Board (IAESB), in redefining the statement "building in professional skepticism from the outset" [15] by extending its reach to the university education level. Originally, this watchword referred to instilling professional skepticism at the beginning of one's auditing career. The findings of this study, however, suggest that building in professional skepticism can start at the university level, long before one's auditing or accounting career begins. In practical aspects, regulatory bodies may reconsider the way they cooperate with universities and focus more on the way accounting and auditing are being taught at both the undergraduate and graduate level.

Furthermore, the findings may be of interest to auditing educators and audit firms, as they are investing considerable resources in training that should provide a better exercise of professional skepticism. Findings in this paper suggest that accounting education at the university level may be considered not only to be a process of transferring theoretical knowledge and practical skills, but also building in professional skepticism through solving "real-life" accounting and auditing problem-oriented programs. The latest reports issued by regulators [15], for example, suggest that,

aside from knowledge itself, greater attention should be paid to enhancing skeptical thinking from the very beginning of one's accounting education. University educators should be aware of the fact that, apart from the education itself, it is important to develop students' attitudes to meet the criteria of professional skepticism described in the standards. It can be of help to students not only in developing their audit career, but also in allowing for a better and deeper understanding of accounting issues that auditors already face at the stage of university education.

Additionally, these findings have potential implications for audit firms that constantly face the problem of audit deficiencies, which are mostly considered to be the direct result of the insufficient exercise of professional skepticism while performing the audit procedures. Specifically, it may encourage audit firms to extend their cooperation with universities offering accounting and auditing programs to joint designing and conducting undergraduate—and graduate-level courses and programs.

These findings also have implications for accounting and auditing education research. Consistent with prior studies on enhancing professional skepticism through proper training, we suggest that additional empirical research is needed to examine this problem, as very few papers have provided research results in this area so far.

The study has some limitations that should be taken into consideration when interpreting the findings. It should be noted that professional skepticism in this study was measured with HPSS, which means that all of the results refer to this construct of professional skepticism only. Furthermore, the values of Cronbach's alpha for two out of six characteristics that are measured with HPSS obtained in this study are far below the recommended minimum level, which may raise some questions concerning the reliability of the partial results. However, alpha for the whole scale (0.81) fits into the optimum range of values recommended in the literature [49,50]. It should also be noted that the questionnaire used in this study was translated into Polish. Although all of the translation procedures recommended in the literature were applied, some inaccuracies may still exist and affect the results. In addition, students from the Poznan University of Economics participated in the research. Although the study is a generic one, the results may be influenced by a university-specific attitude of researched subjects. It should then be noted that replicating this study in other universities may provide different results. Finally, students from the last-year graduate program who participated in this study are a different group of students to those who started university education at the first year of their undergraduate program, and are also researched in this paper. Measuring change in the level of professional skepticism, we compared the means of these two groups of students. However, participants from the last year started their university education four years earlier in different social and economic conditions that are incomparable with conditions experienced by first-year students included in the study. It should thus be noted that these different social and economic environments may have an impact on the results obtained.

Although the results of this study provide some evidence on trait professional skepticism development though university accounting education, further research is needed. Our study focused on researching two different groups of students—first-year undergraduates and last-year graduates—in order to evaluate the change in trait professional skepticism level using HPSS. It would be valuable if further research could measure this trait in the group of first-year undergraduate students and then track and measure the same students as they reach their final year of university education.

Author Contributions: Both authors made equal contributions to the work in this editorial paper.

Appendix A

Table A1. Demographic data and professional statistics form—part A of the questionnaire.

Gender	choose option from the list
Age	enter the number
Country in which I conduct audits of financial statements	enter the name of the country
Nationality	enter your nationality
Professional experience (in years) as an auditor	enter the number
The average number of audited financial statements during the year	enter the number
The average duration of a single audit (in weeks)	enter the number
Which type of a company is dominant in your client portfolio for auditing services?	Small (up to 50 employees, up to 10 million euros of annual turnover, balance sheet total under 10 million euros), Medium (up to 250 employees, up to 50 million euros turnover and balance sheet total under 43 million euros), Large (over 250 employees, over 50 million euros of annual turnover or balance sheet total over 43 million euros). Choose the dominant from the list.
Are you certified by ACCA, CIMA, CFA, CPA or any other similar institution?	choose option from the list
Do you participate in voluntary training for statutory auditors?	choose option from the list

Appendix B

Table A2. The impact of gender on H1a.

	Subjects and Means	Accounting Students (standard)			Accounting Students (ACCA)			Significance		
		n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Gender structure as in 1st year undergraduate	1st year undergraduate	141	121.4	14.2	141	121.4	14.2	-	-	-
	2nd year graduate	69	119.1	14.6	26	125.2	14.1	1.83	1.98 *	Confirmed
	Mean Score change		−2.3			3.8				
	Mean Score % change		−1.9%			3.1%				
		Accounting Students (standard)			**Accounting Students (ACCA)**			**Significance**		
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
Gender structure as in 2nd year graduate accounting (standard)	1st year undergraduate	141	120.1	14.1	141	120.1	14.1	-	-	-
	2nd year graduate	69	118.3	13.4	26	125.7	15.6	2.29	1.98 *	Rejected
	Mean Score change		−1.8			5.6				
	Mean Score % change		−1.5%			4.7%				
		Accounting Students (standard)			**Accounting Students (ACCA)**			**Significance**		
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
Gender structure as in 2nd year graduate accounting (ACCA)	1st year undergraduate	141	121.3	14.0	141	121.3	14.0	-	-	-
	2nd year graduate	69	118.9	14.4	26	125.7	15.6	1.99	1.98 *	Rejected
	Mean Score change		−2.36			4.4				
	Mean Score % change		−1.9%			3.6%				

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

Table A3. The impact of gender on H1b.

	Subjects and Means	Management Students			Accounting Students (ACCA)			Significance		
		n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Gender structure as in 1st year undergraduate	1st year undergraduate	78	123.8	13.2	141	121.4	14.2	1.23	1.97 *	Confirmed
	2nd year graduate	106	118.3	11.6	26	125.2	14.1	2.60	1.98 *	Rejected
	Mean Score change		−5.5			3.8				
	Mean Score % change		−4.4%							
		Management Students			**Accounting Students (ACCA)**			**Significance**		
	Subjects and Means	**n**	**Mean Score**	**Standard Deviation**	**n**	**Mean Score**	**Standard Deviation**	**t**	**p**	**Hypothesis Test Result**
Gender structure as in 2nd year graduate	1st year undergraduate	78	123.1	12.4	141	121.3	14.0	0.95	1.97 *	Confirmed
	2nd year graduate	106	118.1	12.1	26	125.7	15.6	2.70	1.98 *	Rejected
	Mean Score change		−5			4.4				
	Mean Score % change		−4.1%							

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

Table A4. The impact of professional experience on H1.

Accounting Students	No Experience			With Experience			Significance		
	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
1st year undergraduate	109	121.1	13.4	32	122.4	16.4	0.46	1.97 *	Confirmed
2nd year graduate	24	118.2	13.5	71	121.6	14.4	1.01	1.98 *	Confirmed
Mean Score change		−2.9			−0.83				
Mean Score % change		−2.4%			−0.7%				
Management Students	**No Experience**			**With Experience**			**Significance**		
	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
1st year undergraduate	56	122.1	13.6	22	128.4	11.1	1.92	1.97 *	Confirmed
2nd year graduate	22	112	10	84	119.7	12.1	2.76	2.61 **	Rejected
Mean Score change		−10.1			−8.62				
Mean Score % change		−8.3%			−6.7%				

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

Table A5. The impact of professional experience on H1.

Accounting Students	No Experience			Experience in Accounting or Finance			Other Professional Experience			Significance		
	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
	109	121.1	13.4	6	126.3	19.1				0.91	1.98 *	Confirmed
1st year undergr.				6	126.3	19.1	26	121.5	15.9	0.65	2.04 *	Confirmed
	109	121.1	13.4				26	121.5	15.9	0.13	1.97 *	Confirmed
	24	118.2	13.5	46	121.7	14.1				1	1.99 *	Confirmed
2nd year graduate				46	121.7	14.1	25	121.5	14.9	0.06	1.98 *	Confirmed
	24	118.2	13.5				25	121.5	14.9	0.81	2.01 *	Confirmed
Management Students	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Standard Deviation	t	p	0
	56	122.1	13.6	2	138.0	8.0				1.63	2.00 *	Confirmed
1st year undergr.				2	138.0	8.0	20	127.4	11.2	1.29	2.07 *	Confirmed
	56	122.1	13.6				20	127.4	11.2	1.56	1.99 *	Confirmed
	22	112	10	3	126.3	14.2				2.22	2.07 *	Rejected
2nd year graduate				3	126.3	14.2	81	119.5	12.1	0.95	1.99 *	Confirmed
	22	112	10				81	119.5	12.1	2.67	2.63 **	Rejected

*, ** Significant at $p < 0.05$ and $p < 0.01$, respectively (two-tailed).

Table A6. The impact of professional experience on H1a.

		Accounting Students (Standard)			Accounting Students (ACCA)			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Work experience structure as in 1st year undergraduate	1st year undergraduate	141	121.4	14.2	141	121.4	14.2	-	-	-
	2nd year graduate	69	114.5	10.7	26	126.0	9.6	4.80	3.39 ***	Rejected
	Mean Score change			−6.94			4.6			
	Mean Score % change			−5.7%			3.8%			
		Accounting Students (Standard)			Accounting Students (ACCA)			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Work experience structure as in 2nd year graduate accounting (standard)	1st year undergraduate	141	123.8	17.1	141	123.8	17.1	-	-	-
	2nd year graduate	69	118.3	13.4	26	125.5	13.7	2.31	1.98 *	Rejected
	Mean Score change			−5.52			1.65			
	Mean Score % change			−4.5%			1.3%			
		Accounting Students (Standard)			Accounting Students (ACCA)			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Work experience structure as in 2nd year graduate accounting (ACCA)	1st year undergraduate	141	124.0	17.4	141	124.0	17.4	-	-	-
	2nd year graduate	69	118.9	13.7	26	125.7	15.6	2.08	1.98 *	Rejected
	Mean Score change			−5.15			1.67			
	Mean Score % change			−4.2%			1.3%			

*, **, *** Significant at $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (two-tailed).

Table A7. The impact of professional experience on H1b.

		Management Students			Accounting Students (ACCA)			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Work experience structure as in 1st year undergraduate	1st year undergraduate	78	123.8	13.2	141	121.4	14.2	1.23	1.97 *	Confirmed
	2nd year graduate	106	114.3	10.7	26	126	9.6	5.10	3.36 ***	Rejected
	Mean Score change			−9.48			4.6			
	Mean Score % change			−7.7%			3.8%			
		Management Students			Accounting Students (ACCA)			Significance		
	Subjects and Means	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
Work experience structure as in 2nd year graduate	1st year undergraduate	78	126.6	11.7	141	124.0	17.4	1.17	1.97 *	Confirmed
	2nd year graduate	106	118.1	12.1	26	125.7	15.6	2.70	2.61 **	Rejected
	Mean Score change			−8.5			1.67			
	Mean Score % change			−6.7%			1.3%			

*, **, *** Significant at $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (two-tailed).

Table A8. The impact of length of service on trait professional skepticism level for undergraduate students.

Length of Service (years)	n	Mean Score	Standard Deviation			
0	165	121.4	13.4			
(0, 1]	21	121.1	19.3			
(1, 2]	17	124.9	10.5			
(2, 3]	8	128.1	8.1			
(3, 4]	8	131.0	13.6			
ANOVA	219 Sum of Squares	df	Mean Square	F	Sig.	Test F
Between Groups	1143.6	4.0	285.9	1.5052	0.2018	2.4138
Within Groups	40,649.0	214.0	189.9			
Total	41,792.6	218.0				

Table A9. The impact of length of service on trait professional skepticism level for graduate students.

Length of Service (years)	n	Mean Score	Standard Deviation			
(0, 1]	37	122.3	16.2			
(1, 2]	56	120.4	11.2			
(2, 3]	31	118.4	15.0			
(3, 4]	11	119.8	11.5			
>4	20	122.1	11.8			
ANOVA	155 Sum of Squares	df	Mean Square	F	Sig.	Test F
Between Groups	306.6	4.0	76.7	0.4250	0.7904	2.4320
Within Groups	27,054.6	150.0	180.4			
Total	27,361.2	154.0				

Table A10. The impact of age on trait professional skepticism level for undergraduate students.

Age	n	Mean Score	Standard Deviation			
19 and Under	184	121.5	13.7			
20	29	125.6	14.8			
21	6	127.7	16.1			
ANOVA	219 Sum of Squares	df	Mean Square	F	Sig.	Test F
Between Groups	590.2	2.0	295.1	1.5325	0.2184	3.0383
Within Groups	41,013.7	213.0	192.6			
Total	41,603.9	215.0				

Table A11. The impact of age on trait professional skepticism level for graduate students.

Age	n	Mean Score	Standard Deviation			
22	6	119.7	10.6			
23	129	118.8	13.6			
24 and Over	66	119.7	11.9			
ANOVA	201 Sum of Squares	df	Mean Square	F	Sig.	Test F
Between Groups	40.1	2.0	20.1	0.1184	0.8884	3.0415
Within Groups	33,539.8	198.0	169.4			
Total	33,579.9	200.0				

Table A12. The impact of the profession that subjects wished to obtain on trait professional skepticism level for undergraduate students.

Ideal Future Profession	n	Mean Score	Standard Deviation			
Accountant	59	120.5	13.1			
Auditor	14	118.5	16.2			
Other	146	123.2	13.8			
	219					
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Test F**
Between Groups	502.8	2.0	251.4	1.3194	0.2695	3.0379
Within Groups	40,964.5	215.0	190.5			
Total	41,467.3	217.0				

Table A13. The impact of the profession that subjects wished to obtain on trait professional skepticism level for graduate students.

Ideal Future Profession	n	Mean Score	Standard Deviation			
Accountant	51	118.1	13.6			
Auditor	13	123.5	12.5			
Other	137	119.0	12.6			
	201					
ANOVA	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Test F**
Between Groups	308.1	2.0	154.0	0.9273	0.3973	3.0415
Within Groups	32,886.7	198.0	166.1			
Total	33,194.7	200.0				

Table A14. Test results for decomposed HPSS.

		Accounting Students			Accounting Students			Significance	
	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
1st year undergraduate	Search for knowledge	143	24.0	5.1	143	24.0	5.1			
	Suspension of judgment	145	22.4	4.7	145	22.4	4.7			
	Self determining	146	22.2	3.8	146	22.2	3.8			
	Interpersonal understanding	146	22.7	4.4	146	22.7	4.4			
	Self confidence	146	20.2	4.8	146	20.2	4.8			
	Questioning mind	145	10.2	2.6	145	10.2	2.6			

		Accounting Students (Standard)			Accounting Students (ACCA)			Significance	
	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
2nd year graduate	Search for knowledge	69	23.6	5.0	26	26.4	4.9	2.46	1.97 *	Rejected
	Suspension of judgment	69	21.8	4.2	26	22.1	5.8	0.26	1.97 *	Confirmed
	Self determining	69	21.9	3.7	26	22.5	3.4	0.63	1.97 *	Confirmed
	Interpersonal understanding	69	21.1	4.9	26	22.9	4.3	1.70	1.97 *	Confirmed
	Self confidence	69	20.0	3.5	26	20.2	3.8	0.20	1.97 *	Confirmed
	Questioning mind	69	9.9	2.5	26	11.3	2.3	2.60	2.60 **	Rejected

		Accounting Students (Standard)		Accounting Students (ACCA)	
	Components	Change of Mean	% Change of Mean	Mean Score	Standard Deviation
	Search for knowledge	−0.4	−1.8%	2.4	9.9%
	Suspension of judgment	−0.6	−2.6%	−0.3	−1.4%
	Self determining	−0.3	−1.2%	0.2	1.1%
	Interpersonal understanding	−1.6	−7.2%	0.2	0.8%
	Self confidence	−0.2	−1.0%	0.0	−0.2%
	Questioning mind	−0.3	−2.8%	1.2	11.5%

*, **, *** Significant at $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (two-tailed).

Table A15. Test results for decomposed HPSS.

		Accounting Students			Management Students			Significance		
	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
1st year undergraduate	Search for knowledge	143	24.0	5.1	83	24.8	4.6	1.10	1.97 *	Confirmed
	Suspension of judgment	145	22.4	4.7	83	21.1	4.7	1.93	1.97 *	Confirmed
	Self determining	146	22.2	3.8	84	21.9	3.9	0.54	1.97 *	Confirmed
	Interpersonal understanding	146	22.7	4.4	83	23.5	4.1	1.25	1.97 *	Confirmed
	Self confidence	146	20.2	4.8	84	22.7	4.5	3.85	3.33 ***	Rejected
	Questioning mind	145	10.2	2.6	81	9.9	2.7	0.68	1.97 *	Confirmed
		Accounting Students (ACCA)			Management Students			Significance		
	Components	n	Mean Score	Standard Deviation	n	Mean Score	Standard Deviation	t	p	Hypothesis Test Result
2nd year graduate	Search for knowledge	26	26.4	4.9	107	22.9	4.8	3.33	3.33 ***	Rejected
	Suspension of judgment	26	22.1	5.8	107	20.9	4.0	1.18	1.97 *	Confirmed
	Self determining	26	22.5	3.4	107	22.6	3.2	0.14	1.97 *	Confirmed
	Interpersonal understanding	26	22.9	4.3	106	20.8	4.2	2.34	1.97 *	Rejected
	Self confidence	26	20.2	3.8	107	21.0	3.5	1.13	1.97 *	Confirmed
	Questioning mind	26	11.3	2.3	107	10.0	2.2	2.88	2.60 **	Rejected
		Accounting Students (ACCA)			Management Students					
	Components		Change of Mean	% Change of Mean		Mean Score	Standard Deviation			
	Search for knowledge		2.4	9.9%		−1.9	−7.6%			
	Suspension of judgment		−0.3	−1.4%		−0.2	−0.9%			
	Self determining		0.2	1.1%		0.6	2.9%			
	Interpersonal understanding		0.2	0.8%		−2.7	−11.5%			
	Self confidence		0.0	−0.2%		−1.6	−7.2%			
	Questioning mind		1.2	11.5%		0.0	0.5%			

*, **, *** Significant at $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively (two-tailed).

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