Does accounting training drive firm performance?

Evidence from a field experiment with entrepreneurs

Sofia M. Lourenço[a], David Derichs[b], Teemu Malmi[b], Teemu Laine[c], Kati Kouhia-Kuusisto[c]

[a]*ISEG (Lisbon School of Economics & Management), Universidade de Lisboa and ADVANCE, CSG Research Center*
[b] *Aalto University*
[c] *Tampere University*

Does accounting training drive firm performance?

Evidence from a field experiment with entrepreneurs

Abstract

Extant qualitative and survey studies suggest a positive impact of accounting information use on firm performance. However, causal evidence from the field is missing. Moreover, prior studies also suggest that the information the accounting function produces is not widely used among entrepreneurs. One potential reason for this scant use of accounting relates to the limited accounting knowledge and skills of entrepreneurs and employees of micro, small and medium-sized enterprises. To address these issues, we conducted a field experiment with 155 entrepreneurs to directly examine the impact of accounting training on firm performance considering as potential mediators the perceived importance of accounting, accounting skills, and accounting use. A randomized group of entrepreneurs was provided with online accounting education, while a similar group was not. Information about performance and accounting importance, skills and use were collected via questionnaires before and after the experiment for both treatment and control groups. Using partial least squares - structural equation modeling, we show that accounting skills mediate the effect of accounting training on firm performance. Heterogeneous treatment effects analyses suggest stronger effects for entrepreneurs who are low performers, have no university degree, have some prior business education, do not have access to financial support and advice, and engage in some sort of international activities.

Keywords: Accounting training, accounting skills, accounting use, entrepreneurs, field experiment, firm performance.

1. Introduction

Survey and qualitative field-based research suggests that the use of accounting information is positively related to micro, small and medium-sized enterprises (SMEs) performance (Hakola 2010; King et al. 2010; Marriott and Marriott 2000; Peel and Bridge 1998; Sharma and Bhagwat 2007; Sousa et al. 2005; Zengin and Ada 2010). Conversely, these studies suggest that limited use of accounting information can have negative consequences. An early study by Gul (1991) found that insufficient use of management accounting hinders performance in environments characterized by high uncertainty. SMEs using less management accounting have also been found to experience lower levels of competitiveness (Barrar et al. 2002; García Pérez de Lema and Duréndez 2007; Greenhalgh 2000; Hussain et al. 1998). Furthermore, insufficient or improper use of management accounting was found to contribute to business failure (De Loo and Davis 2003; El-Ebaishi et al. 2003; Halabi et al. 2010; Hussain et al. 1998).

In addition to these potential negative consequences related to the limited use of accounting information, prior research also finds that accounting information is used to a lesser extent among SMEs compared to large firms (Quinn 2011; López and Hiebl, 2015; Armitage et al, 2016). This is often related to the limited resources SMEs possess. This lack of resources also translates into a partial or complete lack of management and accounting skills, which is also influenced by inadequate training among the SME staff or the owners (Mitchell and Reid 2000; Alattar et al 2009; Halabi et al. 2010; Perren and Grant 2000). Recent developments in online teaching led to a decrease in both the cost and ease of acquiring accounting knowledge, which represents an opportunity for these firms and also for research.

Currently, the evidence regarding accounting use in SMEs comes predominantly from survey and field-based qualitative research. Hence, no prior study has demonstrated the causal effect of providing accounting training, and therefore improving accounting knowledge and skills, in firm performance among micro and small business entrepreneurs (for evidence in large organizations, see Manthei et al., 2023). As micro and SMEs constitute an important part of economic activity in many countries, it is worth understanding if their performance could be enhanced by increasing the financial literacy of their leaders, especially their founders and entrepreneurs.

In this regard, recent field experiments in economics and management start to uncover the effects of entrepreneurship training programs. Different formats have been used in these studies such as in-class training (Lee et al., 2024), live training over Zoom (Davies et al., 2024), digital training programs with reproducible video capsules and virtual one-on-one consulting meetings (Estefan et al., 2023), virtual one-on-one business marketing coaching (Anderson et al., 2023), and live online sessions combined with one-on-one coaching on export efforts (Cusolito et al., 2023). However, these studies cover a board spectrum of business training, not focusing specifically on accounting issues. Therefore, it is still unclear whether and how accounting training affects firm performance.

To address this question, we use a field experiment to examine whether accounting training has an impact on firm performance. Due to the important role of the entrepreneur, we consider as potential mediators of this relationship the perceived importance of accounting, accounting skills, and accounting use (Bridge et al., 2008; Halabi et al., 2010; Sousa et al., 2010). We invited entrepreneurs of micro and SME from Finland to take part in a project focusing on developing accounting skills and capabilities. Entrepreneurs were told that by participating in the project they would have access to online training modules in accounting that would be released in the future. To ensure objectivity and avoid potential biases, no information about the experiment design or research objectives were provided to the participants. We randomized the participating entrepreneurs to treatment and control conditions. Those in the treatment condition had access to online accounting education, while those in the control condition did not.[1] Education consisted of five modules dealing with financial statement analysis, business models, pricing, financial aspects of human resources, and working capital management. Each module contained short video lectures and questions requiring approximately one to two hours of engagement. Information about performance and accounting importance, skills and use were collected via questionnaires before and after the experiment for both treatment and control groups. This is a common practice of field experiments with entrepreneurs for whom it is usually not possible to collect hard data for both performance and business practices (e.g., Davies et al., 2024). However prior studies document no systematic biases (differences between treatment and control groups) in self-reports, which also

[1] Participants in the control condition only gained access to the online accounting training after the end of our study.

have a high correlation with audited measures (McKenzie and Woodruff, 2017), open-ended double-blind phone discussions (Bloom et al., 2019), and physical proofs (Anderson and McKenzie, 2022).

Using Partial Least Squares Structural Equation Modeling (PLS-SEM), we show that accounting skills mediate the effect of our training on firm performance. Specifically, we find that the treatment had a positive effect on accounting skills, which subsequently led to an increase in firm performance. Heterogeneous treatment effects analyses suggest stronger effects for entrepreneurs who are low performers, have no university degree, have some prior business education, do not have access to financial support and advice, and engage in some sort of international activities.

Our study contributes to literature in three important ways. First, we are among the first to use a field experiment to provide evidence on the effects of accounting training on accounting skills and firm performance in a micro and SME context. Recently, Manthei et al. (2023) used online training videos on a profit metric as part of their field experiment on the impact of accounting information and bonuses for store managers in a large retail chain. In this paper, we examine broader themes of accounting education (e.g., financial statement analysis, business models, pricing, financial aspects of human resources, and working capital management) for micro and SME entrepreneurs. Specifically, we show how a training intervention exclusively focused on accounting methods led to an increase in the participants' skill level which subsequently led to an improvement in performance. Second, we respond to the call by Lopez and Hiebl (2015) to better understand the barriers hindering accounting use in micro enterprises and SMEs and thus potentially improve their performance. Specifically, building on prior studies showing limited accounting skills among entrepreneurs and SME employees (Mitchell and Reid 2000; Alattar et al 2009; Halabi et al. 2010; Perren and Grant 2000), we provide accounting training to a randomized set of entrepreneurs and unravel the mechanism by which it can lead to firm performance. Third, we contribute to an emergent stream of research on entrepreneurship training. Previous studies have been done predominantly in developing countries (e.g., Davies et al., 2024; Estefan et al., 2023) and focus on a different set of management techniques (Anderson et al., 2023; Cusolito et al., 2023). Conversely, our study directly speaks to the specific effects of accounting training in a developed country where entrepreneurs already have a relevant level of education, which is not the case in emerging economies.

The paper proceeds as follows. Section 2 contains a literature review and hypotheses development. Section 3 presents the research method. Section 4 describes data and results. Finally, section 5 concludes the paper.

2. Literature review and hypotheses development

2.1 Prior literature on accounting training and firm performance

The pivotal role of management accounting in firm performance is a well-established theme in the academic discourse. The proficiency in accounting practices is not just a function of compliance or record-keeping but a strategic tool that significantly influences competitiveness and overall business performance (Hakola 2010; King et al. 2010; Marriott and Marriott 2000; Peel and Bridge 1998; Sharma and Bhagwat 2007; Sousa et al. 2005; Zengin and Ada 2010).

In this regard micro-enterprises and SMEs face a constraint related to limited resources, which frequently manifests in a deficiency of management and accounting skills. This situation is often compounded by the lack of comprehensive training for staff and owners, leading to underutilized or inefficient accounting practices (Mitchell and Reid 2000; Shields & Shelleman, 2016). The scale of the enterprise plays a significant role in this context; smaller companies are particularly vulnerable due to their limited ability to allocate resources for specialized accounting skills and systems (Dávila 2005; Dávila and Foster 2005, 2007; Hertati et al, 2020).

The academic literature further highlights the educational levels of key personnel in micro enterprises and SMEs as a determinant factor in the use of management accounting systems. In many cases, particularly in developing countries, the low educational level of owners and managers in accounting and finance leads to a suboptimal application of management accounting practices. This limited application often relegates accounting to a role of mere compliance rather than a strategic tool for decision-making and business planning (Thomsen 2008; Alattar et al. 2009; Halabi et al. 2010; Perren and Grant 2000).

The proficiency of finance and accounting staff also plays a critical role in the adoption and effective use of management accounting systems. Studies have shown that a lack of knowledge

and skills among these staff members can lead to decreased usage of such systems, as they are often unprepared for adopting sophisticated management accounting techniques. This deficiency is partly attributed to the diverse responsibilities shouldered by employees in micro and small firms, which hinders the development of specialized knowledge in any one area (Benjaoran 2009; Ilias et al. 2010; Marc et al. 2010; Marriott and Marriott 2000; Sousa et al. 2005; Thomsen 2008; Wouters and Wilderom 2008).

In contrast, the presence of trained and knowledgeable owners/managers can significantly enhance the use of management accounting. This increased involvement is often motivated by a desire to improve performance and support the strategic use of accounting information (Ritchie and Richardson 2000). However, the inverse is also true: insufficient or improper use of management accounting can lead to business failure and poor strategic decisions, underscoring the critical need for adequate accounting knowledge and skills (De Loo and Davis 2003; El-Ebaishi et al. 2003; Halabi et al. 2010; Hussain et al. 1998; Brierley 2011; Laitinen 2011).

Training can be a solution to improve accounting skills. For example, in entrepreneurship several studies document the effects of entrepreneurship training on firm performance (see Mckenzie et al., 2023, for a review). These studies include many different formats and combinations of training and advise, from in-class training (Lee et al., 2024), live training (Davies et al., 2024), digital training (Estefan et al., 2023), and business coaching (Anderson et al., 2023).

Another solution may be outsourcing accounting services. This practice is examined in various studies and reflects a complex interplay of cost, expertise, and strategic focus. Berry et al. (2006) found a positive correlation between the use of external accounting services and SME growth. However, outsourcing often leads to a loss of internal expertise (Lacity and Hirschheim 1993; Gilley and Rasheed 2000; Beaumont and Sohal 2004) and may not always result in cost savings (Tomkins and Green 1988). Everaert et al. (2007) suggest that SMEs with more experience in outsourcing non-accounting tasks are less likely to outsource accounting, possibly due to its strategic importance and the desire to maintain control over financial information. Despite Barrar et al.'s (2002) finding of greater efficiency in outsourced accounting, particularly for smaller firms, there remains a concern over the quality of output and the loss of immediacy in financial information access, which could hinder operational agility and decision-making in SMEs.

2.2 Hypotheses development

The American Accounting Association defines accounting as the process of identifying, measuring, and communicating economic information to permit informed judgments and decisions by the users of the information. Hence, one could argue that the accounting profession and education are based on the premise that proper knowledge and use of accounting improves decision-making, both within organizations and among capital providers, leading to an efficient allocation of resources and, ultimately, to the financial success of organizations.

Within firms, for instance, understanding profitability and financial position may act as an early warning signal, allowing for planning and decision-making to improve performance. Capital budgeting techniques allow for identification and selection of the most profitable projects and activities. Cost-volume-profit analysis facilitates choosing optimal production levels. Understanding the cost structure of products and services guides pricing and production decisions. Understanding the cashflows allows for effective cash management. In short, *ceteris paribus*, accounting and financial literacy are expected to lead to better financial performance on average. This is expected to be more pronounced in micro and SMEs than in large firms, as entrepreneurs and SME employees are shown to lack management and accounting skills (Mitchell and Reid 2000; Alattar et al 2009; Halabi et al. 2010; Perren and Grant 2000).

The knowledge and understanding of accounting can be gained through different mechanisms: by studying these topics independently, learning by doing (with trial and error) or from others, or by participating in formal accounting training. As one of our core tasks as accounting academics is to provide accounting education and training, we are interested in the effects of accounting training on entrepreneur firm performance. Based on the reasoning above, we propose as our first hypothesis:

H1. Accounting training has a positive effect on entrepreneur firm performance

This hypothesis is not without tension. For example, there might be a considerable time-lag before training translates into firm performance. This is the case of investment opportunities that may even have a negative impact on short-term profitability before starting to pay off in the long run. Additionally, it may take time for entrepreneurs to adjust their capacity to take advantage of their acquired knowledge. It can also be the case that entrepreneurs have limited capacity and time to actually implement in their firms what they have learned in the training, they may need time to assimilate the practices that are most relevant for them, or their use of new knowledge/ practices may fade away with time (Higuchi et al., 2019). Recent field experiments investigating the effects of entrepreneurship programs have also documented limited or non-effects in performance (e.g., Fairlie et al., 2015; Karlan and Valdivia, 2011; McKenzie and Woodruff, 2014; McKenzie, 2021; McKenzie et al., 2023). Hence, it is worth investigating the mechanisms by which accounting training is expected to translate into entrepreneur performance.

In micro enterprises and SMEs, the ownership base is typically rather narrow, and the owner-manager (the entrepreneur) has a strong influence and decision-making power in the company (Bridge et al., 2008). By providing training to owner-managers of entrepreneurial firms, we have the potential to act upon their perception of accounting importance, their skills and the use they make of accounting information. First, prior literature suggests the owner-managers' attitude and wishes towards accounting information make a significant impact on accounting utilization (Halabi et al., 2010). Specifically, we argue that accounting training increases the perceived importance of accounting methods for managing their firm. This is important because entrepreneurs are shown to rely more on biases and heuristics in their strategic decision making compared to managers in large organizations (Busenitz & Barney, 1997). Sarasvathy (2001) argues that entrepreneurs use effectual reasoning especially in the early stages, and do not transition well to later stages requiring more causal reasoning (Sarasvathy 2018). Accounting is traditionally used to support causal reasoning. Increased perceived importance of accounting methods is likely to shift entrepreneurs to causal reasoning with the use of analytical decision-making and reduce biases and heuristics. Hence, trained entrepreneurs may place more weight on accounting information compared to intuition and heuristics in decision-making. Therefore, accounting importance can act as mediator in the relationship between accounting training and entrepreneur firm performance, and we pose the following hypothesis:

H2a Accounting importance is a mediator in the relationship between accounting training and entrepreneur firm performance

Second, by participating in training entrepreneurs may learn new accounting methods as well as gain practice in using new or existing accounting tools. Such practice increases their skill level, which in turn affects firm performance. Nandan (2010) argues that SMEs often lack sophisticated management accounting knowledge, and that training provided by professional accountants could bridge this gap. Bruhn & Zia (2013) found that financial training improved SME investment decision-making, allowing entrepreneurs to allocate resources more efficiently. Training is also likely to increase entrepreneurs' understanding of when and how to apply different accounting tools, rather than simply increasing their use. Halabi et al. (2010) found that prior exposure to accounting tools increased entrepreneurs' likelihood of using them effectively over time, suggesting that training helps embed these practices into daily business operations. Similarly, Sousa et al. (2010) found that while SMEs recognized the value of financial tools, many lacked the training needed to apply them effectively, limiting their ability to translate financial knowledge into action. As entrepreneurs refine their accounting skills, they may either deepen their use of existing financial methods or adopt more advanced techniques. In both cases, training is expected to enhance firm performance by improving financial visibility, decision accuracy, and operational efficiency. But better skills may also improve firm performance by more astute use of existing accounting methods. For instance, entrepreneurs who improve their accounting skills may be able to track financial performance more accurately, anticipate cash flow shortages, and set better pricing strategies, all of which contribute to firm stability and growth. Therefore, better firm performance does not necessarily require more use of accounting, but more sophisticated use of it. Hence, we hypothesize that accounting skill acts as mediator in the relationship between accounting training and entrepreneur firm performance, and state the following hypothesis:

H2b Accounting skills are a mediator in the relationship between accounting training and entrepreneur firm performance

Finally, training can reduce entrepreneurs' anxiety and boost their confidence in applying accounting methods. Specifically, by clarifying how accounting information is generated and can aid managerial decisions, training is likely to prompt entrepreneurs to incorporate this information more systematically in their daily operations. This view is broadly consistent with prior research showing that small-firm owners who grasp accounting's practical benefits rely on it more frequently (Halabi et al. 2010; Hussain et al. 1998). Such deeper reliance on accounting methods, in turn, has been repeatedly linked to stronger firm performance under uncertainty (Gul 1991; Sharma and Bhagwat 2007). Consequently, once entrepreneurs gain greater ease and awareness in using accounting information, we expect this more extensive usage to explain how training ultimately benefits firm performance. Therefore, we propose that accounting use mediates the relationship between accounting training and entrepreneur firm performance, and pose the following hypothesis:

H2c Accounting use is a mediator in the relationship between accounting training and entrepreneur firm performance

Figure 1 presents our theoretical model.

3. Method

3.1 Study Design

Our study is a field experiment with 155 entrepreneurs in Finland.[2] We partnered with a Finnish association for new entrepreneurs to identify entrepreneurs who could participate in accounting training. To collect information about these entrepreneurs we distributed a first questionnaire via our partner organization. In this first questionnaire we collected information about (i) the respondent and the firm, (ii) the use of accounting methods, (iii) the importance of accounting

[2] Prior to the experiment, we obtained ethical approval through one of the participating university's ethical pre-review procedure.

methods, (iv) the skills to use accounting methods, and (v) the accounting support or advice received and desired. The items included in the accounting methods questions (use, importance, and skills) were related to financial planning (e.g., sales forecasts, P&L budgeting, cash budgets, capital budgets) and monitoring financial (e.g., sales, financial statements, costs, accounts receivable, inventory turnover) and non-financial information (e.g., customer satisfaction, employee satisfaction, quality).

This first questionnaire was distributed by phone and online between December 2019 and April 2020. In total we collected 281 responses. This questionnaire was important to randomize the participating entrepreneurs to treatment and control conditions. We were able to randomize 273 participants to the experimental groups because 2 firms were already out of business and 6 participants were private persons and not firms. Our aim was to have 50% of participants in each condition and we were able to verify that the two conditions were similar in observable variables (described later).

After the end of the experiment (described below), we distributed a second questionnaire via email to the 273 participants. This questionnaire repeated questionnaire 1, so that we could infer any changes during the experimental period. We collected responses to this second questionnaire between February and August 2021. Entrepreneurs in the control condition upon completing this second questionnaire got access to the training platform. Even though we sent several reminders and made phone calls asking to fill in the questionnaire, we were only able to get 155 responses. This high drop-out is quite common in remote training programs (e.g., Davies et al., 22024).

3.2 Experimental Manipulation

Our experimental manipulation is an online accounting education training. For this purpose, we designed a comprehensive and accessible web-based learning platform that provided an online course training, tailored to entrepreneurs. The treatment took place from May to December 2020. In May 2020, only the entrepreneurs in the treatment group received the log-in credentials necessary to access the training platform.[3] Entrepreneurs could access the content through different

[3] Entrepreneurs in the control group only received the log-in credentials after the end of our study.

technologies, including mobile devices and computers. The majority of accesses to the training platform occurred between May and October 2020.

The training was structured around five central topics, each presented through engaging animated scenarios featuring two entrepreneurs encountering relevant business challenges (See Figure 1, for an example of a screen from an animated video). The course content was delivered in concise video lectures, ranging from 1 to 7 minutes, followed by assessments including multiple-choice questions and reflective written assignments. Reflection assignments required entrepreneurs to apply the course content to their own organization and define action steps for implementing the content. Successful completion of these assessments earned participants badges for each module, with a final course certificate awarded upon completion of all modules. Therefore, we gamified the learning experience to achieve higher engagement. Each module required approximately one to two hours of engagement, including all assignments.

The course comprised the following modules:

- Financial Reporting: This module educates entrepreneurs on interpreting financial reports. It covers the reading and understanding of income statements and balance sheets and teaches how these financial statements can be used to assess a company's situation.
- Business Models: Here, the focus is on integrating company strategy, operational processes, and financial aspects. This module assists entrepreneurs in aligning their business operations with financial planning and making informed decisions crucial for their business.
- Pricing: This section delves into various pricing strategies and considerations. It addresses the information necessary for effective pricing, including assessing the value offered to customers, understanding costs, and considering competition. The module aims to provide an analytical framework for making successful pricing decisions.
- Human Resources (HR): Focusing on the financial aspects of hiring and remunerating external employees, this module guides entrepreneurs through the

evaluation of hiring costs, wage-related obligations, and additional financial implications of employment.

- Working Capital Management: This module teaches effective management of working capital to enhance profit and cash flow. It covers various aspects such as accounts receivable management, debt management, inventory control, and supplier payments, providing strategies for optimal financial execution in these areas.

By integrating animated scenarios, interactive content, and assessment tools, the course aimed to provide entrepreneurs with practical, actionable business knowledge and skills to be acquired in a manageable amount of time.

3.3 Variables

Our main outcome variable of interest is entrepreneur firm performance. Because entrepreneurs participating in our experiment represent mainly micro-enterprises, we could not collect hard financial data regarding their performance as these data are not publicly available for all types of companies in Finland. Moreover, because our experimental manipulation occurred between May and December 2020, we could not obtain a clean pre- and post-performance as financial data match a fiscal year, which usually coincides with the calendar year.

To overcome this issue, we collected a self-reported measure of firm performance both in the pre-experiment and in the post-experiment questionnaire. This measure is based on a previously validated scale (Roth & Jackson, 1995) and adapted to better fit the entrepreneurial context. On a 7-point Likert-scale ranging from 1 (very poor) to 7 (excellent), we ask respondents to assess their company success regarding five dimensions (growth, profitability, competitiveness, efficiency of operations, and overall success). Factor analysis of these items in the pre-experimental (post-experimental) questionnaire reveals one factor explaining 63% (74%) of the variance, with item loadings above 0.75 (0.76) and a Cronbach's alpha of 0.91 (0.91). Based on these results, we average the five items to form the performance variables.

Because we are interested in the effect of our training manipulation, and given the randomization of the participants to treatment and control groups, our main dependent variable is the post-

experiment performance (POST_PERF). In some of the analyses, we also used the change in performance (CHG_PERF) as the outcome variable. We computed CHG_PERF as the difference between POST_PERF and pre-performance (PRE_PERF).

Our main independent variable is TREAT, a dummy variable that is equal to one for the treatment group and equal to zero, otherwise. This variable enables us to compute the intention-to-treat of our manipulation. Like other training field experiments, not all participants in the treatment group engaged in the training. From the original sample of 137 participants randomized to the treatment group only 81 logged-in at least once in the online training platform. This corresponds to a 59% take-up rate, which is quite high compared to other online asynchronous courses (Davies et al., 2024). Considering only the respondents of the second questionnaire, the take-up rate is 79% (52 participated in the training out of the 66 in the treatment group that responded to the second questionnaire).[4]

We also consider in our model the mediator variables: (i) the use of accounting methods, (ii) the importance of accounting, and (iii) skills in using accounting methods. To build these variables we relied on questionnaire items related to our accounting training - Planning and forecasting sales or sales budgets; P&L Budgeting; Choosing/modifying pricing principles; Cash flow analyses or cash flow plans / cash budgets; Monitoring the realization of sales; Monitoring financial statements.

Regarding the use (USE) of accounting methods, on a 6-point Likert-scale (0=not used at all; 1=use max. once a year; 2= used a few times a year; 3 = used monthly; 4= used weekly; 5=used almost daily), we ask respondents to assess the use of accounting methods in their company. Factor analysis of the items in the pre-experimental (post-experimental) questionnaire reveals one factor explaining 45% (62%) of the variance, with item loadings above 0.63 (0.71), and a Cronbach's alpha of 0.75 (0.87).[5] Based on these results, we average the six items to form the PRE_USE (POST_USE) variable.

Regarding the importance (IMP) of accounting methods, we ask respondents their level of agreement with the following statement "I view this method as important for managing this

[4] In the "Data and Results" section a formal comparison of the treatment and control conditions will be conducted.
[5] The exception to these values is the pricing item in the PRE_USE variable, which has a loading of 0.46. However, we opted to retain this item so that the PRE_USE variable was comparable to the POST_USE variable. In the POST_USE variable the pricing item has a loading of 0.71.

company". The answers were provided on a 5-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). Factor analysis of the items in the pe-experimental (post-experimental) questionnaire reveals one factor explaining 50% (62%) of the variance, with item loadings above 0.66 (0.77), and a Cronbach's alpha of 0.79 (0.89).[6] Based on these results, we average the six items to form the PRE_IMP (POST_IMP) variable.

Regarding the skills (SKILL) in using accounting methods, we ask respondents their level of agreement with the following statement "I have sufficient skills to use this method." The answers were provided on a 5-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). Factor analysis of the items in the pe-experimental (post-experimental) questionnaire reveals one factor explaining 61% (65%) of the variance, with item loadings above 0.71 (0.73), and a Cronbach's alpha of 0.87 (0.89). Based on these results, we average the six items to form the PRE_SKILL (POST_SKILL) variable.

Similar to the performance variable, and because we are interested in the effect of our training manipulation and given the randomization of the participants to treatment and control conditions, our main mediator variables are POST_USE, POST_IMP, and POST_SKILL. In some tests, we also use change variables. As such, we computed CHG_USE as the difference between POST_USE and PRE_USE, CHG_IMP as the difference between POST_IMP and PRE_IMP, and CHG_SKILL as the difference between POST_SKILL and PRE_SKILL.

4. Data and Results

4.1 Data

Table 1 shows the demographic characteristics of the 155 participants and firms at the start of our experiment. Our sample is composed of micro-enterprises (the average number of employees is 1.89) and our participants have on average 23.02 years of working experience, 8.83 years of

[6] The exception to these values is the pricing item in the PRE_SKILL variable, which has a loading of 0.52. However, we opted to retain this item so that the PRE_SKILL variable was comparable to the POST_SKILL variable. In the POST_SKILL variable the pricing item has a loading of 0.83.

managerial working experience and 6.25 years of entrepreneurial experience. 85% of the respondents are CEOs in their firms and around 63% have a university degree.

Table 2 shows the descriptive statistics of the main variables. Even though we randomized 50% of the original 273 participants to treatment group (137), only 43% of the respondents to the second questionnaire (155) belonged to the treatment group (66). This different response rate (65% for the control group and 48% for the treatment group) is likely due to the additional incentive those in the control group had to reply to the second questionnaire as only after finishing it they would receive the credentials necessary to access the training platform. Conversely, the treatment group did not have an explicit incentive to participate as they already had access to the training platform. Nevertheless, and as we will show next, treatment and control groups neither differ in the pre-experiment observable variables ex-ante (considering the 273 participants from the first questionnaire) nor ex-post (considering the 155 participants from the second questionnaire).

Additionally, table 2 shows that post-experiment performance is slightly below pre-experiment performance, which can be attributed to the COVID19 pandemic occurring while the experiment took place. Additionally, the average use of accounting in the post-experiment is also slightly below the pre-experiment (the median use is identical), a trend that is similar in the importance of accounting (post-experiment mean is lower than pre-experiment). Conversely, we can observe that on average post-experiment accounting skills are higher than in the pre-experimental period.

Table 3 shows the correlations among the main continuous variables. Panel A shows the correlations for the pre-experiment variables. We find that pre-performance is positively correlated with pre-use of accounting information and that the three mediators (use, importance, and skill) are positively correlated. Panel B shows the correlations for the post-experiment variables. We find that post-performance is positively correlated with post-skill (and not with use, as before) and that post-use is positively correlated with post-importance and post-skill (as before). Finally, Panel C shows the correlations for the change variables. We find that change in use and change in skill are positively correlated. We also analyzed (untabulated) whether our performance variables were correlated with the demographics of our sample and we did not find statistically significant correlations. The exception was the number of employees, which was positively correlated with pre-performance and post-performance. We also tested for difference in performance between high

and low industries exposed to COVID19 (untabulated), which had an outbreak during our experiment. We did find a statistically significant mean difference for the post-performance variable. Finally, we also find (untabulated) that pre-performance is positively and significantly correlated with the post-performance.[7] As such, and to make the models comparable, we will control for the number of employees and industries highly exposed to COVID19. In the models using post-data we will also control for the pre-performance.

Table 4 shows that randomization was successful *ex ante* (with the 273 initial participants) and *ex post* (with the 155 participants who responded to the second questionnaire). Specifically, all T-tests comparing the treatment and control conditions means are not statistically significant.

4.2 Treatment Effects

Table 5 provides first evidence of the effects of our manipulation by comparing the means of our dependent and mediator variables between treatment and control groups. In Panel A we compare the post means whereas in Panel B we compare the changes, which allows us to control for potential differences in the pre-levels of each variable. In Panel A, we find that our treatment has a negative effect on the perceived importance of accounting methods and a positive effect on accounting skills. We do not find statistically significant effects for performance and accounting use. In Panel B, we corroborate the previous findings, except for accounting importance. When we control for the pre-level of importance, we do not find an effect of our treatment in the change of accounting importance.

Because we have a small number of observations, multiple relationships among the variables, and latent variables, we use Partial Least Squares Structural Equation Modelling (PLS-SEM) to test our model. We start by using a reflective measurement model. Our assessment of outer loadings,

[7] Pre-performance is also negatively and significantly correlated with change in performance, which is directly related with the construction of the variable as change is computed as the difference between post-performance and pre-performance. As such, we will not control for pre-performance when using change in performance as the dependent variable. However, we will analyze heterogenous treatment effects in our model based on the pre-performance level.

composite reliability, and average variance extracted (not tabulated) reveals adequate indicators' reliability, internal consistency, convergent validity, and discriminant validity.

Table 6 Panel A shows the results for the structural model computed using bootstrapping with 10,000 repetitions and Panel B shows the indirect effects of the treatment on performance. We start by computing our model with pre-experimental data. The objective is to confirm that treatment is not ex-ante related with our variables and to identify pre-existing relationships among mediators and performance. Column 1 shows the results for our conceptual model without controls, whereas column 2 shows the results controlling for the effects of the number of employees and high impact COVID19 industries on performance (these were the covariates related to performance in the correlation analysis). These columns show that treatment is neither previously related to performance nor to the different mediators. However, accounting use is already positively related to performance prior to the experiment, which corroborates previous studies (Hakola 2010; King et al. 2010; Marriott and Marriott 2000; Peel and Bridge 1998; Sharma and Bhagwat 2007; Sousa et al. 2005; Zengin and Ada 2010). Additionally, the number of employees is also positively related to the pre-performance level. Finally, we do not find any significant indirect effects of treatment on performance.

Column 3 shows the results for the POST variables, without any controls for performance. In Paneç A, we find that our treatment does not have a direct effect on performance as the coefficient for the path between TT and PERF is not statistically significant (coeff=0.057, p-value>0.1). Regarding our mediator variables, we find that treatment has a positive and statistically significant effect on skill (coeff=0.307, p-value<0.05), a negative and statistically significant effect on importance (coeff=-0.324, p-value<0.05), and a non-statistically significant effect on use (coeff=0.181, p-value>0.1). Additionally, we find that skill has a positive and statistically significant effect on performance (coeff=0.299, p-value<0.01). Conversely, importance and use do not have statistically significant path coefficients. Hence, there is a change relative to the model with the pre-experiment data, as the path between use and performance is no longer significant in the experimental period. Conversely, the path between skill and performance, which was not significant prior to the experiment, is now significant. Hence, our treatment seems to change the driver of performance, from accounting use to accounting skill. Since our measure of accounting use is the frequency of selected accounting tools, participants may have kept their frequency (the

descriptive statistics in Table 3 show only a slight decrease in accounting use, which is concentrated in the control group as shown in Table 4) but changed their skills in how they were using them (to a more effective use), which ultimately led to a better performance.

On Panel B, we find that the total indirect effect of treatment on performance is statistically significant (effect=0.19, p-value<0.1), which is mainly due to the specific indirect effect TT=>SKILL=>PERF which is statistically significant (coeff=0.092, p-value<0.1). Conversely, the specific indirect effects TT=>IMP=>PERF and TT=>USE=>PERF are not statistically significant. Overall, Column 3 shows that treatment does not have a direct effect on performance, and therefore we do not find support for H1, but has an indirect effect on performance via skill, and thus we find support for H2b. In fact, skill acts as a full mediator in the relationship treatment and performance. Conversely, we do not find any mediation effect of importance and use in the relationship treatment and performance. Hence, we do not find support for H2a and H2c. Nevertheless, we document a negative effect of treatment on importance. A possible explanation for this negative effect is that our training allowed our participants to have a better understanding of accounting information and, therefore, to a certain demystification of accounting which led the respondents in the treatment group to provide lower scores in the importance question.

Column 4 of Table 6 shows that our results are robust to the inclusion of covariates that the correlation analysis showed being related to performance (pre-performance, number of employees, and high COVID19). Specifically, even though some point estimates change, the statistical significance of the path coefficients does not change, as well as the sign of the statistically significant coefficients. The same conclusion is obtained for the indirect effects as only the mediator skill is statistically significant. Additionally, we find that the pre-performance level is positively related to post performance (coeff=0.445, p-value<0.01) which shows that those with high levels of performance before the experiment also perform better after the experiment. We also find that the high impact COVID19 industry dummy is negatively related to the post performance (coeff=-0.312, p-value<0.01) suggesting that the pandemic was still influencing company's performance at that time. The number of employees is no longer related to performance.

In columns 5 and 6 of Table 6, we replicate our models using the change variables for both performance and mediators, and not the post scores. This analysis is stricter than the previous one using the post data as it directly accounts for the pre-level scores of each variable. Empirically, we operationalize this model by using changes as observed variables and not latent variables as changes corresponded to the difference between the post-level scores and the pre-level scores of each variable. In column 5, we corroborate the results of column 3, except for the path TT=>IMP which is no longer significant. Additionally, we find a positive and statistically significant effect of use on performance (coeff=0.103, p-value<0.1). However, this result is not robust to the inclusion of our control variables, even though none is statistically significant.[8] Overall, and in both columns, skill emerges as the mediator variable in the relationship between treatment and performance as the path TT=>SKILL=>PERF is statistically significant (effect=0.071, p-value<0.1), which leads to a significant total indirect effect of treatment on performance (effect=0.099, p-value<0.1).

As a robustness test, and because our mediator variables are mildly correlated with one another, we estimate our models with one mediator at a time. The results (untabulated) corroborate the previous ones. Specifically, even though the point estimates may change, the sign and significance of the coefficients are similar to those presented in Table 6. The only exception is the coefficient of the path USE=>PERF in the changes model with controls (column 6) that is significant (at 10% level). However, the indirect effect (TT=>USE=>PERF) is still not statistically significant.

4.3 Alternative Model

We consider an alternative model that allows for relationships between our moderators, as suggested by the literature. Specifically, prior literature suggests that managers' perception of accounting information can have a significant impact on accounting use (Halabi et al., 2010). Similarly, highly skilled managers are more likely to use accounting tools (Nandan, 2010). Therefore, we consider that the use of accounting information may be dependent on the skill level

[8] We do not consider pre-performance as a control variable in this model because pre-performance is collinear with the change variable for performance, which is computed by the difference between post-performance and pre-performance.

and the perceived importance. The remaining relationships are similar to those of the main model. This alternative model is presented in Figure 3.

Table 7 presents the results of this alternative model and similarly to Table 6 considers PRE variables in columns 1 and 2, POST variables in columns 3 and 4, and CHG variables in columns 5 and 6. Columns 1, 3 and 5 do not consider controls, whereas columns 2, 4 and 6 present the results of the alternative model with controls.

Column 1 of Panel A, Table 7, shows similar results to those of column 1 of Table 6 and additional positive and statistically significant relationships between SKILL and USE (coeff=0.465, p-value<0.01) and IMP and USE (coeff=0.19, p-value<0.05). Column 1, Panel B, shows that, as expected, none of the indirect effects of treatment prior to the experiment is statistically significant. Column 2 corroborates these results and, as in column 2 of Table 6, the number of employees is positive and statistically significant related to performance.

Column 3 of Panel A, Table 7, shows similar results to those of column 3 of Table 6, i.e., positive and significant paths TT=>SKILL and SKILL=>PERF. Additionally, and similar to the pre-experimental model, we find a positive and statistically significant relationship between SKILL and USE (coeff=0.301, p-value<0.01) using the post-experiment data. However, using these data, we do not find a statistically significant relationship between IMP and USE (coeff=0.145, p-value>0.1), which was present in the pre-experiment data. On Panel B, we find that the total indirect effect of treatment on performance remains statistically significant (effect=0.102, p-value<0.1), as well as the specific indirect effect TT=>SKILL=>PERF (effect=0.093, p-value<0.1). Additionally, we find a statistically significant indirect effect TT=>SKILL=>USE (effect=0.12, p-value<0.05). All other indirect effects of TT are not statistically significant. Overall, this analysis corroborates that from Table 6 and suggests that even though skill has a positive effect on use, this latter variable has no effect on performance, which differs from the pre-experimental period. Hence, and as mentioned before, these results suggest that our manipulation changed the driver of entrepreneur performance from accounting use to accounting skill.

Column 4 of Table 7 shows that these results are robust to the inclusion of control variables linked to performance. Even though some point estimates change, all coefficients keep their statistical significance, as well as their sign. Likewise, the significance of the indirect effects is also similar

to that of column 3. Regarding the control variables, we find that the pre-performance level and the number of employees are positively related to post performance (coeff=0.446, p-value<0.01; coeff=0.082, p-value<0.1, respectively). We also find that the COVID19_high dummy is negatively related to the post performance (coeff=-0.309, p-value<0.01).

Column 5 of Table 7 (with change variables and not post scores) corroborates the results of column 3, except for the path TT=>IMP which is no longer significant. Additionally, we find a positive and statistically significant relationship use and performance (coeff=0.103, p-value<0.1). Similarly to column 3, the only statistically significant indirect effects are TT=>SKILL=>PERF (effect=0.072, p-value<0.1) and TT=>SKILL=>USE (effect=0.079, p-value<0.1).

Column 6 of Table 7 (with change variables and controls) replicates the results of column 6, except for the relationship between use and performance that is no longer statistically significant. All the other coefficients, and even though some point estimates may change, keep their sign and statistical significance. The control variables are not statistically significant. Likewise, the statistically significant indirect effects are the same as those reported in the previous columns.

Overall, and even though we considered an alternative model admitting potential effects of importance and skill on accounting use, we still do not find evidence supporting our hypothesis that use is a mediator in the relationship between treatment and performance. However, we do find evidence suggesting a positive relationship between accounting skill and accounting use. Moreover, and consistent with Table 6, we find support for the mediation of accounting skill on the relationship between treatment and performance. Even though the link between accounting skill and accounting use is not surprising, our results suggest that performance benefits from training entrepreneurs do not come from a more frequent use, but rather from skill, i.e., a more astute use of accounting tools.

4.3 Heterogenous treatment effects

We explore whether there are heterogenous treatment effects (HTE) in our model. Due to the small sample size, these analyses should be interpreted with caution, as the subsamples may lack statistical power to identify significant results, even if we use a bootstrapping procedure with

10,000 repetitions. We test for HTE using our first model with controls and change variables. This option allows us to control for potential pre-existing differences, as well as reduce the number of observations needed to estimate the model as change variables are observed and not latent variables.

We start by exploring the heterogeneity of our sample in terms of performance. Prior research finds that the effects of entrepreneurship training and advice may vary with the prior performance of the entrepreneur (e.g., Estefan et al., 2024; Otis et al., 2024). Estefan et al. (2024) provide evidence that entrepreneurs with low prior performance (measured as a combination of sales and franchising compliance) do not respond as much to business training and advice as those with high prior performance. Otis et al. (2024) find that using new knowledge (in their case generative AI) has a positive effect for those who were high performers before the experiment and a negative effect for those who were low performers. We adopt and extend these analyses to our accounting training manipulation. We divide our sample based on a median partition of the pre-performance variable (median = 3, on a 1 to 7 scale, with 1 being the lowest performance and 7 the highest). Table 8, Panel A, shows the results for the subsamples of high and low performers, as well as the test for the difference in coefficients using bootstrap multi-group analysis. We find that our treatment has a positive and significant effect on skill for both high performers and low performers. However, only in the subsample of low performers skill is positive and statistically related to the performance, though the difference in coefficients between the two subsamples is not statistically significant. Additionally, we find that treatment has a negative effect on importance for the low performers but not for the high performers. As mentioned before, a possible explanation for this effect is that training demystified accounting and led participants in the treatment group to provide lower scores in the importance questions, which had a very high score in the pre-experimental questionnaire. Conversely, importance is negatively associated with performance for the high performers but not for the low performers. This surprising result may also be explained by the high starting level of importance. Finally, we find that our treatment has a positive effect on use for high performers but not for low performers. This partially supports our mediation hypothesis for use, but the link USE=>PERF is not statistically significant. Regarding the difference in coefficients between the two subsamples, we find statistically significant differences on the paths TT=>IMP, TT=>USE, and IMP=>PERF. The indirect effects of treatment on performance (not tabulated) are not statistically significant.

Overall, these findings are somewhat different from prior literature, which reports stronger training effects for high performers (Estefan et al., 2024; Otis et al., 2024). In our study, accounting training seems to produce better results for low performers via the skill mediator, though the differences are not statistically significant at conventional levels.

We also explore HTE of our training manipulation based on the prior education of the entrepreneurs. The rationale for this analysis is prior research documenting the effects of education on entrepreneurship. Van der Sluis et al. (2008)'s meta-analysis summarizes the impact of formal schooling on entrepreneurship selection and performance in industrial countries. The authors find that the effect of education on performance is positive and significant, with the return to a marginal year of schooling of 6.1% for an entrepreneur. Extending this analysis to our training, higher education can be a necessary condition for entrepreneurs to grasp the accounting content and reflect it on performance. In this case, education and training would act as complements. However, it can also be the case that our training can be redundant relative to the current knowledge of entrepreneurs with higher education and, hence, they would not be able to improve further their skills and performance. In this case, education could be a substitute for our training. To explore this issue, we partition our sample based on the educational level reported by participants in the first survey. We create a subsample of high education for entrepreneurs with a bachelor, master or PhD degree (N=114), and a subsample of low education for those with secondary or grade school (N=41). Table 8, Panel B, shows the results for the subsamples of high and low education, as well as the test for the difference in coefficients. We find that our treatment has a positive effect on skill for both the high and low education entrepreneurs. However, only in the low education subsample skill is positive and significantly associated with performance. Additionally, we find that in the low education subsample treatment has a negative effect on importance and that use is positively and significantly associated with performance. Finally, we find that treatment has a negative direct effect on performance in the low education subsample (but the difference in coefficients between groups is not statistically significant). However, this negative effect is mitigated by a positive total indirect effect of treatment on performance (effect=0.351, p-value<0.10, not tabulated) which occurs mainly via the specific indirect path TT=>SKILL=>IMP (effect=0.222, p-value<0.10, not tabulated). These significant indirect effects on the low education subsample are statistically different from those on the high education subsample and are consistent with those reported for the full sample. Comparing the path coefficients between the two groups, we find statistically

significant differences in the paths TT=>IMP, USE=>PERF, and SKILL=>PERF. Overall, our results suggest that our accounting training intervention is more successful for low education participants.

Related with education, in our first survey we also inquired entrepreneurs about their specific business education (e.g., business degree, vocational qualification, executive training). The rationale for exploring HTE regarding business education is similar to the one presented for education level. On the one hand, training may have a stronger effect for those without any business background because their improvement potential is higher. In this regard, Alattar et al. (2009) qualitative study documents how limited formal education in accounting among micro-entrepreneurs translates into knowledge gaps. Therefore, accounting training can directly close those gaps that are not expected to exist for those with formal business education. Similarly, Chatterji et al. (2019) field experiment shows that entrepreneurs with MBAs or accelerator experience do not respond to an intervention regarding advice on formal HR management (in contrast to informal HR management) targeting startup performance whereas those without this background had positive outcomes. On the other hand, some prior business knowledge may be necessary to fully grasp the training provided. Consistent with this argument, Halabi et al. (2010)'s exploratory study suggests that prior accounting exposure helps small-firm owners adopt new accounting practices more smoothly, thus implying clear benefits of having a business background.

To examine this issue, we divide our sample based on the business education reported by the participants in the first survey. We create a subsample for entrepreneurs without business education (N=83), and a subsample of entrepreneurs with some type of business education (N=72). Table 8, Panel C, shows the results for these subsamples. We find that our treatment has a positive effect on skill for both subsamples. However, only in the subsample with prior business education skill is positive and significantly related to performance, and the difference in coefficients between the two groups is statistically significant. Additionally, we find that in the subsample with prior business education, use (importance) is positively (negatively) related to performance, and the difference in coefficients between the two groups is statistically significant. The indirect effects (untabulated) are not statistically significant. Overall, and in contrast with our findings for the general education level, our results suggest that business education can act as a complement to our accounting training manipulation, as we observe stronger effects for those with some business

education. This is in line with the argument presented by Halabi et al. (2010), where prior accounting exposure is seen as beneficial for accounting adoption.

We also addressed the heterogeneity of our sample in terms of decision-making process. The rationale for this analysis is that our training could have a different impact on those with or without financial advice and support. Prior research suggests that many SMEs rely significantly on external accountants for interpreting accounting information and performing accounting tasks, which in the long run can lead to an increase in the financial skills of the clients (Marriott and Marriott, 2000). As a result, entrepreneurs lacking external financial advice and support may have a bigger knowledge gap and, therefore, accounting training can have a higher impact on those without support. Hence, in the first questionnaire we asked participants whether they received any help in their financial decision-making process, such as support and advice from accountants or auditors. Based on this question, we create a subsample of entrepreneurs without financial advice (N=78) and another subsample for those with some sort of decision-making support (N=77). Table 9, Panel A, shows the results for these subsamples. We find that our treatment has a positive effect on skill only for the subsample of entrepreneurs without financial advice, and the difference between the two subsamples is statistically significant. Additionally, only in the subsample of entrepreneurs without financial advice, skill is positive and significantly related to performance, though the difference between the two subsamples is not statistically significant. Finally, we find that the direct effect of treatment on performance is negative and statistically significant for the subsample with financial advice, but again the difference between subsamples is not statistically significant. Moreover, this negative direct effect is mitigated with a positive total indirect effect of treatment on performance (effect= 0.236, p-value<0.10, not tabulated) which occurs mainly via the specific indirect path TT=>SKILL=>PERF (effect=0.204, p-value<0.10, not tabulated), which is statistically different between the two subsamples. Our results are in line with the argument that accounting training could have a greater impact on entrepreneurs without accounting advice and support, as those with such support have the opportunity to improve their accounting skills, as suggested by prior research (Marriott and Marriott, 2000). Therefore, the findings of our study suggest that financial support and advice can act as a substitute for accounting training.

Finally, we also addressed the heterogeneity of our sample in terms of internationalization. Being an international firm can proxy for the ambition or growth perspectives of the entrepreneur. Prior

research finds that ambitious entrepreneurs benefit more from training focused on growth-catalyst tools (e.g., business-model design, leveraging external networks, and building internal teams) as they increase their performance to a greater extent than both the control group and entrepreneurs in the treatment group who were less ambitious (Kotha et al., 2023). In this vein, our rationale for HTE is that accounting training could have a stronger effect for entrepreneurs with international activities, a proxy for their ambition and growth perspectives. We partition our sample based on the international activities reported by the participants, if any, in the first survey.[9] We create a subsample of international entrepreneurs for participants who reported any type of international activity (N=100), and a subsample of domestic entrepreneurs for those that did not (N=51). Table 8, Panel C, shows the results for the subsamples of international and domestic entrepreneurs, as well as the test for the difference in coefficients. We find that our treatment has a positive effect on skill for both subsamples. However, only in the international subsample skill is positive and significantly related to performance. Additionally, we find that in the international subsample treatment has a positive effect on use, which is aligned with our mediation hypothesis for use (though use is not significantly related to performance), and that importance is negatively related to performance. Comparing the coefficients between the two groups, we only find a statistically significant difference in the path IMP=>PERF. Regarding the indirect effects of treatment on performance (not tabulated), we only find statistically significant effects on the international subsample for the total indirect effect TT=>PERF and for the specific indirect effect TT=>SKILL=>PERF. However, the comparison of these indirect effects between the two groups is not statistically significant. Overall, our results are aligned with prior research documenting larger effects on performance of training focused on growth-catalyst tools for ambitious entrepreneurs (Kotha et al. 2023). We extend this line of research as our study suggests that even training focused on accounting (and not growth per se) can be more successful with international entrepreneurs.

[9] The participants had the option to identify import, export, joint venture, branch abroad and other as international activities. The option other had the corresponding text field to identify the specific international activities.

5. Conclusions

In this paper, we examine whether accounting training has an impact on the perceived importance of accounting, accounting skills, accounting use, and firm performance in a sample of Finnish entrepreneurs. Remarkably, this study is the first in accounting research to use a field experiment to provide evidence on the mechanism relating accounting training to entrepreneur firm performance.

The empirical results do not support a direct effect of accounting training on firm performance. However, we find an indirect effect of accounting training on firm performance via accounting skills, which are a mediator in this relationship. Heterogeneous treatment effects analyses suggest stronger effects for entrepreneurs who are low performers, have no university degree, have some prior business education, do not have access to financial support and advice, and engage in some sort of international activities.

These findings respond to the call by Lopez and Hiebl (2015) to better understand the barriers hindering accounting use in micro enterprises and SMEs and thus potentially providing insights on how to improve their performance. Specifically, building on earlier studies on the topic, our study shows that accounting training can enhance accounting skills that ultimately lead to an increase in firm performance. The improvement of these skills answers a previously identified gap regarding limited accounting knowledge among entrepreneurs and SME employees (Mitchell and Reid 2000; Alattar et al 2009; Halabi et al. 2010; Perren and Grant 2000).

The field experiment, as utilized in this paper, is rather unique in the accounting literature. By providing online accounting training to entrepreneurs in the treatment group, our study also contributes to an emergent stream of research showing how management and training interventions can improve firm performance (e.g., Davies et al., 2024; Estefan et al., 2024; Higuchi et al., 2019). Instead of providing expensive consulting services to firms (e.g., Bloom et al., 2013; Bruhn et al., 2018), we used a low-cost training program to increase the accounting skills of entrepreneurs which, ultimately, lead to an improvement in performance.

Our study has several practical implications. First, our study speaks to institutions providing accounting education as we show that online training was able to elevate the accounting skills of

the treatment group. For designing such online training, the paper benefited from a rather practical orientation of the training, with clear connections to the decision-making of the entrepreneurs, instead of a more theoretical approach to accounting. Second, for entrepreneurs, our paper suggests enhancing accounting skills can provide an avenue for improving performance. Despite the challenges of COVID19 during the implementation of the field experiment and the limited timeframe, we offer promising results as they suggest that accounting skills can lead to better performance even in the short-term, despite the challenging conditions in the business environment.

The findings of our study should also be reflected upon the limitations of the study. First, our field experiment was conducted in a short-time frame, from May to December 2020. This may have limited the effects on performance as entrepreneurs did not have much time to apply their new knowledge. Second, our experiment was run during the COVID19 pandemic which restricted and challenged many businesses. Even though we control for industries more exposed to the impact of the pandemic in some of our analyses (or use changes to account for firm specific characteristics), the effects on performance may have been limited due to this adverse context. Third, we use only a subjective measure of performance. Due to the characteristics of our participants (entrepreneurs), it was not possible to collect hard financial data to run the analyses. This is a common problem of field experiments with entrepreneurs for whom it is not usually possible to collect objective hard data for both performance and business practices (e.g., Davies et al., 2024). However prior studies document no systematic biases (differences between treatment and control groups) in self-reports, which also have a high correlation with audited measures (McKenzie and Woodruff, 2017), open-ended double-blind phone discussions (Bloom et al., 2019), and physical proofs (Anderson and McKenzie, 2022). In our study, and to mitigate concerns of using subjective measures, we use changes (post-measure minus pre-measure) in some of our analyses that should control for any bias in the values reported. Fourth, and similar to other field experiments documenting the effects of any given intervention (e.g., Bruhn et al., 2028; Estefan et al., 2023; Higuchi et al., 2019), our findings are dependent on how effective the intervention is. In this regard, our aim was to provide accounting training with practical and relevant information to entrepreneurs in order to maximize the effect of our intervention. But of course, any limitation in the training content may have had an impact on our findings.

Our study provides multiple avenues for future research. For example, our study provides a starting point to use field experiments to analyze the effects of accounting training in specific accounting methods and information. It would be interesting to analyze the introduction of other accounting methods and their effect on performance. Additionally, future research can investigate differences between short-term and long-term effects of these manipulations as some effects may fade away with time (Davies et al., 2024) or, conversely, become more pronounced with the knowledge acquired (Higuchi et al., 2019).

References

Alattar, J.M., Kouhy, R. & Innes, J. (2009). Management accounting information in micro enterprises in Gaza. *Journal of Accounting & Organizational Change*, 5(1), 81-107.

Anderson, S. J., & McKenzie, D. (2022). Improving business practices and the boundary of the entrepreneur: A randomized experiment comparing training, consulting, insourcing, and outsourcing. *Journal of Political Economy*, 130(1), 157-209.

Anderson, S. J., Chintagunta, P. K., & Vilcassim, N. (2024). Virtual collaboration technology and international business coaching: Examining the impact on marketing strategies and sales. *Marketing Science*, *43*(3), 637-672.

Armitage, H. M., Webb, A. & Glynn, J. (2016). The use of management accounting techniques by small and medium-sized enterprises: A field study of Canadian and Australian practice. *Accounting Perspectives*, 15(1), 31–69.

Barrar, P., Wood, D., Jones, J. & Vedovato, M. (2002). The efficiency of accounting service provision. *Business Process Management Journal*, 8(3), 195-217.

Beaumont, N. & Sohal, A. (2004). Outsourcing in Australia. *International Journal of Operations & Production Management*, 24(7), 688-700.

Benjaoran, V. (2009). A cost control system development: A collaborative approach for small and medium-sized contractors. *International Journal of Project Management*, 27(3), 270-277.

Bloom, N., Brynjolfsson, E., Foster, L., Jarmin, R., Patnaik, M., Saporta-Eksten, I., & Van Reenen, J. (2019). What drives differences in management practices?. *American Economic Review*, *109*(5), 1648-1683.

Bloom, N., Eifert, B., Mahajan, A., McKenzie, D., & Roberts, J. (2013). Does management matter? Evidence from India. *The Quarterly Journal of Economics*, 128(1), 1-51.

Bridge, S., O'Neill, K., Martin, F. (2008). *Understanding Enterprise: Entrepreneurship and Small Business*. Palgrave Macmillan; 3rd edition. 480p.

Brierley, J.A. (2011). A comparison of the product costing practices of large and small-to medium-sized enterprises: A survey of British manufacturing firms. *International Journal of Management*, 28(4), 184.

Bruhn, M., & Zia, B. (2013). Stimulating managerial capital in emerging markets: The impact of business training for young entrepreneurs. *Journal of Development Effectiveness*, *5*(2), 232-266.

Bruhn, M., Karlan, D., & Schoar, A. (2018). The impact of consulting services on small and medium enterprises: Evidence from a randomized trial in Mexico. *Journal of Political Economy*, *126*(2), 635-687.

Busenitz, L.W & Barney, J.B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of Business Venturing*, 12(1), 9-30.

Chatterji, A., Delecourt, S., Hasan, S., & Koning, R. (2019). When does advice impact startup performance?. *Strategic Management Journal*, 40(3), 331-356.

Cusolito, A. P., Darova, O., & McKenzie, D. (2023). Capacity building as a route to export market expansion: A six-country experiment in the Western Balkans. *Journal of International Economics*, *144*, 103794.

Davies, E., Deffebach, P., Iacovone, L., & Mckenzie, D. (2024). Training microentrepreneurs over Zoom: Experimental evidence from Mexico. *Journal of Development Economics*, *167*, 103244.

Davila, A. & Foster, G. (2005). Management Accounting Systems Adoption Decisions: Evidence and Performance Implications from Early-Stage/Startup Companies. *The Accounting Review*, 80(4), 1039-1068.

Davila, A. & Foster, G. (2007). Management Control Systems in Early-Stage Startup Companies. *The Accounting Review*, 82(4), 907-937.

Davila, T. (2005). An exploratory study on the emergence of management control systems: formalizing human resources in small growing firms. *Accounting, Organizations and Society*, 30(3), 223-248.

De Loo, I., & Davis, D. (2003). Black Swan records, 1921 to 1924: from a swanky swan to a dead duck. *Accounting History*, 8(2), 35-60.

El-Ebaishi, M., Karbhari, Y., & Naser, K. (2003). Empirical evidence on the use of management accounting techniques in a sample of Saudi manufacturing companies. *International Journal of Commerce and Management*, 13(2), 74-101.

Estefan, A., Improta, M., Ordoñez, R., & Winters, P. (2024). Digital Training for Micro-Entrepreneurs: Experimental Evidence from Guatemala. *The World Bank Economic Review*, *38*(2), 394-421.

Everaert, P., Sarens, G., & Rommel, J. (2007). Sourcing strategy of Belgian SMEs: empirical evidence for the accounting services. *Production Planning and Control*, 18(8), 716-725.

Fairlie, R. W., Karlan, D., & Zinman, J. (2015). Behind the GATE experiment: Evidence on effects of and rationales for subsidized entrepreneurship training. *American Economic Journal: Economic Policy*, *7*(2), 125-161.

Garcia Perez de Lema, D., & Duréndez, A. (2007). Managerial behaviour of small and medium-sized family businesses: an empirical study. *International Journal of Entrepreneurial Behavior & Research*, 13(3), 151-172.

Gilley, K. M., & Rasheed, A. (2000). Making more by doing less: an analysis of outsourcing and its effects on firm performance. *Journal of management*, 26(4), 763-790.

Greenhalgh, R. W. (2000). Information and the transnational SME controller. *Management Accounting Research*, 11(4), 413-426.

Gul, F. A. (1991). The effects of management accounting systems and environmental uncertainty on small business managers' performance. *Accounting and business research*, 22(85), 57-61.

Hakola, M. (2010). Balanced scorecard as a tool for small business reorganisation. *International Journal of Management and Enterprise Development*, 9(4), 364-384.

Halabi, A. K., Barrett, R., & Dyt, R. (2010). Understanding financial information used to assess small firm performance: An Australian qualitative study. *Qualitative Research in Accounting & Management*, 7(2), 163-179.

Hertati, Lesi, Otniel Safkaur, and Aoron M. Simanjuntak. (2020), "How to align management commitments to the successful implementation of management accounting information systems in manager decision making." Ilomata International Journal of Tax and Accounting 1(2), 89-102.

Higuchi, Y., Mhede, E. P., & Sonobe, T. (2019). Short-and medium-run impacts of management training: An experiment in Tanzania. *World Development*, *114*, 220-236.

Hussain, M. M., Gunasekaran, A., & Laitinen, E. K. (1998). Management accounting systems in Finnish service firms. *Technovation*, 18(1), 57-67.

Ilias, A., Razak, M. Z., & Yasoa, M. R. (2010). The preliminary study of management accounting practices (MAPs) in small business. *Global Business and Management Research: An International Journal*, 2(1), 79-88.

Karlan, D., & Valdivia, M. (2011). Teaching entrepreneurship: Impact of business training on microfinance clients and institutions. *Review of Economics and statistics*, *93*(2), 510-527.

King, R., Clarkson, P. M., & Wallace, S. (2010). Budgeting practices and performance in small healthcare businesses. *Management Accounting Research*, 21(1), 40-55.

Kotha, R., Vissa, B., Lin, Y., & Corboz, A. V. (2023). Do ambitious entrepreneurs benefit more from training?. *Strategic Management Journal*, 44(2), 549-575.

Lacity, M. C., & Hirschheim, R. (1993). The information systems outsourcing bandwagon. *MIT Sloan management review*, 35(1), 73.

Laitinen, E. K. (2011). Effect of reorganization actions on the financial performance of small entrepreneurial distressed firms. *Journal of Accounting & Organizational Change*, 7(1), 57-95.

Lee, D., Floyd, E., Hochberg, Y. V., Fehder, D. C., & Bailey-Rihawi, E. (2024). Learning to quit? a multi-year field experiment with innovation driven entrepreneurs. *Available at SSRN 4865251*.

López, O.L. & Hiebl, M.R.W. (2015). Management Accounting in Small and Medium-Sized Enterprises: Current Knowledge and Avenues for Further Research. *Journal of Management Accounting Research*, 27(1), 81-119.

Manthei, K., Sliwka, D., & Vogelsang, T. (2023). Information, incentives, and attention: A field experiment on the interaction of management controls. *The Accounting Review*, 98(5), 455-479.

Marc, M., D. Peljhan, N. Ponikvar, A. Sobota, & M. Tekavicic. (2010). Determinants of integrated performance measurement systems usage: An empirical study. *Journal of Applied Business Research*, 26(5), 63–76.

Marriott, N., & Marriott, P. (2000). Professional accountants and the development of a management accounting service for the small firm: barriers and possibilities. *Management Accounting Research*, 11(4), 475-492.

McKenzie, D. (2021). Small business training to improve management practices in developing countries: re-assessing the evidence for 'training doesn't work'. *Oxford Review of Economic Policy*, *37*(2), 276-301.

McKenzie, D., & Woodruff, C. (2014). What are we learning from business training and entrepreneurship evaluations around the developing world?. *The World Bank Research Observer*, *29*(1), 48-82.

McKenzie, D., & Woodruff, C. (2017). Business practices in small firms in developing countries. *Management Science*, *63*(9), 2967-2981.

McKenzie, D., Woodruff, C., Bjorvatn, K., Bruhn, M., Cai, J., Gonzalez-Uribe, J., Quinn, S., Sonobe, T., & Valdivia, M. (2023). Training entrepreneurs. *VoxDevLit*, 1(3), 1-30.

Mitchell, F., & Reid, G. C. (2000). Problems, challenges and opportunities: the small business as a setting for management accounting research. *Management Accounting Research*, 11(4), 385-390.

Nandan, R. (2010). Management accounting needs of SMEs and the role of professional accountants: A renewed research agenda. *Journal of Applied Management Accounting Research*, *8*(1), 65.

Otis, N., Clarke, R., Delecourt, S., Holtz, D., & Koning, R. (2024). *The uneven impact of generative AI on entrepreneurial performance*. Working Paper no. 24-042, Harvard Business School, Cambridge, MA, 2023.

Peel, M. J., & Bridge, J. (1998). How planning and capital budgeting improve SME performance. *Long Range Planning*, 31(6), 848-856.

Perren, L., & Grant, P. (2000). The evolution of management accounting routines in small businesses: a social construction perspective. *Management accounting research*, 11(4), 391-411.

Quinn, Martin. (2011), "Routines in management accounting research: further exploration." Journal of Accounting & Organizational Change 7(4), 337–357.

Sarasvathy, S.D (2018). What makes entrepreneurs entrepreneurial? Darden Business Publishing, UVA-ENT-0065.

Sarasvathy, S.D. (2001). Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. Academy of Management Review, 26(2), 243-263.

Sharma, M. K., & Bhagwat, R. (2007). Performance measurement system: case studies from SMEs in India. *International Journal of Productivity and Quality Management*, 2(4), 475-509.

Shields, Jeff, and Joyce Shelleman. (2016), "Management accounting systems in micro-SMEs." Journal of Applied Management and Entrepreneurship 21(1), 19–31.

Sousa, S. D., Aspinwall, E., Sampaio, P. A., & Rodrigues, A. G. (2005). Performance measures and quality tools in Portuguese small and medium enterprises: survey results. *Total Quality Management and Business Excellence*, 16(2), 277-307.

Thomsen, J. (2008). Processes of Localization and Institutionalization of Local Managers in Economic Functions in Danish Owned Subsidiaries in Baltic Countries. *Journal of Business Economics and Management*, (4), 279-287.

Tomkins, C., & Green, R. (1988). An experiment in the use of data envelopment analysis for evaluating the efficiency of UK university departments of accounting. *Financial Accountability & Management*, 4(2), 147-164.

Van der Sluis, J., Van Praag, M., & Vijverberg, W. (2008). Education and entrepreneurship selection and performance: A review of the empirical literature. *Journal of Economic Surveys*, 22(5), 795-841.

Wouters, M., & Wilderom, C. (2008). Developing performance-measurement systems as enabling formalization: A longitudinal field study of a logistics department. *Accounting, Organizations and Society*, 33(4-5), 488-516.

Zengin, Y., & Ada, E. (2010). Cost management through product design: target costing approach. *International Journal of production research*, 48(19), 5593-5611.

Figures

Figure 1. Theoretical model

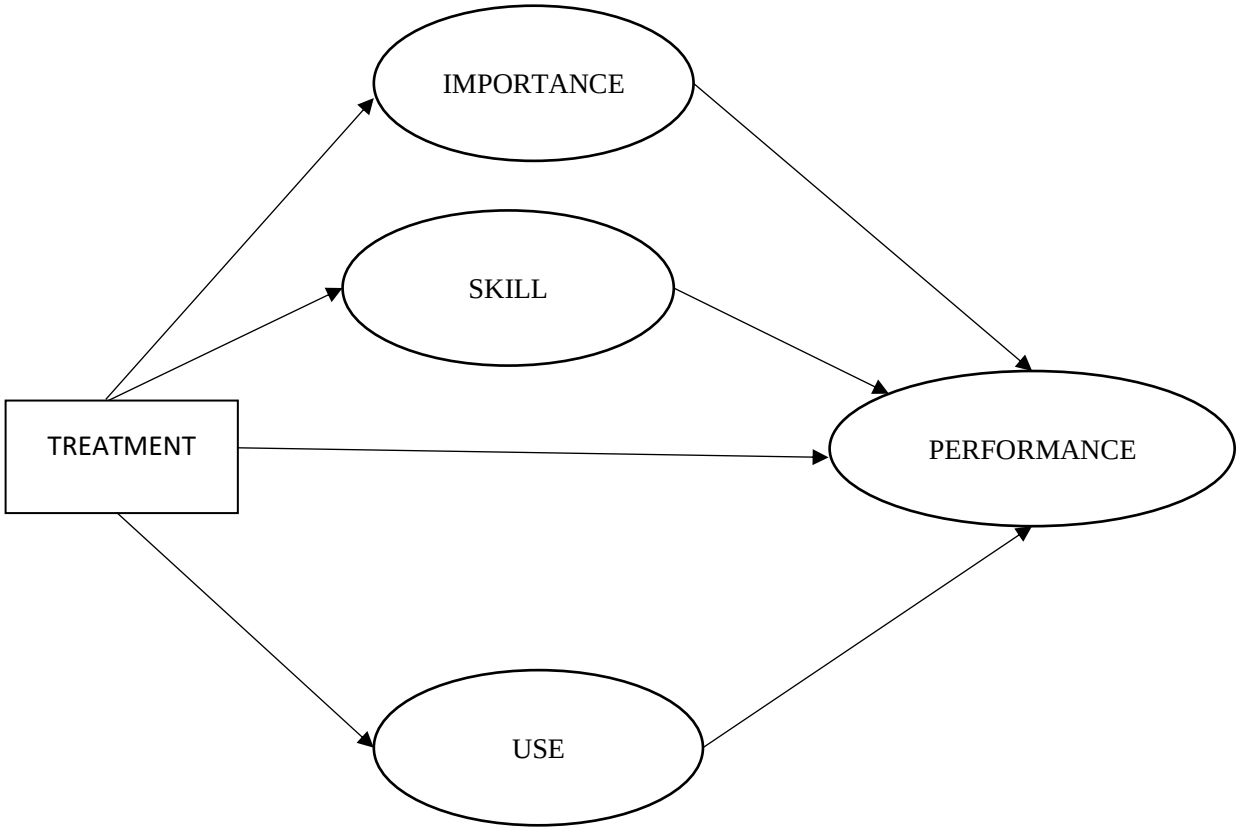
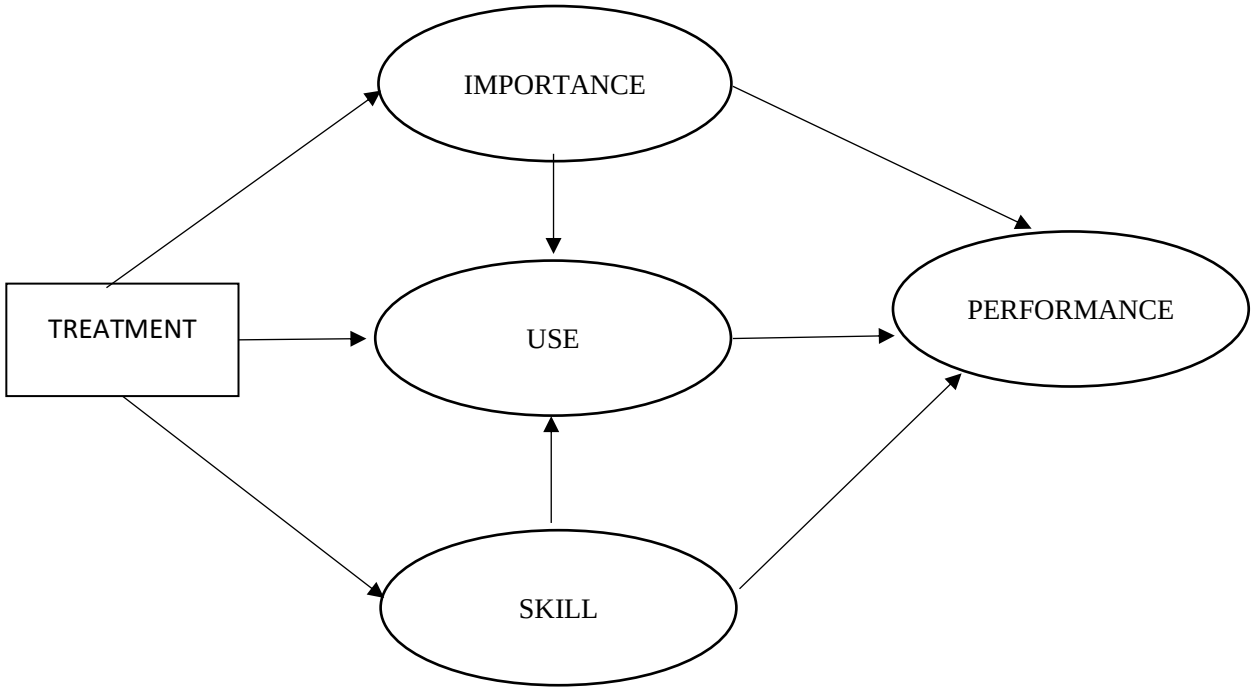


Figure 2. Example of a screen from an animated video, featuring the two entrepreneurs.

Figure 3. Alternative model



Tables

Table 1. Descriptive statistics of the sample at the start of the experiment [a]

Panel A: Demographic information of respondents and firms				
Variable	N	Mean	Median	Standard Deviation
Working Experience (years)	154	23.02	23	9.70
Managerial Working Experience (years)	154	8.83	5	10.27
Experience in SMEs (years)	154	10.50	8	10.06
Experience in Entrepreneurship (years)	155	6.25	3	8.32
Firm size (no. of employees)	155	1.89	1	2.13
Panel B: Job titles				
		Number	%	
CEO		125	85.61	
Other managers		17	11.64	
Chair of Board/Board member		4	2.74	
Panel C: Educational Background				
		Number	%	
University degree (bachelor's or master's level)		106	68.39	
Secondary school (college, vocational school, high school)		39	25.16	
PhD		8	5.16	
Grade school or equivalent		2	1.29	

[a] The number of observations can be smaller than the total sample due to missing values.

Table 2. Descriptive statistics of main variables.

Variable	Range	N	Mean	Median	Standard Deviation
TREAT	0-1	155	0.43		
CHG_PERF		146	-0.15	-0.10	1.25
POST_PERF	1-7	152	3.63	3.60	1.33
PRE_PERF	1-7	147	3.81	4.00	1.04
CHG_USE		140	-0.07	0.00	0.85
POST_USE	0-5	155	2.08	2.17	1.03
PRE_USE	0-5	140	2.14	2.17	0.87
CHG_IMP		132	-0.11	0.00	0.74
POST_IMP	1-5	148	4.40	4.50	0.67
PRE_IMP	1-5	137	4.48	4.67	0.56
CHG_SKILL		132	0.25	0.32	0.66
POST_SKILL	1-5	147	3.28	3.17	0.71
PRE_SKILL	1-5	138	3.04	3.00	0.81

Table 3. Pairwise correlations between main variables.

Variables				
Panel A – Pre – Experiment	**1**	**2**	**3**	**4**
1. PRE_PERF	1			
2. PRE_USE	0.26**	1		
3. PRE_IMP	0.01	0.30***	1	
4. PRE_SKILL	0.14	0.50***	0.20**	1
Panel B – Post - Experiment	**1**	**2**	**3**	**4**
1. POST_PERF	1			
2. POST_USE	0.09	1		
3. POST_IMP	-0.05	0.18**	1	
4. POST_SKILL	0.28**	0.45***	0.03	1
Panel C - Changes	**1**	**2**	**3**	**4**
1. CHG_PERF	1			
2. CHG_USE	0.15*	1		
3. CHG_IMP	-0.05	0.09	1	
4. CHG_SKILL	0.18**	0.24***	0.12	1

***Significant in a two-sided test at 1% level; **5% level; *10% level

Table 4. Difference in means between treatment and control conditions on pre-experiment variables.

Panel A: Initial Sample [a]			
Variable	Treatment (N = 137)	Control (N = 136)	T-test [b]
PRE_PERF	3.87	3.96	-0.66
PRE_USE	2.09	2.09	-0.03
PRE_IMP	4.52	4.52	-0.06
PRE_SKILL	2.94	3.06	-1.13
Working Experience	21.72	22.65	-0.78
Managerial Working Experience	8.81	9.16	-0.25
Experience in SMEs	10.08	9.92	0.13
Experience in Entrepreneurship	5.57	5.87	-0.31
Number Employees	2.42	1.90	1.14
Panel B: Respondents of the second questionnaire [a]			
Variable	Treatment (N = 66)	Control (N = 89)	T-test [b]
PRE_PERF	3.92	3.73	1.04
PRE_USE	2.14	2.15	-0.07
PRE_IMP	4.42	4.52	-0.99
PRE_SKILL	3.01	3.06	-0.34
Working Experience	22.63	23.32	-0.44
Managerial Working Experience	8.55	9.04	-0.29
Experience in SMEs	10.34	10.61	-0.16
Experience in Entrepreneurship	6.25	6.24	0.01
Number Employees	1.89	1.89	0.02

[a] The number of observations can be smaller than the total in each condition due to missing values.
[b] Two-sided test with equal variances when the test for the equality of variances was not rejected (when rejected, unequal variances were considered).

Table 5. Difference in post and change performance means between treatment and control conditions

Panel A: Difference in post variables [a]			
Variable	Treatment (N = 66)	Control (N = 89)	T-test [b]
PS_PERF	3.71	3.56	0.69
PS_USE	2.17	2.02	0.87
PS_IMP	4.29	4.49	-1.80**
PS_SKILL	3.41	3.18	1.93**
Panel B: Difference in change variables [a]			
Variable	Treatment (N = 66)	Control (N = 89)	T-test [b]
CHG_PERF	-0.21	-0.10	-0.52
CHG_USE	0.02	-0.15	1.11
CHG_IMP	-0.17	-0.06	-0.81
CHG_SKILL	0.40	0.11	2.56***

[a] The number of observations can be smaller than the total in each condition due to missing values.

[b] One-sided test with equal variances when the test for the equality of variances was not rejected (when rejected, unequal variances were considered).

*** indicates the significance of the *p* value at 0.01, and ** at the 0.05.

Table 6. PLS-SEM Models[a)]

Panel A – PLS SEM structural model results							
Path	**Pred Sign**	**Column 1 PRE**	**Column 2 PRE**	**Column 3 POST**	**Column 4 POST**	**Column 5 CHG**	**Column 6 CHG**
TT=> IMP	+	-0.377	-0.376	-0.324**	-0.324**	-0.134	-0.134
TT=> USE	+	0.062	0.063	0.181	0.185	0.181	0.181
TT => SKILL	+	-0.043	-0.042	0.307**	0.308**	0.412***	0.412***
TT => PERF	+	0.258	0.230	0.057	-0.042	-0.186	-0.186
IMP => PERF	+	0.120	0.058	-0.035	-0.065	-0.081	-0.087
USE => PERF	+	0.270***	0.257***	0.036	0.006	0.103*	0.091
SKILL => PERF	+	-0.004	0.015	0.299***	0.261***	0.175**	0.172**
Controls							
PRE_PERF=> PERF					0.445***		
N_employees=> PERF			0.200***		0.078		-0.012
COVID19_high=> PERF			-0.172		-0.312**		-0.174
N		155	155	155	155	155	155
SRMR		0.143	0.136	0.124	0.107	0.089	0.078
Panel B – Indirect Effects							
Total Indirect Effects							
TT => PERF	+	-0.028	-0.006	0.110*	0.102*	0.101*	0.099*
Specific Indirect Effects							
TT=>IMP=>PERF	+	-0.045	-0.022	0.011	0.021	0.011	0.012
TT=>USE =>PERF	+	0.017	0.016	0.007	0.001	0.019	0.017
TT=>SKILL=>PERF	+	0.000	-0.001	0.092*	0.080*	0.072*	0.071*

[a)] In the PRE columns the PERF, IMP, USE and SKILL variables refer to the pre experiment variables obtained as latent variables from the respective questionnaire items. In the POST columns the PERF, IMP, USE and SKILL variables refer to the post experiment variables obtained as latent variables from the respective questionnaire items. In the CHG columns the PERF, IMP, USE and SKILL variables refer to the observed change variables previously computed CHG_PERF, CHG_IMP, CHG_USE, and CHG_SKILL, respectively. The control variables are observed variables except for the Prior_Performance that is a latent variable in the POST columns. Standardized coefficients are reported. Two-sided tests except when there is a prediction for the relationship in the POST and CHG columns. *** indicates the significance of the *p* value at 0.01, ** at the 0.05, and * at 0.1.

Table 7. Alternative PLS-SEM Models[a)]

Panel A – PLS SEM structural model results							
Path	**Pred Sign**	**Column 1 PRE**	**Column 2 PRE**	**Column 3 POST**	**Column 4 POST**	**Column 5 CHG**	**Column 6 CHG**
TT=> IMP	+	-0.133	-0.133	-0.308**	-0.307**	-0.134	-0.134
TT=> USE	+	0.058	0.058	0.071	0.071	0.110	0.110
TT => SKILL	+	-0.035	-0.035	0.301**	0.301**	0.412***	0.412***
TT => PERF	+	0.223	0.209	0.065	-0.034	-0.186	-0.186
IMP => USE	+	0.190**	0.190**	0.145	0.145	0.056	0.056
SKILL => USE	+	0.465***	0.465***	0.400***	0.400***	0.192**	0.192**
IMP => PERF	+	-0.066	-0.099	-0.030	-0.057	-0.081	-0.087
USE => PERF	+	0.300***	0.282***	-0.005	-0.039	0.103*	0.091
SKILL => PERF	+	-0.005	0.012	0.311***	0.275***	0.175**	0.172**
Controls							
PRE_PERF=> PERF					0.446***		
N_employees=> PERF			0.221***		0.082*		-0.012
COVID19_high=> PERF			-0.205		-0.309**		-0.174
N		155	155	155	155	155	155
SRMR		0.086	0.089	0.089	0.082	0.078	0.072
Panel B – Indirect Effects							
Total Indirect Effects							
TT => PERF	+	0.014	0.017	0.102*	0.095*	0.101*	0.099*
Specific Indirect Effects							
TT=>IMP=>PERF	+	0.009	0.013	0.009	0.018	0.011	0.012
TT=>USE =>PERF	+	0.017	0.016	-0.000	-0.003	0.011	0.010
TT=>SKILL=>PERF	+	0.000	-0.000	0.093*	0.083*	0.072*	0.071*
TT => IMP => USE	+	-0.025	-0.025	-0.044	-0.045	-0.008	-0.008
TT=>SKILL=>USE	+	-0.016	-0.016	0.120**	0.120**	0.079*	0.079*
TT=>IMP=>USE=>PERF	+	-0.008	-0.007	0.000	0.002	-0.001	-0.001
TT=>SKILL=>USE=>PERF	+	-0.005	-0.005	-0.001	-0.005	0.008	0.007

[a)] In the PRE columns the PERF, IMP, USE and SKILL variables refer to the pre experiment variables obtained as latent variables from the respective questionnaire items. In the POST columns the PERF, IMP, USE and SKILL variables refer to the post experiment variables obtained as latent variables from the respective questionnaire items. In the CHG columns the PERF, IMP, USE and SKILL variables refer to the observed change variables previously computed CHG_PERF, CHG_IMP, CHG_USE, and CHG_SKILL, respectively. The control variables are observed variables except for the Prior_Performance that is a latent variable in the POST columns. Standardized coefficients are reported. Two-sided tests except when there is a prediction for the relationship in the POST and CHG columns. *** indicates the significance of the *p* value at 0.01, ** at the 0.05, and * at 0.1.

Table 8. Heterogeneous Treatment Effects – Prior Performance and Education[a)]

PLS SEM structural model results										
		Panel A			Panel B			Panel C		
Path	Pred. Sign	High Performers	Low Performers	Diff in coeffic	High Education	Low Education	Diff in coeffic	No business education	Some business education	Diff. Coeff.
TT=> IMP	+	0.199	-0.465**	0.664**	0.002	-0.543**	0.545*	-0.225	-0.036	-0.190
TT=> USE	+	0.473**	-0.080	0.553*	0.217	0.119	0.097	0.120	0.211	-0.090
TT => SKILL	+	0.399**	0.469**	-0.070	0.319*	0.588**	-0.269	0.377**	0.378*	-0.001
TT => PERF	+	-0.017	-0.270	0.253	-0.064	-0.434*	0.370	-0.092	-0.223	0.131
IMP => PERF	+	-0.225**	0.012	-0.237*	-0.104	-0.141	0.037	0.086	-0.259***	0.344***
USE => PERF	+	0.109	0.005	0.104	-0.061	0.441***	-0.502***	-0.097	0.194**	-0.290**
SKILL => PERF	+	0.068	0.246**	-0.178	0.109	0.377***	-0.269*	0.057	0.347***	-0.291**
Controls										
N_employees=> PERF		0.020	0.039	-0.019	-0.039	0.125	-0.164	0.013	0.009	0.004
COVID19_high=> PERF		-0.506**	0.113	-0.618*	-0.234	-0.220	-0.013	-0.437*	0.167	-0.604*
N		75	72		114	41		83	72	
SRMR		0.099	0.139		0.093	0.117		0.087	0.104	

[a)] All columns use CHG variables - PERF, IMP, USE and SKILL variables refer to the observed change variables previously computed CHG_PERF, CHG_IMP, CHG_USE, and CHG_SKILL, respectively. The control variables are observed variables. Standardized coefficients are reported, except on the column difference in coefficients. Two-sided tests except when there is a prediction for the relationship. *** indicates the significance of the *p* value at 0.01, ** at the 0.05, and * at 0.1.

Table 9. Heterogeneous Treatment Effects – Financial decision support and internationalization[a)]

PLS SEM structural model results							
		Panel A			Panel B		
Path	Pred. Sign	No Support	With Support	Diff. Coeff.	Interna-tional	Domestic	Diff in coeffic
TT=> IMP	+	-0.259	-0.094	-0.166	-0.177	-0.082	-0.095
TT=> USE	+	0.055	0.289	-0.234	0.364*	0.069	0.295
TT => SKILL	+	0.719***	0.154	0.565**	0.523**	0.471**	0.052
TT => PERF	+	-0.396*	-0.034	-0.362	-0.309	-0.171	-0.139
IMP => PERF	+	-0.114	-0.023	-0.090	-0.279**	0.034	-0.313**
USE => PERF	+	0.048	0.118	-0.070	0.112	0.051	0.061
SKILL => PERF	+	0.283**	0.094	0.190	0.345**	0.099	0.245
Controls on PERF							
N_employees=> PERF		-0.053	0.026	-0.079	0.018	0.030	-0.012
COVID19_high=> PERF		-0.006	-0.246	0.240	-0.104	-0.175	0.072
N		78	77		51	100	
SRMR		0.134	0.073		0.096	0.103	

[a)] All columns use CHG variables - PERF, IMP, USE and SKILL variables refer to the observed change variables previously computed CHG_PERF, CHG_IMP, CHG_USE, and CHG_SKILL, respectively. The control variables are observed variables. Standardized coefficients are reported, except on the column difference in coefficients. Two-sided tests except when there is a prediction for the relationship. *** indicates the significance of the *p* value at 0.01, ** at the 0.05, and * at 0.1