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Learning preferences in accounting education: a focus on the role of visualization

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Structured Abstract:

Purpose

In accounting education studies, there is increasing interest in using teaching visual tools and contents. However, the research is still limited. The paper aims to investigate whether using visual tools and content in this context is pedagogically effective. In doing so, the paper contributes to the debate by providing preliminary evidence on the extent to which the use of visualization in accounting education aligns with learning preferences.

Design/methodology/approach

The paper adopted the VARK questionnaire as a tested means to study the learning preferences of accounting students and academics. The empirical study is based on a survey conducted with academics, undergraduate and postgraduate accounting students.

Findings

The results show that visualization appears to be the less-relevant learning preference of students. This result is not in line with the emergent discussion in accounting education literature, which examines how visual tools can improve the presentation of accounting information.

Originality/value

The paper shows the limit of visual tools in teaching accounting, despite the increasing role of visualization in the discipline more broadly. The paper argues that academics and instructors who are knowledgeable about learning styles and their implications can modify or adapt their teaching strategies to maximize students' learning potential. This can aid educators to augment teaching strategies to make coursework more engaging, meaningful and effective.

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1. Introduction

"I hear and I forget. I see and I remember. I do and I understand" (Confucius 551–479 BC). This quote reminds us there is not a single approach to learning, and individuals' learning preferences can affect the results of an educational program. Effective teaching cannot be limited to the delivery of information; rather, it needs to be based on a model aligned with students' learning style (Anderson and Adams, 1992). Students learn in many ways. Some, for example, learn by seeing and hearing, others by reflecting and acting, by reasoning logically and intuitively, by memorizing and visualizing, or by drawing analogies and building mathematical models (Felder and Silverman, 1988). Learning styles can also influence the quality of teaching (Visser, McChlery and Vreken, 2006), and it is necessary to adapt teaching strategies to engage with different learning preferences, (Suskie, 2004; Felder and Brent, 2005). This approach increases students' self-motivation by focusing on their learning needs, rather than merely acquiring facts (Kilroy, 2004).

In accounting education literature, some scholars argue for changes to the content covered, teaching methods used and pedagogies employed to develop professional competencies and skills (Kimmel, 1995; Porter and Carr, 1999; Albrecht and Sack, 2000; Lucas, 2000; Samkin and Stainbank, 2016; Teixeira and Gomes, 2016). Others call for the development of new teaching models and tools that match the new ways we use accounting knowledge and information in organizations and society as a whole (Imel, 1998; Goldman and Torrisi-Staele, 2002; Baer, 2005; McGuigan and Kern, 2015, 2016). Researchers are increasingly seeking to understand the implications of visualization and the role of accounting in creating visibilities/invisibilities in relation to different kinds of visual tools and content (Graves et al., 1996; Courtis, 2004; Campbell et al., 2009; Davison and Warren, 2009; Warren and Parker, 2009; Dilla et al. 2010; Davison, 2011; Busco and Quattrone, 2015; Hirsch et al., 2015). In accounting education, in particular, the use of visual tools and content can improve teaching and align content with preferred learning styles (Visser et al., 2006).

Given that teaching methods consistent with students' learning preferences increase the performance and quality of education (Kilroy, 2004; Lovelace, 2005; Visser et al., 2006), and that there is a need

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to understand "the benefit from the use of visual material as teaching aids" (Davison, 2015; p.29), this paper investigates whether using visual tools and content in accounting education can be effective pedagogically, and can align with students' and academics' learning preferences.

In order to answer to the research questions, the paper adopts the VARK learning model framework developed by Fleming (2011). We use the VARK questionnaire with a sample of accounting students and academics in an Italian university.

The results show that visualization appeared to be the less-relevant learning preference among students. This is not in line with the emergent discussion in accounting education literature, and accounting literature more broadly, about how visual tools can improve the presentation of accounting concepts and pedagogical output. This has significant practical and research implications.

The rest of the paper is structured as follows. The second section discusses the literature on accounting education and learning preferences. The third section highlights the framework of analysis. The fourth section presents the methodology and the research design. The fifth section analyses the results. The paper concludes with a discussion and some final remarks.

2. Accounting education, visual and learning preferences

Learning preference is the way in which "an individual learns, perceives, interacts with, and responds to learning environments" (Keefe, 1979). Felder and Brent (2005) extend this definition to consider learning preference as the manner by which the brain works most efficiently to process, comprehend and learn new information. Learning theories suggest that learning preferences influence the effectiveness with which individuals communicate and learn. Thus, teaching methods need to be appropriate to students' learning preferences (Kolb, 1976, 1984; Fleming and Mills, 1992; Fleming, 2011; Kumar et al., 2012). In reality, students display a range of approaches to learning, and a single-mode approach means that instructors will only reach some of the students (Richardson et al., 2013). Moreover, differences in learning could also depend on a gender (Kumar et al. 2012) or nationality (Donald and Jackling, 2007). Analyzing learning preferences enables us to understand the ways in

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which students learn, and the ways in which the learning context interacts with learning choices (Booth et al., 1999). Success in teaching involves not only high-quality content, but also an understanding of students' learning preferences and study behaviors. Lovelace (2005) finds that an educational approach consistent with students' learning preferences increased academic achievement and improved attitudes toward learning. In fact, learning styles interact with the extent of collaborative learning in affecting the students' learning outcomes (Chen et al. 2018). As a consequence, students are more motivated (Jessee et al., 2006) and learn more effectively and rapidly when using their preferred learning preference (Stevenson and Dunn, 2001). Similarly, Jessee et al. (2006) demonstrate the importance of understanding and acknowledging different learning preferences as a way to improve education methods. Fleming and Bonwell (1998) suggest that it is considerably easier to change learning and teaching strategy than to attempt to change the learner's learning preference. Therefore, identifying learning preferences in student groups is important when developing suitable teaching and learning methods (Chio and Forde, 2002).

Accounting education literature emphasizes the importance of student preferences and teaching preferences in the construction of course materials and content (Visser et al., 2006). Indeed, accounting may be communicated in three 'languages': numbers, words and visual images (Davison and Warren, 2009). One particular teaching method that is increasingly diffused in accounting is the use of visual techniques and aids (Davison, 2015). Osgerby et al. (2018) highlight that the visualization process encourages accounting students to think beyond a basic written personal development plan, and enables deeper exploration and critical assessment of future personal goals. The authors suggest that using visual elements in teaching encourages students to integrate their educational and life experiences with their career aspirations. Wynder (2017) emphasizes that in many countries with significant increases in students for whom English is a second language, visualization in accounting studies could facilitate conceptual knowledge and compensate for linguistic and cultural differences. Swanson (2014) reports that the use of a hyperbolic browser for classroom instruction and curriculum management enables information visualization that can be used

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to map transactions through the ERP accounting system. This tendency to use visual elements in accounting education is not recent. The visual has increasingly permeated aspects of accounting, and the move from aural/oral cultures to written/visual culture with the spread of double-entry bookkeeping is one example of this use (Davison 2015, Quattrone 2009). Visual elements in accounting may be a useful supplementary means of communicating financial information (Smith and Taffler, 1984; Beattie and Jones 1992), and may support accounting information (Libby, 1981) in order to make clearer and more efficient representations (Smith and Taffler, 1996). The adoption of tools like diagrams, charts and graphs as visual tools can help to define, for example, the role of financial and non-financial data in the design of accounting systems (Beattie and Jones, 2002). Visual elements could help to communicate complex messages simply (Davison, 2015). In fact, De Villiers and Dumay (2013) highlight that using visual elements in accounting papers can overcome criticisms that papers are too long and dry. Visual elements can provide a more immediate means to communicate, which creates interest and leads to greater understanding. Davison (2015, p. 30) provides a review and synthesis of visual research in accounting, and emphasizes that visual forms are important to accounting because of their power and their ubiquity in an increasingly visual society. Despite this growing emphasis on the visual in accounting education studies, however, more effort is needed to understand the pedagogical benefits of delivering accounting content through visual teaching aids and methods (Davison, 2015; Visser et al., 2006), in line with the learning preferences of students.

3. Learning preferences: a framework of analysis

The previous section showed how students learn in many ways, and that students' learning preferences are different and vary from one individual to another. Various authors have tried to define types and categories of learning preferences. Kolb (1984) sets out four distinct learning preferences, which are based on four-stage learning: diverging (feeling and watching), assimilating (watching and thinking), converging (doing and thinking) and accommodating (doing and feeling). Honey and

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Mumford (1992) define four categories of learning preferences: activist, reflector, theorist and pragmatist. Gregorc (1985) provides metrics for four learning preferences: concrete-sequential (CS), abstract-sequential (AS), abstract-random (AR), and concrete-random (CR). Felder and Silverman (1988) differentiate learning preferences through four dimensions: perception (sensory/intuitive), information input (image/verbal), information process (active/reflective) and understanding (sequential/global).

For this paper, we adopt Fleming's VARK model (Fleming, 2011) for its explicit reference to the visual learning preference mode, which aligns with our research aims. Moreover, the VARK model is a multimodal model that allows analysis of visual learning preferences without omitting other types of learning. Although this research focuses on the role of the visual learning preference, learning preferences need to be investigated in a comprehensive way. The VARK model is also appropriate for this study because of its neutrality with respect to the discipline taught. In fact, the VARK does not use discipline-specific questions about content. A number of studies confirm the reliability of VARK as a diagnostic tool (Hawk and Shah, 2007; Leite et al., 2010) and to determine the extent to which students have a particular learning preference (Fleming and Mills, 1992; Maran et al., 2013). The VARK model is also useful for educators who want to develop additional learning strategies for their classroom (Ramayah et al., 2009; Morgan and Baker, 2013). VARK is used in extensively in medical education research (Murphy et al., 2004; Felder and Brent, 2005; Alkhasawneha et al., 2008), but its use in accounting education research is not widespread.

The VARK model was developed by Fleming and based on the experiential learning theory (Kolb, 1984). According to Kolb, learning preferences are the ways that people prefer to interchange information, and including read/write (learning by reading/writing), auditory (learning by hearing), visual (learning by seeing) and kinesthetic (learning by doing) (Fleming, 2001; Felder and Brent, 2005). According to Fleming (2011), 'visual' includes the depiction of information in maps, spider diagrams, charts, graphs, flow charts, labelled diagrams and all the symbolic arrows, circles, hierarchies and other devices that people use to represent things that could have been presented in

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words. This definition is coherent with the categories of visual accounting used in the literature (Davison, 2015). Aural/auditory describes people with a preference for information that is 'heard or spoken.' (Fleming, 2011). This cohort learns best from lectures, group discussion, radio, email, using mobile phones, speaking, web-chat and talking things through. Read/write represents a preference for information displayed as words. Kinesthetic refers to the perceptual preference related to the use of experience and practice (simulated or real). People with more than one preference are defined as multimodal. There are two types of multimodal preferences. Type 1 includes people who are flexible in their communication preferences and who switch from one mode to another mode depending on what they are working with. They are context specific. Type 2 people are not satisfied until they have had input (or output) in all their preferred modes. They take longer to gather information from each mode and, as a result, they often have a deeper and broader understanding. Their decision making and learning may be better because of that breadth of understanding (Fleming, 2011).

4. Methodology and research design

In order to answer our research questions, we adopted the VARK questionnaire as a tested means to study the preferences of accounting students and academics. The empirical study is based on a survey conducted with academics, undergraduate and postgraduate accounting students.

The VARK questionnaire has 16 multiple questions with four different responses (see Appendix 1), adopting four subscales (a, b, c, d) that correspond to four different learning preferences, namely: visual, aural, read/write and kinesthetic. The results of the VARK score for each student is the sum of the responses for the four categories, which indicates a tendency toward one or more learning preference. Questionnaires were distributed from December 2013 to March 2014 in an Italian university. The choice of the Italian context was made considering the latest regulatory developments that have highlighted the role of teaching and research in order to obtain state funding. In particular, Law 240/2010 and Presidential Decree 76/2010 introduced a system of accreditation and periodic evaluation that aimed to strengthen self-assessment for the allocation of state funding. This system is

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based on the use of specific indicators defined by the ANVUR (National Agency of Evaluation of University and Research System) to verify whether universities have appropriate educational, structural, organizational qualification requirements for teachers and research activities, as well as economic and financial sustainability. In Italy, an undergraduate course represents the first university cycle, while a postgraduate course is the second university cycle. Figure 1 shows the existing education structure in the Italian context.

The objective is to investigate the preferred learning styles of accounting students and academics, and the implications for educators and practitioners. In doing so, the paper compares learning preferences at different stages of the education process and seeks to understand if there are differences in learning preferences between academics and undergraduate and postgraduate students. The questionnaire was distributed in paper form during class time with the academic's permission. Academics were asked to complete the questionnaire at the same time. Other academics were contacted by email.

Figure 1: place here

Table 1 summarizes the details of the questionnaires administered to the undergraduate and postgraduate students. The questionnaires were distributed to students attending undergraduate and postgraduate degree courses. The title of the course is reported in column 'Courses.' The column 'Questionnaires collected' represents the number of questionnaires distributed to students attending the courses. The column 'Number of students' represents the number of students enrolled.

Students were asked to complete the questionnaire and to deliver it directly to the researchers. We distributed and collected 756 questionnaires (610 for undergraduate and 146 for postgraduate students), the coverage rate was 51.89 per cent (51.05 per cent for undergraduate and 55.73 per cent for postgraduate students). Only three questionnaires were unusable and were eliminated. As Table 2 shows, around 45 per cent of respondents are male and 55 per cent female, whereas 89.1 per cent

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are domestic students. Students' status (undergraduate/post-graduate), gender and group of origin (national or international students) were tested as control variables.

In addition, we distributed and collected questionnaires from 8 of the 13 (61.54 per cent) accounting academics of the department. Despite the limited absolute number of academics, we believe the findings, although preliminary and not generalizable, can provide some interesting evidence to be further investigated in subsequent studies.

The data was analyzed using R statistical software.

Table 1 and table 2: place here

5. Analysis of results

The analysis of the questionnaire results is described in the next subsections, beginning with an analysis of the learning preferences of undergraduate and postgraduate students, and then of accounting academics. For each group, the single VARK learning preference is presented as visual (V), aural (A), read/write (R) and kinesthetic (K), as well as multimodal (MM). Multimodalities occur when there are equal preferences in VARK scores. Ten combinations are possible: VA (visual/aural), VR (visual/read/write), VK (visual/kinesthetic), AR (aural/read/write), AK (aural/kinesthetic), RK (read/write/kinesthetic), VAR (visual/aural/read/write), ARK (aural/read/write/kinesthetic), VRK (visual/read/write/kinesthetic), VARK (visual/aural/read/write/kinesthetic).

Undergraduate and postgraduate students

In this section, we summarize the results for both undergraduate and postgraduate students. The dominant learning style in undergraduate students was aural. As noted in Table 3, 33.61 per cent of undergraduate students had aural style as their dominant preference. This means that the students have a preference for information that is heard or spoken (Fleming, 2011). Students who have this preference style learn best from lectures, group discussion, radio, email, using mobile phones,

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speaking, web-chat and talking things through (Fleming, 2011). Some undergraduate students (23.72 per cent) also expressed a preference for the kinesthetic style, which means their perceptual preference is related to the use of experience and practice, simulated or real, which includes demonstrations, simulations, case studies, practical example and applications (Fleming, 2011). The third preference expressed by undergraduate students was the read/write style (20.92 per cent). Only 5.44 per cent of undergraduate students prefer the visual learning style. These overall results suggest that students tend to prefer a reductionist style rather than a holistic style (Fleming, 2011). Female students tend to prefer more visual and read/write learning styles compared with male students. Male students prefer more aural. Domestic students prefer aural learning, while international students prefer more visual and kinesthetic style.

Table 3: place here

The multimodal cases shown in Table 4 represent the 16.31 per cent of the total sample. Type 1 people make up the majority of the multimodal cases (85 per cent). Those who belong to this category switch from mode to mode depending on what they are working with. Type 2 comprises 4 per cent, while 11 per cent comprised learners in transition modality – those who fall between VARK type 1 and VARK type 2.

Table 4 shows there are few people with a visual preference in addition to another mode, (approximately 11 per cent). The majority of respondents have a preference for AR and AK, so the visual preference is not widespread among undergraduate students with a multimodal preference. The VARK results for this cohort show that visualization is not the dominant preferred learning style of undergraduate students.

Table 4: place here

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The dominant learning style of postgraduate students is aural (33.56 per cent), in line with that of undergraduate students (Table 5). This group prefers information they can hear or that is spoken, and they learn best from lectures, group discussion, radio, email, using mobile phones, speaking, web-chat and talking things through (Fleming, 2011). The second dominant style is kinesthetic (25.34 per cent) which means that the perceptual preference of a quarter of postgraduate students relates experience and practice (Fleming, 2011). The third preference style for postgraduate students was the read/write style, with 22.60 per cent preferring the read/write learning style. Similar to the other results, visual is the least preferred learning style. Only 4.79 per cent of postgraduate students prefer the visual learning style. The results are similar to those for undergraduate students. In addition, female postgraduate students tend to prefer the read/write learning style, and male students tend to prefer the aural style. And as reported in Table 4, domestic students prefer more aural and read/write learning styles, while international students prefer more visual and kinesthetic styles. Results for postgraduate students are similar to undergraduate students. It seems there is an association between gender, group of origin and VARK profile.

Table 5: place here

The multimodal population represents 13.70 per cent (Table 6), of which 55 per cent was aural/kinesthetic. The majority was type 1 (70 per cent). Type 2 represents 15 per cent, while 15 per cent were in transition modality, which includes learners who fall in between VARK type 1 and VARK type 2. There are few (5 per cent) respondents with multimodal preferences who have a visual preference and another mode of learning. The majority has a combination of A, K and R modes of learning.

Table 6: place here

Academics

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Eight accounting academics contributed to the research project, representing some 68 per cent of accounting academics of the department. Figure 2 shows that the dominant learning preference for the academics was an aural (62.5 per cent) style of learning. The second dominant style was kinesthetic (25 per cent). No academics displayed visual or read/write as a single learning preference. Results are similar to undergraduate and postgraduate students.

One academic (12.5 per cent) had a multimodal preference (aural/kinesthetic). The sum of this person's responses for the four categories is 16 – according to Fleming (2011), this academic is classified as type 1. Those who belong to this category are flexible and switch from mode to mode.

Academics' preferred learning style is aural. People who have this as their main preference report they learn best from lectures, group discussion, radio, email, using mobile phones, speaking, web-chat and talking things through (Fleming, 2011).

The results are not consistent with trends in accounting to use more visual tools because academics prefer aural/kinesthetic modes of learning. This raises questions that are not within the scope of this research about whether there is a relationship between quality of teaching and learning style preference. Adapting teaching methods to the students' preferences (Kumar et al., 2012) may increase the efficiency and effectiveness of teaching, and lead to more engagement from students. In addition, adapting teaching methods to the academics' preferences may increase their engagement.

Figure 2: place here

Statistical tests

We used R statistical software to do the association test. We performed tests only for undergraduate and postgraduate students, while academics were excluded as the sample is not large enough to be representative for statistical tests. We performed chi-squared test and we calculated the Cramer's V. The level of significance is 0.05. The variables tested are: gender, group of origin (national or international students), years of study, status (undergraduate or postgraduate students) and age. The

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tests were made considering the association with the four learning preferences (V, A, R, K), and adding multimodal as one profile (V, A, R, K, MM), and considering all learning preferences (Table 7 and 8).

Table 7 and 8: place here

The age variable was discretized by dividing it into three classes as follows: 18–20 years; 21–23 years; from 24 years onwards.

Results show there is no association between status, age, years and learning preferences. On the other hand, we found a significant association between learning preference and the other two controlling variables, gender and group of origin. However, the Cramer's V shows that the level of association remains moderate. The Cramer's V for gender is 0.156, while for group of origin is 0.157. Similar results were obtained by considering only the four learning preferences (V, A, R, K) with a Cramer's V for gender of 0.166 and for group of origin of 0.167.

6. Discussion

In this section, we attempt to answer our research question. The results show that visualization appeared to be the less-relevant learning preference for both students and academics. This result is not in line with the emergent discussion in accounting education literature about how visual tools can improve presentation of accounting information (Libby, 1981) and make clearer and more efficient representations (Smith and Taffler, 1996). According to Yalamova (2010), visualization can stimulate and enhance students' engagement with learning. Therefore, questions could be raised about using visual means as a major pedagogical tool in terms of the efficiency of teaching and the level of students' engagement. Students display a range of approaches to learning, and a single-mode approach to the delivery of education means that instructors will only reach some students (Richardson et al., 2013). Therefore, academics who understand how to incorporate different learning preferences can modify or adapt their teaching strategies to maximize students' learning potential (Zapalska and Brozik, 2006) and prepare them for real-life work environments. The findings suggest

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that students prefer a more balanced approach in learning. This implies, in turn, that the teaching approach should be balanced too, in order to maximize educational outcomes (Visser et al., 2006). Academics, therefore, need to combine visual tools with more traditional ones to stimulate other learning preferences through reading, case-study discussion, etc.

Gender and group of origin are statistically associated variables that explain some of the differentiation between students' learning preferences. In terms of gender, the results are in line with Kumar et al. (2012) who report males and females have different learning preferences. However, we also show that female students tend to have a much higher preference for visual techniques with respect to male students. Students' group of origin affects their learning preferences. Although we only differentiated between national and international students, the results are in line with Donald and Jackling (2007), who show differences in learning preference among Chinese and Australian students. This result is of particular interest given the internationalization of the university context, and with an increased number of foreign students enrolling in Italian, European and non-European universities. The international trend will challenge content delivery, since learning preferences appear to be biased by cultural factors. Researchers and academics need to pay attention to how the use of visual elements and other teaching strategies can be adapted and/or integrated to have a better understanding of the development of accounting education. Culture-specific learning styles carry several implications for educators, such as problems associated with overloading short-term memory, the importance of prior experience and the role of visual prompts and motivation among students and educators (Sikkema et al., 2015).

The results may suggest the presence of some forms of path-dependency in terms of learning preferences in courses at different academic levels. In fact, we did not find any relevant difference between undergraduate students and postgraduate students. In previous studies (i.e. Jackling, 2005), students showed changing learning preferences in their educational advancements. However, changing learning preference is not a linear process; McGuigan and Kern (2016) argue that to achieve a more creative form of accounting education, it is important to learn how to unlearn. Students may

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thus learn to study through aural and/or writing, since these forms are traditionally used by educators from primary school to college. It is not surprising that visual learning preference play a limited role among students as well as educators. The same may apply to academics, since we found a similarity of learning preferences with students. Although there is a clear match between students' and academics' learning preferences, there is a need to understand how academics' learning preferences affect the content of their courses, and how this affect students' learning preferences.

7. Closing remarks and limitation of the study

The paper provides some preliminary evidence of students' and academics' visual learning preferences in accounting education. The overall contribution of the paper is threefold. First, it is one of the few studies shedding some light on the use of visual information in accounting education (Davison, 2015; Visser et al., 2006). In particular, despite the increasing interest in visual aids both in accounting practice and education, our results show that visual tools may not be an effective and efficient way to deliver accounting courses. Given the multimodality of learning preferences, the use of visual techniques, combined with more traditional ones, can be developed as an integrative form of learning in students. Second, we show how gender and group of origin (national or international students) influences the visual learning preference of students, signalling the need to consider adaptive teaching strategies in relation to students' composition. This is particularly relevant for international courses where a mix of cultures is present in the same class, as our data show nationality is relevant. Lastly, most of the literature on visual accounting is based on Anglo-Saxon contexts (Davison, 2015), we provide an analysis from a Latin country.

The paper is not free from limitations. Due to limited and localized sample of respondents, attention needs to be paid when attempting to generalize the results. However, future studies, can expand the study to provide more robust evidence, and in different national contexts. In addition, we did not analyze the teaching aids educators used in class, and whether these may influence the preferences of

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students. Further studies could analyze academics' approach to teaching in the classroom and compare it with students' preferences.

In conclusion, more efforts should be made to understand the ways accounting content is delivered, and if its effectiveness can be improved. Adapting teaching methods to students' learning preference (Kumar et al., 2012) increases the efficiency and effectiveness of teaching and encourages more engagement from students. Holeomb and Michaelsen (1996) report that the decision to become an accountant is often made during the first two courses in basic accounting. It is imperative that these courses depict the field fairly and effectively. How effectively this is done will depend on the perceptions of students as well as the ways in which content is delivered (Lucas, 2000; Teixeira and Gomes, 2016). We do not know whether students' learning preferences change when they move from an academic environment to a working environment; further studies are required to investigate this issue.

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Appendix: VARK questionnaire Version 7.1 (2011)

Copyright is held by Neil D. Fleming, Christchurch, New Zealand. Authorization to use the VARK Questionnaire received on 06/05/2016.

The VARK Questionnaire (Version 7.1)

How Do I Learn Best?

Gender: □ M □ F

Age: ….years

Citizenship □ Italian □ Non Italian (to specify) ……

Degree course:

□ Undergraduate	□ Postgraduate
□ 1^ year	□ 1^ year
□ 2^ year	□ 2^ year
□ 3^ year	

Choose the answer which best explains your preference and circle the letter(s) next to it.
Please circle more than one if a single answer does not match your perception. Leave blank any question that does not apply.

1. You are helping someone who wants to go to your airport, the center of town or railway station. You would:
   a. go with her.
   b. tell her the directions.
   c. write down the directions.
   d. draw, or give her a map.
2. You are not sure whether a word should be spelled `dependent' or `dependant'. You would:
   a. see the words in your mind and choose by the way they look.
   b. think about how each word sounds and choose one.
   c. find it online or in a dictionary.
   d. write both words on paper and choose one.
3. You are planning a vacation for a group. You want some feedback from them about the plan. You would:
   a. describe some of the highlights.
   b. use a map or website to show them the places.
   c. give them a copy of the printed itinerary.
   d. phone, text or email them.
4. You are going to cook something as a special treat for your family. You would:
   a. cook something you know without the need for instructions.
   b. ask friends for suggestions.

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c. look through the cookbook for ideas from the pictures.
d. use a cookbook where you know there is a good recipe.

5. A group of tourists want to learn about the parks or wildlife reserves in your area. You would:
   a. talk about, or arrange a talk for them about parks or wildlife reserves.
   b. show them internet pictures, photographs or picture books.
   c. take them to a park or wildlife reserve and walk with them.
   d. give them a book or pamphlets about the parks or wildlife reserves.
6. You are about to purchase a digital camera or mobile phone. Other than price, what would most influence your decision?
   a. Trying or testing it.
   b. Reading the details about its features.
   c. It is a modern design and looks good.
   d. The salesperson telling me about its features.
7. Remember a time when you learned how to do something new. Try to avoid choosing a physical skill, eg. riding a bike. You learned best by:
   a. watching a demonstration.
   b. listening to somebody explaining it and asking questions.
   c. diagrams and charts - visual clues.
   d. written instructions – e.g. a manual or textbook.
8. You have a problem with your heart. You would prefer that the doctor:
   a. gave you a something to read to explain what was wrong.
   b. used a plastic model to show what was wrong.
   c. described what was wrong.
   d. showed you a diagram of what was wrong.
9. You want to learn a new program, skill or game on a computer. You would:
   a. read the written instructions that came with the program.
   b. talk with people who know about the program.
   c. use the controls or keyboard.
   d. follow the diagrams in the book that came with it.
10. I like websites that have:
   a. things I can click on, shift or try.
   b. interesting design and visual features.
   c. interesting written descriptions, lists and explanations.
   d. audio channels where I can hear music, radio programs or interviews.
11. Other than price, what would most influence your decision to buy a new non-fiction book?
   a. The way it looks is appealing.
   b. Quickly reading parts of it.
   c. A friend talks about it and recommends it.
   d. It has real-life stories, experiences and examples.
12. You are using a book, CD or website to learn how to take photos with your new digital camera. You would like to have:
   a. a chance to ask questions and talk about the camera and its features.
   b. clear written instructions with lists and bullet points about what to do.
   c. diagrams showing the camera and what each part does.
   d. many examples of good and poor photos and how to improve them.
13. Do you prefer a teacher or a presenter who uses:
   a. demonstrations, models or practical sessions.

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b. question and answer, talk, group discussion, or guest speakers.
c. handouts, books, or readings.
d. diagrams, charts or graphs.

14. You have finished a competition or test and would like some feedback. You would like to have feedback:
    a. using examples from what you have done.
    b. using a written description of your results.
    c. from somebody who talks it through with you.
    d. using graphs showing what you had achieved.
15. You are going to choose food at a restaurant or cafe. You would:
    a. choose something that you have had there before.
    b. listen to the waiter or ask friends to recommend choices.
    c. choose from the descriptions in the menu.
    d. look at what others are eating or look at pictures of each dish.
16. You have to make an important speech at a conference or special occasion. You would:
    a. make diagrams or get graphs to help explain things.
    b. write a few key words and practice saying your speech over and over.
    c. write out your speech and learn from reading it over several times.
    d. gather many examples and stories to make the talk real and practical.

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The VARK Questionnaire Scoring Chart

Use the following scoring chart to find the VARK category that each of your answers corresponds to. Circle the letters that correspond to your answers

e.g. If you answered b and c for question 3, circle V and R in the question 3 row.

Question	a category	b category	c category	d category
3	K	V	R	A

Scoring Chart

Question	**a** category	**b** category	**c** category	**d** category
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

Calculating your scores

Count the number of each of the VARK letters you have circled to get your score for each VARK category. Total number of **V**s circled =

Total number of **A**s circled =

Total number of **R**s circled = Total number of **K**s circled =

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Table 1. Questionnaires administered to undergraduate students

Courses	Questionnaires collected	Number of students	Coverage rate
Undergraduate students	610	1.195	51.05%
Post-graduate students	146	262	55.73%
Total/Average	**756**	**1.457**	**51.89**

Table 2. Characteristics of respondents

Characteristics	**Undergraduate**		**Postgraduate**		**Total**	
	Frequency	*%*	*Frequency*	*%*	*Frequency*	*%*
Gender						
Male	277	46%	65	45%	342	45.2%
Female	330	54%	81	55%	411	54.8%
Group of origin						
Domestic students	539	89%	135	92%	674	89.1%
International students	68	11%	11	8%	79	10.9%

Table 3. Single VARK and multimodal preferences of undergraduate students

Characteristics	**V**	**A**	**R**	**K**	**MM**	**Total**
Undergraduates						
Gender						
Male	3.61%	39.35%	15.52%	23.83%	17.69%	100%
Female	6.97%	28.79%	25.45%	23.64%	15.15%	100%
Total	**5.44%**	**33.61%**	**20.92%**	**23.72%**	**16.31%**	**100%**
Group of origin						
Domestic students	4.64%	34.88%	21.34%	22.45%	16.70%	100%
International students	11.76%	23.53%	17.65%	33.82%	13.24%	100%
Total	**5.44%**	**33.61%**	**20.92%**	**23.72%**	**16.31%**	**100%**

Table 4. Multimodal preferences of undergraduate students

Characteristics	**VA**	**VR**	**VK**	**AR**	**AK**	**RK**	**VAR**	**ARK**	**VARK**	**Total**
Undegraduates										
Gender										
Male	8.16%	2.04%	2.04%	26.53%	38.78%	16.33%	0.00%	4.08%	2.04%	100%
Female	4.00%	0.00%	2.00%	36.00%	30.00%	16.00%	4.00%	8.00%	0.00%	100%
Total	**6.06%**	**1.01%**	**2.02%**	**31.31%**	**34.34%**	**16.16%**	**2.02%**	**6.06%**	**1.01%**	**100%**
Group of origin										
Domestic students	5.56%	0.00%	2.22%	34.44%	33.33%	15.56%	2.22%	5.56%	1.11%	100%
International students	11.11%	11.11%	0.00%	0.00%	44.44%	22.22%	0.00%	11.11%	0.00%	100%
Total	**6.06%**	**1.01%**	**2.02%**	**31.31%**	**34.34%**	**16.16%**	**2.02%**	**6.06%**	**1.01%**	**100%**

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Table 5. Single VARK and multimodal preferences of postgraduate students

Characteristics	V	A	R	K	MM	Total
Gender						
Male	4.62%	36.92%	15.38%	29.23%	13.85%	100%
Female	4.94%	30.86%	28.40%	22.22%	13.58%	100%
Total	**4.79%**	**33.56%**	**22.60%**	**25.34%**	**13.70%**	**100%**
Group of origin						
Domestic students	4.44%	35.56%	23.70%	22.22%	14.07%	100%
International students	9.09%	9.09%	9.09%	63.64%	9.09%	100%
Total	**4.79%**	**33.56%**	**22.60%**	**25.34%**	**13.70%**	**100%**

Table 6. Multimodal preferences of postgraduate students

Characteristics	VA	VR	VK	AR	AK	RK	VAR	ARK	VRK	VARK	Total
Gender											
Male	0.00%	0.00%	0.00%	22.22%	66.67%	11.11%	0.00%	0.00%	0.00%	0.00%	100.00%
Female	0.00%	0.00%	0.00%	18.18%	45.45%	18.18%	0.00%	9.09%	9.09%	0.00%	100.00%
Total	**0.00%**	**0.00%**	**0.00%**	**20.00%**	**55.00%**	**15.00%**	**0.00%**	**5.00%**	**5.00%**	**0.00%**	**100.00%**
Group of origin											
Domestic students	0.00%	0.00%	0.00%	21.05%	52.63%	15.79%	0.00%	5.26%	5.26%	0.00%	100.00%
International students	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Total	**0.00%**	**0.00%**	**0.00%**	**20.00%**	**55.00%**	**15.00%**	**0.00%**	**5.00%**	**5.00%**	**0.00%**	**100.00%**

Table 7.Association between VARK and other covariates (V, A, R, K, MM)

Variable	Test-Stat	p-value(chi^2)	Cramer V	Association
Gender	18.369	0.001	0.156	Yes
Group of origin	18.615	0.001	0.157	Yes
Status	0.854	0.931	0.034	No
Age	8.126	0.421	0.084	No
Year	12.262	0.726	0.064	No

Full Sample size (n=756)

Table 8. Association between VARK and other covariates (V, A, R, K)

Variable	Test-Stat	p-value(chi^2)	Cramer V	Association
Gender	17.784	0.000	0.167	Yes
Group of origin	17.388	0.001	0.166	Yes
Status	0.258	0.968	0.020	No
Age	7.030	0.318	0.083	No
Year	10.817	0.545	0.075	No

Only VARK subjects (n=635)

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Figure 1. Italian education tiers

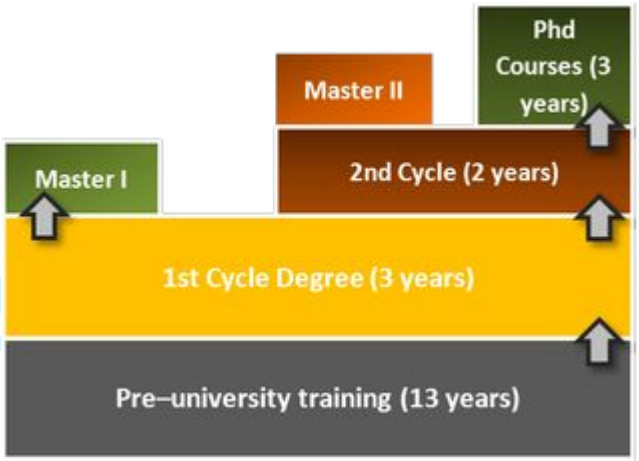
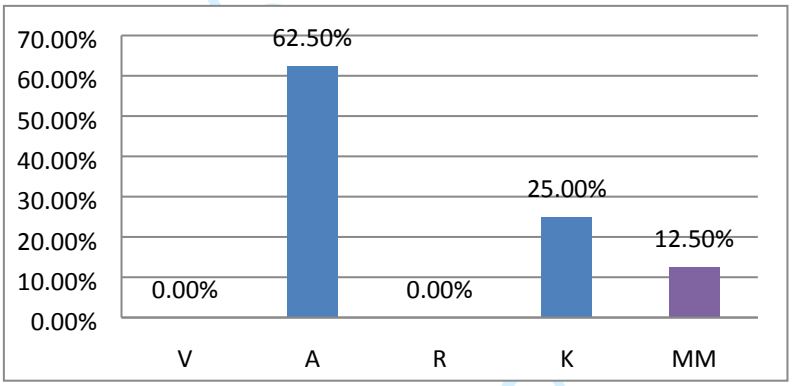


Figure 2. Single VARK and multimodal preferences of academics



A Aural, K Kinesthetic, MM Multimodal, R Read/Write, V Visual

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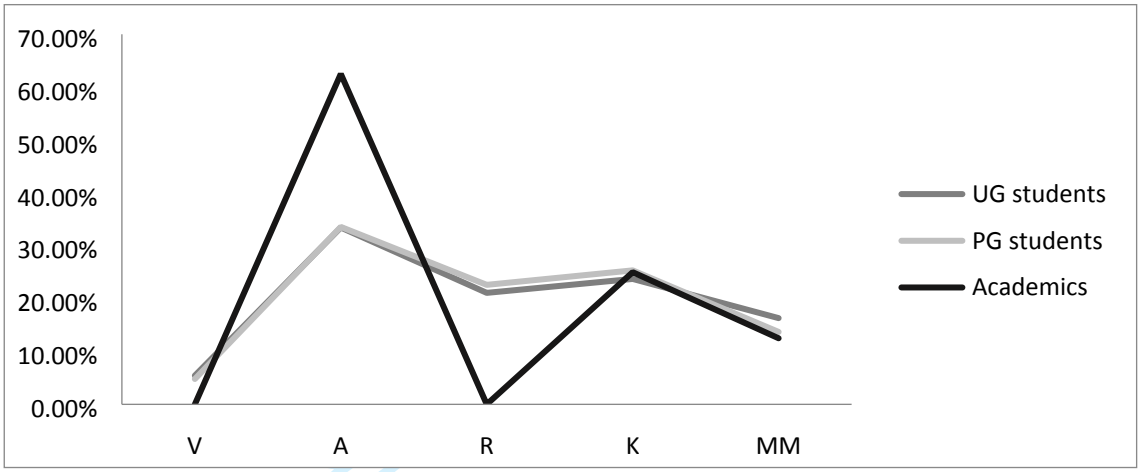
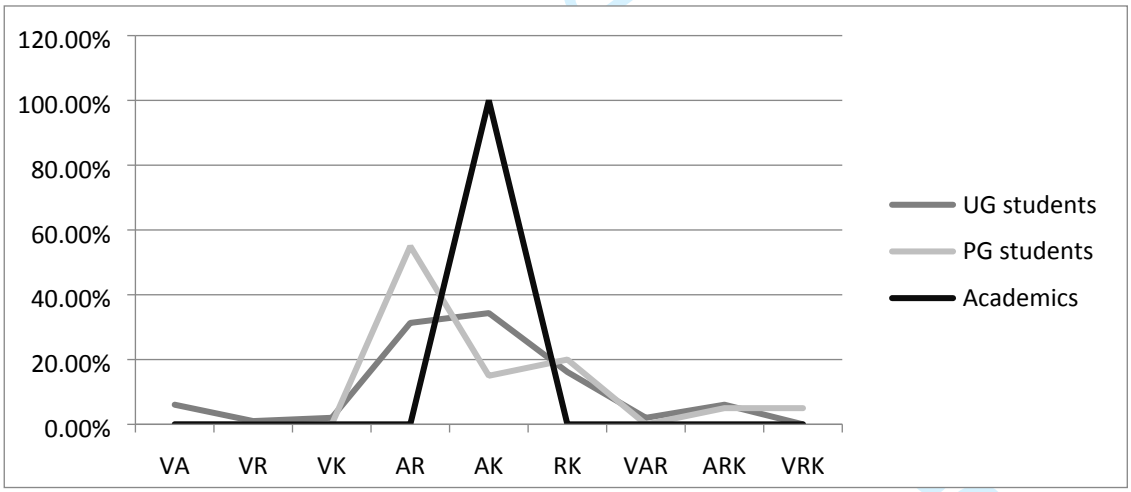
Figure 3. Comparison of VARK and multimodal preferences



A Aural, K Kinesthetic, MM Multimodal, PF postgraduate, R Read/Write, UG undergraduate, V Visual

Figure 4. Comparison of multimodal preferences



A Aural, K Kinesthetic, PF postgraduate, R Read/Write, UG undergraduate, V Visual

Learning preferences in accounting education: a focus on the role of visualization

Reviewer 1: Major Revision	
Comments	**Replies**
I recommend authors to collect additional data from academics to justify their construct. Statistical analysis between students and academics may be one solution to strengthen the quality of the paper.	In the methodology section we specify that we distributed and collected questionnaires from 8 of the 13 (61.54%) accounting academics of the department. To have a significant sample the research must be extended to other accounting departments in other universities, this will be objective for another research.
The purpose of the study is not consistently discussed throughout the whole paper. For example, Structured Abstract, P.2 The paper aims to understand what is the relevance of the visual among the learning preferences of accounting students and academics, and the implications for educators and practitioners. Introduction, P.3 The paper aims to contribute to the debate by providing preliminary evidence on the extent to which visualization trends in accounting align with the learning preferences of accounting students and academics and can represent an effective teaching aid. P.6 Our interest is to investigate whether visual is amongst the preferred learning preferences of students and educators alike. P.9 The objective was to compare learning preferences at different stages of the education process and to understand if there are differences in the learning preferences between academics and undergraduate and postgraduate students. **All descriptions seem to be changing little by little, so that author/s may adjust them to get same context throughout whole manuscript.**	We discussed the purpose of the study and we better explained it.
The motivation of the study highly relies on Davison (2015), but there seems little discussion about this study in the manuscript. Author/s says “Davison (2015, p.30) offered a review and synthesis of visual research in accounting and emphasized that visual forms are important to accounting because of their power and their ubiquity in an increasingly visual society.” But this sentence is not enough to persuade readers the importance of the motivation of this research. I want to know why and how visualization is important in accounting. Author/s should show the research gap to be more clearer in order to do this research.	We extended literature to better motivate research. In particular, we integrated the accounting education literature so sustain our research question

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The research question is not clear. I would like author to rephrase it. "what is the relevance of the visual among the learning preferences of accounting students and academics, and the implications for educators and practitioners?" Furthermore, I want to know more how the outcome of the research contribute to the implications for practitioners. Research question or hypothesis of the research should be constructed through the discussion in the literature review and/or theoretical rationales. Authors simply introduced the research questions "what is the relevance of the visual among the learning preferences of accounting students and academics, and the implications for educators and practitioners?". But why this is the question based on theoretical framework of VARK or Kolb's experiential learning theory? I recommend authors to reconstruct literature review and theoretical framework sections to address this point.	Based on the literature revision (see above), we revised the research question to make it more clearer and consistent throughout the paper.
Methodology is not appropriately constructed to address the research question. The major issue is not to use statistical testing for the main analysis. Sample from academics is too small to do statistical analysis, which is the major drawback.	We provided statistical analysis in the paper in relation to the student learning preferences. We agree that the absolute number of academics does not allow to have a robust statistical analysis, but we still believe the descriptive statistics are interesting to be discussed. We now better defined the RQ and we don't want to make any statistical analysis relating student preferences with that of the academics. We also deleted the comparative section.
In the Table 1, author uses a word "Italian citizenship". Is the citizenship important to distinguish student groups? Or perhaps international and domestic student groups are better to describe?	We adjusted terminology using "international and domestic students"
All statistical analysis results did not appear in the manuscript. Please show them.	We reported the statistical results in the paper.
Author/s conclude that adapting teaching methods to the students' preference (Kumar et al., 2012) may increase the efficiency and effectiveness of teaching and lead to more engagement from students. Is this true? Please show readers which theory tells this. If Kumar et al (2012) tells this, authors must introduce more details of this study in the literature review or theoretical framework. Similarly, all prior studies citing in the discussion section would be introduced in the earlier sections (e.g. literature review).	The literature review was revised substantially adding more accounting education literature. The references to the work of Kumar and other scholars are presented beforehand and not just in the concluding section
I recommend authors to use editing service to correct language quality. Also the paper is too long. Authors had better to reduce the page of manuscript as much as possible. There are several parts overlapping in the manuscript.	The paper was professionally proof-read. In revising the paper we reduced several sections to shorten the paper and to make it more focused.

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