From Technology Readiness to Technical Competence: Assessing Accounting Students under the IES 2 Framework

Filipa J. Silva [1 2*], Teresa O. Barros [1], Manuel G. Sá [1], Afonso L. Lessa [1] and Armindo S. Lima [2 3]

[1] Accounting Department, Accounting and Business School, Polytechnic of Porto, Matosinhos, Portugal
[2] CEOS.PP - Centro de Estudos Organizacionais e Sociais do Politécnico do Porto, Matosinhos, Portugal
[3] Accounting Department, Instituto Superior de Entre o Douro e Vouga (ISVOUGA), Santa Maria da Feira, Portugal
Email: fjbs@iscap.ipp.pt (F.J.S.); tbarros@iscap.ipp.pt (T.O.B.); man_sa@iscap.ipp.pt (M.G.S.); afonso.levi@iscap.ipp.pt (A.L.L.); alima@doc.isvouga.pt (A.S.L.)
*Corresponding author

***Abstract* — Purpose: The digital transformation in accounting, driven by automation and artificial intelligence, has reinforced the importance of technical skills, particularly in terms of technological adaptation in the training of future professionals. In this context, this study analyses the relation between the technological readiness of higher education students and their perception of technical readiness across the 12 competency areas operationalised from the International Education Standard 2 (IES 2) of the International Federation of Accountants (IFAC).**

Method: The research adopts a quantitative approach, based on a structured questionnaire administered to 146 students. The survey comprised three core components: sociodemographic data, self-assessment of technical readiness across the 12 IES 2 competency areas, and application of the Technology Readiness Index (TRI 2.0). Data analysis involved descriptive statistics, reliability analysis and Spearman's correlations, with the aim of examining the association between technological readiness and the perception of technical competencies.

Main Results: Based on the TRI 2.0 model by Parasuraman and Colby (2015), the results reveal a profile characterised by high optimism, moderate innovativeness, relatively low discomfort and high insecurity, reflecting a moderate overall level of technological readiness. At the same time, students report an overall positive perception of their technical readiness, with higher scores in financial accounting and reporting, information and communication technologies, and taxation, and lower scores in auditing. However, no statistically significant association was observed between overall technological readiness and the overall perception of technical competence. Nevertheless, a positive and significant relation was identified between overall technological readiness and competence in information and communication technologies.

Key Conclusions: It is concluded that technological readiness does not automatically translate into a high overall perception of technical competence, although it appears to be associated with areas more directly related to the use of technology. The results reinforce the importance of pedagogical strategies that link the development of technical skills with technological adaptation, in a professional context increasingly marked by technological demands.

***Keywords* — Technology Readiness; TRI 2.0; IES 2; Accounting Education; Technical Competencies**

I. Introduction

Currently, the accounting profession is undergoing a process of transformation, driven by digitalisation, automation, robotics, blockchain and advances in Artificial Intelligence (AI) [1], [2]. This change is not limited just to the adoption of new technological tools, but also involves adjustments and a reconfiguration of professional practices, work routines and the skills required of future accountants [3], [4], [5].

Tasks traditionally associated with the processing, recording and organisation of financial information are now increasingly carried out using integrated systems, specialised software and applications based on robotics and automation processes [6], which shifts the professional's role towards functions involving analysis, interpretation, judgement and decision support [7].

In this context, the transformation process requires students to develop skills that go beyond technical ones [8]. It is no longer sufficient to acquire traditional technical knowledge; it is necessary to ensure that students develop skills suited to a more technologically demanding and dynamic professional environment. These demands place additional pressure on higher education institutions and, in particular, on Accounting and Management degree programmes.

It is therefore important to understand not only which skills need to be developed, but also to what extent future professionals perceive themselves as technically prepared to work in a professional context characterised by digital tools, information systems and increasingly automated processes [1], [2].

The aim of this study is to analyse the relation between the technological readiness of higher education students on Accounting and Management degree programmes and their technical competencies in the 12 areas defined by the International Education Standard 2 (IES 2) of the International Federation of Accountants (IFAC). Specifically, the study aims to characterise students' technological readiness profile based on the dimensions of the Technology Readiness Index (TRI 2.0); to analyse students' perceptions of their technical readiness across the 12 competency areas under consideration; and to examine whether there are associations between technological readiness and this perceived technical readiness.

This study contributes to the accounting education literature by linking students' technological readiness, measured using TRI 2.0, with their perceived technical readiness across the 12 competence areas defined in IES 2. By integrating these two frameworks, the study provides empirical evidence on whether students' predisposition towards technology is associated with broader perceptions of technical competence among future accounting professionals.

In this regard, the study is guided by the following research questions:

RQ1: What is the level of students' technological readiness?

https://doi.org/10.34630/cip.vi.7684

RQ2: How do students assess their technical readiness across the 12 areas of competence?
RQ3: To what extent does technological readiness relate to the perception of technical readiness?
The article is structured as follows: The next section presents a review of the literature based on the transformation of the accounting profession and the technical competencies defined by IES 2 [9]. Next, the research methodology is outlined, using the concept of technological readiness and the TRI 2.0 model [10], including the sample characteristics, the data collection instrument and the statistical analysis procedures. The empirical results are then presented and discussed. Finally, the concluding remarks, the limitations of the study and some suggestions for future research are presented.

II. THE PROCESS OF PROFESSIONAL TRANSFORMATION AND IES 2

The combined effect of these technological developments is reshaping the competencies expected of accounting professionals and the way accounting work is organised [1], [2], [6]. In this context, professional value is shifting from routine recording and processing tasks towards activities involving analysis, interpretation, judgement and decision support, requiring more adaptable and technologically proficient profiles [7], [11]. The literature maintains that future accountants must combine hard, soft and technological skills, which reinforces the need to rethink initial training in light of a broader and fast-changing professional environment [12].
It is precisely in terms of rethinking initial training that IES 2, revised in March 2025, takes on particular relevance, by establishing the learning outcomes for technical competence to be achieved by students [9]. The standard defines technical competence as the ability to apply professional knowledge to perform a function according to a defined standard and organises this requirement into 12 areas of competence, including: Financial accounting and reporting; Information and communications technologies (ICT); Taxation; Business and organisational context; Management accounting; Economics; Finance and financial management; Business laws and regulations; Business strategy and management; Assurance; Governance, risk management and internal control; and Audit [9]. The 2025 revision is significant because it reinforces the importance of ICT, the use of automated tools in assurance and auditing, data protection and privacy, as well as the link between financial accounting and sustainability reporting and disclosures [9]. Furthermore, IES 2 stipulates that curricula must be regularly reviewed and updated and that technical competence must be formally assessed, which reinforces the idea that curriculum alignment should focus on market demands and expectations [9].
The demands of the labour market are evolving; an analysis of job advertisements in the field of accounting reveals that employers place great value on interpersonal and communication skills, analytical ability and problem-solving, alongside digital and technological skills [13]. The literature also highlights the mismatch between what the market seeks and how students assess their own skills, particularly in technology-related areas, notably the new demands arising from the context of AI and Industry 5.0 [14], [15], [16]. This evidence suggests that the discussion regarding students' skills in the field of Accounting can no longer be limited to the transmission of traditional technical content, but rather requires an explicit link between curricula, technological adaptations and the labour market [1], [2], [8], [16], [17].
Furthermore, in this scenario, the response from higher education institutions cannot simply involve adding isolated technological modules, but instead integrate hard, soft and technological skills across the curriculum [17]. The use of technology in the training of accounting students helps to foster innovation and respond to the market [16]. In short, the literature converges on the idea that the current transformation of the profession requires a reconfiguration of accounting curricula, not only in terms of content but also in terms of methods, learning environments and alignment between higher education institutions and market needs.

III. TECHNOLOGY READINESS INDEX (TRI 2.0)

The TRI 2.0, proposed by Parasuraman and Colby [10], provides a useful framework for understanding individuals' predisposition towards technology. The model is based on the idea that the adoption and use of new technologies depend not only on objective skills or access to technical resources, but also on relatively stable psychological orientations that shape the way individuals view technological innovation.
Technological readiness is understood as the propensity to accept and use new technologies in the pursuit of personal and professional goals. TRI 2.0 reformulates and simplifies the original version of the instrument [18], now comprising 16 items organised into four dimensions: Optimism and Innovativeness, as facilitating forces, and Discomfort and Insecurity, as inhibitors of the relationship with technology. Optimism reflects a positive view of technology and the belief that it increases control, flexibility and efficiency; innovativeness refers to the tendency to adopt technology at an early stage; discomfort expresses the perception of a lack of control or overload when faced with technological systems; and insecurity reflects mistrust regarding the functioning, reliability or consequences of using technology [10].
The use of TRI 2.0 in this study is justified by the introduction of an explanatory dimension that goes beyond formal technical training and helps to understand why students exposed to the same curriculum may hold different perceptions regarding their readiness for professional practice. In a context where the accounting profession demands increasing proficiency in technological environments [1], [2], [8], [16], [17], students' individual predisposition to deal with technology becomes relevant to how they assess their readiness for professional practice.
In the questionnaire administered, the TRI 2.0 was operationalised through its 16 items, distributed across the four dimensions mentioned, on a five-point agreement scale, enabling the capture of both the motivating and inhibiting factors of technological readiness in the group studied. Thus, this model provides an appropriate conceptual basis for analysing the extent to which favourable or unfavourable attitudes towards technology correlate with the perception of technical competence in the 12 areas defined by IES 2.

IV. METHODOLOGY

This study adopts a quantitative, descriptive and correlational approach [19] to analyse the relationship between technological readiness and students' perceived technical readiness across the 12 technical competence areas defined in IES 2. This design is appropriate for identifying patterns in

students' perceptions, characterising technological readiness and examining associations between variables.

According to Krause [19], correlational studies are suitable for examining the strength and direction of relationships between variables without manipulating them. This approach is also appropriate when surveys are used to capture beliefs, attitudes and perceptions [20]. Therefore, the methodological design addresses the research questions within the context of the initial education of future accounting professionals.

The study was conducted in a higher education context and included students at different stages of their academic training. The analysis focused on two dimensions: the technical competence areas defined in IES 2 and students' predisposition to accept and use technology, as measured by TRI 2.0.

The study population comprised 337 students enrolled in Bachelor's degree programmes in Accounting and Management at two higher education institutions. Students in the first, second and third years were included to cover different stages of their academic pathway. Of the 337 eligible students, 146 completed the questionnaire and provided valid responses, corresponding to a response rate of 43.3%.

Although the questionnaire was administered at two institutions, the purpose was not to compare them, but to analyse students enrolled in accounting-related higher education programmes. The two institutions were included to broaden the sample and increase coverage of the study population.

Data were collected through a structured questionnaire organised into three sections. The first gathered sociodemographic information. The second assessed students' perceived technical readiness across the 12 competence areas defined in IES 2 using a five-point Likert scale. The third incorporated the 16-item TRI 2.0 instrument, covering Optimism, Innovativeness, Discomfort and Insecurity, also using a five-point Likert scale.

The questionnaire combined items developed specifically for this study with an existing validated instrument. The items assessing perceived technical readiness were developed by the authors based on the 12 competence areas defined in IES 2. Technological readiness was measured using the TRI 2.0 scale developed and validated by Parasuraman and Colby [10], with permission from the scale developers.

Before its general administration, the questionnaire was pre-tested with three students from the target population to assess the clarity and comprehensibility of the questions, the adequacy of the wording, completion time and overall functioning. The pre-test revealed no significant comprehension difficulties, and no substantive changes were required.

Statistical analysis was conducted using Jamovi software. Descriptive statistics, including frequencies, means, standard deviations, medians, minimums and maximums, were used to characterise the sample and describe students' perceived technical readiness and technological readiness profile.

The internal consistency of the four TRI 2.0 dimensions was assessed using Cronbach's alpha and McDonald's omega coefficients. Composite variables were then constructed for the four dimensions and the overall technological readiness index. In accordance with the original model, Optimism and Innovativeness were treated as facilitating dimensions, while Discomfort and Insecurity were treated as inhibiting dimensions.

Finally, Spearman's correlation coefficients were used to examine the relationships between the overall technological readiness index and overall perceived technical readiness, between each TRI 2.0 dimension and overall perceived technical readiness, and between the overall technological readiness index and each of the 12 technical competence areas.

This analytical strategy enabled an examination of whether students' technological predisposition is associated with their perceived technical readiness in higher education in Accounting.

V. ANALYSIS AND DISCUSSION OF THE RESULTS

The descriptive results show an overall favourable perception of students' technical readiness, as all means are above 3.5. This result suggests that students tend to agree with the statement that they feel technically prepared to perform professional duties in the various areas considered. However, this perception is not uniform, with differences observed between skills, which allows key areas to be identified.

Table 1: Perception of technical readiness by area of competence

ID	Competence area	Mean	SD
TEC1	Financial accounting and reporting	4.40	1.01
TEC9	Information and communication technologies	4.34	1.02
TEC4	Taxation	4.24	1.12
TEC10	Business and organisational context	4.23	1.09
TEC2	Management accounting	4.22	1.10
TEC11	Economics	4.21	1.10
TEC3	Finance and financial management	4.06	1.09
TEC8	Business laws and regulations	4.03	1.20
TEC12	Business strategy and management	3.97	1.21
TEC6	Assurance	3.89	1.20
TEC7	Governance, risk management and internal control	3.82	1.20
TEC5	Audit	3.62	1.29

As shown in Table 1, the areas with the highest scores are financial accounting and reporting, information and communication technologies, and taxation, whilst the lowest scores are found in auditing, governance and internal control, and assurance.

This pattern is significant for two reasons. Firstly, it suggests that students perceive higher levels of preparation in areas that are more established throughout their academic journey and closer to content traditionally central to accounting education. Secondly, it reveals lower levels of perceived readiness in areas such as auditing and assurance. This perception is consistent with the fact that in Portugal the profession of auditor has its own distinct career path, separate from that of the accounting professional.

An analysis of students' technological readiness, measured using TRI 2.0, indicates that students display high levels of optimism, moderate innovativeness, relatively low discomfort and high levels of insecurity. This combination is particularly relevant, as it shows that a generally positive

view of the use of technology in the profession does not eliminate reservations, concerns or mistrust regarding its use. In aggregate terms, the overall technology readiness index stands at a moderate level, indicating that students recognise the usefulness of technology but do not always view it with complete confidence or comfort.

Table 2: Technology readiness profile and internal consistency of TRI 2.0

ID	Dimension	Mean	SD	Cronbach's alpha	McDonald's omega
MOPT	Optimism	4.41	0.834	0.787	0.797
MINN	Innovativeness	3.72	0.840	0.609	0.630
MDIS	Discomfort	2.88	0.874	0.693	0.704
MINS	Insecurity	4.48	0.832	0.808	0.812
TRI_G	TRI Global	3.19	0.446	—	—

Table 2 allows us to assess the internal consistency of the survey. The Optimism and Insecurity dimensions show satisfactory levels of reliability, while Discomfort presents acceptable values. Innovativeness shows lower internal consistency and should therefore be interpreted with caution. Nevertheless, taken as a whole, the indicators are sufficient to support the exploratory use of TRI 2.0 in analysing the technological readiness of this sample. From a substantive perspective, the high value for Insecurity warrants particular attention, as it indicates that students, whilst recognising the benefits of technology, harbour significant concerns regarding its reliability, its effects and the way in which it is used.

To analyse the relations between technological readiness and the perception of technical competence, a Spearman's correlation analysis was conducted between: 1) the overall technological readiness index; 2) the four dimensions of TRI 2.0 and the overall perception of technical competence; and 3) the overall TRI and specific competencies.

The results show that there is no statistically significant association between the overall technology readiness index and the overall perception of technical readiness. Nor are there any significant correlations between the overall perception of technical competence and each of the four dimensions of TRI 2.0 considered in isolation. This result suggests that students' technological readiness does not automatically translate into a higher overall perception of technical readiness.

Table 3: Spearman correlations between technology readiness and technical competences

Relationship	Spearman's rho	p-value
TRI_G × MTEC	0.057	0.492
MOPT × MTEC	0.125	0.132
MINN × MTEC	0.108	0.196
MDIS × MTEC	0.027	0.745
MINS × MTEC	0.141	0.090
TRI_G × TEC9 (ICT)	0.258	0.002

Table 3 summarises the main finding, which indicates that the correlation coefficient between TRI_G and MTEC is low and statistically insignificant, indicating no evidence of an overall relationship between technological readiness and overall perceived technical readiness. However, the same table reveals a positive and significant association between overall technological readiness and competence in information and communication technologies (TEC9). This result is particularly relevant because it suggests that technological readiness does not act as a cross-cutting factor reinforcing technical skills across all areas. This result tends to manifest itself in fields where technology constitutes a direct dimension of the educational pathway and future professional practice. In other words, students with greater technological readiness do not feel generally better prepared across all technical skills, but tend to feel better prepared in areas explicitly associated with the use of technology.

This interpretation is consistent with the rationale of IES 2, as revised in March 2025, which emphasises the central role of information and communication technologies as a specific area of technical competence. The standard recognises that future professionals must understand the impact of technological developments within an organisational context, use digital tools for data analysis, support decision-making, and assess the suitability of technological processes and controls [9]. In this sense, the existence of a significant association between technological readiness and ICT competence suggests that individual aptitude for dealing with technology becomes particularly relevant in precisely those areas where the technological component is most explicit and least peripheral. At the same time, the absence of an overall relation with the perception of technical competence suggests that the digital transformation of the profession itself does not imply a uniform increase in students' technical self-confidence across all areas of accounting education.

VI. FINAL CONSIDERATIONS

The aim of this study was to analyse the relation between technological readiness and the perception of technical readiness among future accounting professionals, using the 12 competency areas of IES 2 and the TRI 2.0 model by Parasuraman and Colby (2015) as a reference.

Table 4: Summary of results

Research Question	Results
RQ1 - Level of technological readiness	• Overall TRI (3.19): Moderate • Optimism (4.41): High • Innovativeness (3.72): Moderate • Discomfort (2.88): Low • Insecurity (4.48): High
RQ2 - Perception of technical readiness	• Averages between 3.62 and 4.40 • Financial accounting (4.40) • Auditing (3.62)
RQ3 - Relationship between technological readiness and perceived technical readiness	• Overall correlation not significant TRI_G × MTEC (rho = 0.057; p = 0.492) • Significant correlation only with TRI_G × TEC9 (rho = 0.258; p = 0.002)

As summarised in the results in Table 4, students report an overall positive perception of their technical readiness, although there are differences between areas, with auditing being the field in which they feel least prepared.

Technological readiness is moderate, combining high optimism with high insecurity, which shows that attitudes favourable to technology coexist with reservations regarding its use. Finally, no significant overall relationship was found between technological readiness (TRI_G) and overall perceived technical competence (MTEC), with only a specific association emerging with ICT competence. Thus, the results suggest that the integration of technology into accounting education should be considered not only as a matter of curriculum content, but also as a pedagogical process of introducing students to real-world technological environments, so as to simultaneously reinforce technical mastery and confidence in the use of technology.

From an educational perspective, the findings underscore the importance of not reducing the adaptation of accounting education to the mere inclusion of technology modules within the curriculum. The current transformation of the profession requires a combination of technical skills, confidence in the use of technology, and the development of learning environments that encourage simulated practical application, analysis and the critical use of technologies. Thus, higher education in Accounting will benefit from strategies which, in addition to developing the intended technical content, also promote a more confident and functional relation between students and technology.

The study has limitations that must be acknowledged, as it assesses students' perception of their technical readiness rather than their objective performance. The study does not allow for tracking the evolution of technological readiness and perceptions of competence over time. Finally, regarding the technological readiness survey, the Innovativeness dimension showed lower levels of internal consistency than the other subscales, which calls for caution in the detailed interpretation of the results associated with this dimension.

Future research could complement students' perceptions with those of employers and conduct longitudinal studies to observe how technological readiness and perceptions of technical readiness evolve throughout the academic journey. Analysis of specific areas could also be deepened, particularly those where the technological dimension is more explicit, such as ICT, auditing assisted by automated tools, or contexts related to data analysis.

ACKNOWLEDGMENT

The authors gratefully acknowledge Ananthanarayanan Parasuraman and Charles L. Colby for kindly granting permission to use the TRI 2.0 questionnaire for academic purposes in this study.

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