Identifying future directions for IC research in education: a literature review

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Abstract

Purpose – It is important to have a literature review to open any special issue as a way of introducing the state-of-the-art topics and link past research with the papers appearing in this special issue on IC in education. The paper aims to discuss this issue.
Design/methodology/approach – This research uses the structured literature to investigate the state-of-the-art and future directions of IC literature in education. In total, 47 articles are explored including nine from this special issue.
Findings – IC in education research is concentrated in Europe and mainly addresses IC in universities. Additionally, current IC research is progressing by examining IC practices inside universities using a third-stage IC approach, with new research also concentrating on third-mission outcomes, thus there is scope to continue IC and education research beyond universities. IC in education can also expand into fifth stage IC research, which abandons the boundaries of the educational institution and concentrate on the impact of IC and education on multiple stakeholders.
Research limitations/implications – Current IC in education research is too narrow and mainly investigates IC in European contexts using case study methodology. However, there is ample scope to widen research that develops new frameworks in different educational and country contexts using a wider range of research methodologies. IC in education needs to expand its boundaries so it does not lose its relevance, and thus be able to contribute to wider policy debates.
Originality/value – This paper presents the current state-of-the-art structured literature review of the articles investigating IC in education.

Keywords Universities, Schools, Intellectual capital, Education, Structured literature review, Research centres

Paper type Literature review

1. Introduction

It is important to have a literature review to open any special issue as a way of introducing the state-of-the-art topics and link past research with the papers appearing in this edition. Furthermore, while individual articles offer further recommendations for research, by examining the state-of-the-art gaps relating to the big picture of IC education research can be identified and highlighted to offer new research opportunities. The review also answers Dumay *et al.*'s (2015) call to synthesise the existing research on IC in education. For the purposes of this review, education spans schools, universities, research centres, or any higher institute that offers education services. By investigating how researchers

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conceptualise and discuss IC in education, this review explores how concepts, theories, methodologies, and academic thinking have developed since inception. From this foundation, research gaps can be identified to inspire promising directions for future scholarly endeavours in this important field.

Contemporary interest in IC education research stems from the significant role intangible resources play in schools, universities, and research centres. After all, their inputs and outputs are mainly intangible (Cañibano and Sánchez, 2008). But further, education helps to grow social capital within a community – a role that is particularly important for universities (Mowery and Sampat, 2005). While IC is typically associated with private and listed companies, evidence of its usefulness for education providers can be found in several IC projects. For example, in Austria, universities were restructured to increase autonomy, re-orient outputs, and base funding on performance as a result of "new public management" principles, and this led to the mandatory adoption of IC reporting (Habersam *et al.*, 2013). The aim was to support the management of intangible resources and provide stakeholders with adequate information about the development and productive use of IC (Leitner, 2004). However, even though Austrian universities have adopted mandatory reporting, other jurisdictions have not followed suit. Consequently, the focus on IC in education is increasing (Bezhani, 2010; Veltri and Silvestri, 2015; Ramírez-Córcoles and Gordillo, 2014; Secundo *et al.*, 2015).

Each piece of research has a different purpose and uses different methodological approaches. Therefore, there is a need to identify the relative strengths and weaknesses in a body of literature and, possibly, unearth areas that have been neglected. As Dumay *et al.* (2015, p. 277) point out, there is "an opportunity for a study to synthesise the findings" because researchers must "ensure that future research is informed about the contributions made by previous researchers and outline the frameworks already proposed to test their applicability in practice". Since Dumay *et al.'s* (2015) public sector review, several more articles have been published, along with the articles included in this special issue, widening the depth and breadth of IC in education research. Therefore, continuing this research specifically focussing on education presents an opportunity to complement this special issue with a state-of-the-art literature review up to and including the articles appearing in this special issue.

This paper follows the structured literature review (SLR) methodology outlined by Massaro *et al.* (2016) and builds upon a sub-set of the data presented in Dumay *et al.* (2015). We used Alvesson and Deetz's (2000) critical management framework to analyse the collection with three critical research questions in mind:

RQ1. How is IC education research developing?

RQ2. What is the focus and critique of IC education research literature?

RQ3. What is the future of IC education research?

The paper is organised into three further sections. The next section presents the SLR. Section 3 answers *RQ1* and *RQ2*. Section 4 concludes the paper by answering *RQ3*, along with the paper's limitations.

2. Methodology

A literature review is a research method that connects past knowledge to future research directions by examining theories or by summarising particular issues (Petticrew and Roberts, 2008; Transfield *et al.*, 2003; Massaro *et al.*, 2016). The wider availability of academic articles and the plethora of approaches used within them means literature reviews are evolving. Massaro *et al.* (2016, p. 769) described a "literature review continuum" that ranges from a rapid review with few rules to an SLR with specific rules. The latter approach

goes beyond merely synthesising and interpreting previous contributions because it provides a transparent research methodology for assessing and classifying each study. The research questions have already been identified, but several more steps are needed to develop the data set and analytical framework, and these are outlined next.

2.1 Literature research

This step involves selecting eligible literature to meet our research objectives. The initial selection criteria for this review were based on the following keywords: ((("intellectual capital") OR ("human capital") OR ("relational capital") OR ("structural capital") OR ("organi*ational capital") OR ("knowledge management")) AND (("universit*") OR ("public sector") OR ("education") OR ("research centre") OR ("school"))).

Two databases were searched, Scopus and ISI Web of Science, with some limitations. The domain was limited to social science, and the research areas only included business economics and public administration. Additionally, only articles appearing in English in peer-reviewed journals were included. A parallel search of several specific and relevant journals was also conducted to provide consistency with Dumay *et al.*'s (2015) previous literature review and to ensure that interdisciplinary accounting studies including IC were captured. These journals were:

- *Accounting Auditing and Accountability Journal (AAAJ)*;
- *Accounting Forum (AF)*;
- *Accounting Organizations and Society (AOS)*;
- *British Accounting Review (BAR)*;
- *Critical Perspectives on Accounting (CPA)*;
- *European Accounting Review (EAR)*;
- *Management Accounting Research (MAR)*; and
- *Meditari Accounting Research (MeAR)*.

The initial search retrieved a total of 1,296 papers. After 178 duplicates were removed, the final data set comprised 1,118 papers. Table I shows the number of articles retrieved from each database.

To assess the quality of each article, we followed the methodology adopted in previous SLRs (Massaro *et al.*, 2016; Transfield *et al.*, 2003). The abstracts of all the articles were carefully read and excluded based on a set of predefined criteria. According to these criteria, we excluded: 820 articles that were not strictly related to IC in education; 200 articles that mainly focussed on the third mission of universities from the perspective of private firms; and 47 articles about knowledge management with no specific association to education. Additionally, only articles published in journals included in Q1 and Q2 of the SCImago Journal rankings of accounting, business, management and accounting, education, and management information systems were included in the final review. Thus, a further 16 papers were excluded. This process of elimination resulted in 35 relevant articles.

	Database		
	Scopus	ISI WoS	Total
Keyword search of the title and/or abstract	894	442	1,296
Number of duplicates			−178
After deleting duplicates			1,118

Table I.
Database

Three further articles were added after a residual search and subsequent comparison with the Guthrie and Dumay (2015) review because of their diffusion in the literature concerning IC in education. Lastly, the nine articles in this special issue were added; this SLR was not. The final selection comprised 47 relevant articles for review (see Table II).

Table III reveals that the vast majority of the selected articles (36) were published in the *Journal of Intellectual Capital*. However, it is worth noting that articles on IC have been published in journals with different thematic areas, which means this topic has been investigated from different perspectives using different theoretical and methodological approaches.

It is also worth noting that, with the exception of *CPA*, no specific journal we selected has published an article on IC in education (i.e. *AAAJ*; *AF*; *AOS*; *BAR*; *EAR*; *MAR*; *MeAR*). For example, *AAAJ* has been publishing articles on IC since 2001; *CPA* published a special issue on IC (Vol. 20, No. 7, 2009); and *BAR* has published several articles. Therefore, while IC issues are considered worthy of investigation by leading accounting journals, IC in education is a specific topic that has not appeared much beyond the *Journal of Intellectual Capital*.

2.2 Article impact

The impact of each article was determined by the number of Google Scholar citations (excluding the articles accepted in the special issue). Citation counts were downloaded as of 26 June 2017. The top ten articles by citation appear in Table IV. Considering that older articles have had more time to collect citations than recent articles (Dumay *et al.*, 2016), we developed a second ranking based on the average citations per year (CPY) as a countermeasure. Table V lists the top ten articles by CPY[1].

Sample	Number of articles
Selected articles	1,118
Articles concerning other fields	−820
Articles concerning private firms	−200
Articles concerning knowledge management	−47
Number of articles published in non-Q1/Q2 journals	−16
Relevant articles	35
Articles added after a residual search	3
Articles accepted in the special issue	9
Total	47

Table II. The search for relevant articles

Code	Journal name	No.	%
CPA	*Critical Perspectives on Accounting*	1	2.6
EEA	*Estudios de Economía Aplicada*	1	2.6
EM	*Economic Modelling*	1	2.6
I&M	*Information and Management*	1	2.6
IRAS	*International Review of Administrative Science*	1	2.6
JHRC&A	*Journal of Human Resource Costing & Accounting*	1	2.6
JIC	*Journal of Intellectual Capital*	36	71.1
KMR&P	*Knowledge Management Research and Practice*	2	5.3
MBE	*Measuring Business Excellence*	1	2.6
RE	*Research Evaluation*	1	2.6
TMHRHE	*Trends in the Management of Human Resources in Higher Education*	1	2.6
	Totals	47	100.0

Table III. Classification of articles by journal

No.		Article	Cit.
1	Chua (2002)	The influence of social interaction on knowledge creation	227
2	Sánchez and Elena (2006)	Intellectual capital in universities: improving transparency and internal management	190
3	Leitner (2004)	Intellectual capital reporting for universities: conceptual background and application for Austrian universities	174
4	Martínez-Torres (2006)	A procedure to design a structural and measurement model of intellectual capital: an exploratory study	160
5	Sánchez *et al.* (2009)	Intellectual capital dynamics in universities: a reporting model	128
6	Ramirez Córcoles *et al.* (2007)	Intellectual capital management in Spanish universities	117
7	Secundo *et al.* (2010)	Intangible assets in higher education and research: mission, performance, or both?	105
8	Fazlagic (2005)	Measuring the intellectual capital of a university	94
9	Hellström and Husted (2004)	Mapping knowledge and intellectual capital in academic environments: a focus group study	90
10	Bezhani (2010)	Intellectual capital reporting at UK universities	77

Table IV.
Top ten articles by Google Scholar citations (as at 26 June 2017)

No.	Article		CPY
1	Sánchez and Elena (2006)	Intellectual capital in universities: improving transparency and internal management	17.3
2	Sánchez *et al.* (2009)	Intellectual capital dynamics in universities: a reporting model	16.0
3	Chua (2002)	The influence of social interaction on knowledge creation	15.1
4	Secundo *et al.* (2010)	Intangible assets in higher education and research: mission, performance or both?	15.0
5	Martínez-Torres (2006)	A procedure to design a structural and measurement model of intellectual capital: an exploratory study	14.5
6	Leitner (2004)	Intellectual capital reporting for universities: conceptual background and application for Austrian universities	13.4
7	Secundo *et al.* (2016)	Managing intellectual capital through a collective intelligence approach: an integrated framework for universities	12.0
8	Ramírez-Córcoles *et al.* (2007)	Intellectual capital management in Spanish universities	11.7
9	Bezhani (2010)	Intellectual capital reporting at UK universities	11.0
10	Secundo *et al.* (2015)	An intellectual capital maturity model (ICMM) to improve strategic management in European universities: a dynamic approach	11.0

Table V.
Top ten articles by citation per year (CPY) (as on 26 June 26 2017)

Eight articles hold a rank in both tables (Bezhani, 2010; Chua, 2002; Leitner, 2004; Martínez-Torres, 2006; Ramírez-Córcoles *et al.*, 2007; Sánchez and Elena, 2006; Sánchez *et al.*, 2009; Secundo *et al.*, 2010). However, focusing on CPY, Table V shows two articles that were published more recently (Secundo *et al.*, 2015, 2016). The recent articles show the growing academic interest in citing the latest IC research. In broader terms, it also provides evidence of interest in IC in education as a relevant field of research among scholars. Notably, these two articles propose new IC frameworks for universities. Additionally, while several authors boast two papers in Tables IV and V, there is no evidence of any one author dominating the research on IC in education, which evidences a wide and fragmented research field (Serenko and Dumay, 2015).

2.3 Defining the analytical framework

To maintain consistency with previous reviews, we adopted the analytical framework in Guthrie *et al.* (2012) and Dumay *et al.* (2016). However, some changes were required to suit

this special issue. Since this study is solely focussed on education, the "Jurisdiction" category was not relevant and was removed. "Organisational focus" became "educational context" and now classifies articles in the following categories: A1: universities/higher education institutions (HEIs); A2: research centres; A3: schools; A4: universities/HEI and research centres and/or schools. Too many articles concentrate on the European context; therefore, we modified the "country of research" category to drill down on individual European countries. We adapted the "focus of the article" to emphasise the main issues under investigation (i.e. the disclosure, management, and measurement of IC). The "research method" and "frameworks/models" categories were not changed. Finally, we added a "research stage" to classify articles according to the stage of the IC research the articles primarily discuss (Dumay, Guthrie, Ricceri, and Nielsen, 2017a). The results of the analysis are presented in Table VI. The following subsections discuss these results category by category.

2.4 Developing reliability

The authors held several meetings to define and assess the pertinence of the criteria for selecting the articles. Issues relating to the classification of the articles were clarified through discussions between the authors. Given all decisions were made by consensus during the course of the process, the authors did not conduct a formal reliability check, such as Krippendorff's α (Krippendorff, 2013). This was deemed unnecessary as there was little disagreement about the analysis among the authors.

3. Insights and critique

In this section, we answer the first two research questions:

RQ1. How is IC in education developing?

RQ2. What is the focus and critique of IC literature in education?

To do this, we refer to the data in Table VI.

A	Educational context	No.	%	B.	Country of research	No.	%
A1	Universities/HEI	38	80.9	B1	America	4	8.5
A2	Research centre (RC)	3	6.4	B2	Australasia	8	17.0
A3	School	2	4.3	B3	Europe	35	74.5
A4	Universities/HEI and RC and/or School	4	4.3	B4	Africa	0	0.0
	Totals	47	100.0		Totals	47	100.0
C.	Focus of the article	No.	%	D.	Research methods	No	%
C1	External reporting/IC disclosure	9	19.1	D1	Case/Field study/Interviews	26	55.3
C2	Auditing	0	0.0	D2	Content analysis/Historical analysis	4	9.0
C3	Accountability and governance	0	0.0	D3	Survey/Questionnaire/Other empirical	8	17.0
C4	Management and Strategy	31	66.0	D4	Commentary/Normative/Policy	9	19.1
C5	IC measurement	7	14.9	D5	Literature review	0	0.0
C6	Other	0	0.0				
	Totals	47	100.0		Totals	47	100.0
E.	Frameworks and models	No.	%	F.	Research stage	No.	%
E1	None proposed	15	31.9	F1	First stage	5	10.6
E2	Applies or considers previous	17	36.2	F2	Second stage	12	25.5
E3	Proposes a new	15	31.9	F3	Third stage	22	46.8
				F4	Fourth stage	8	17.0
	Totals	47	100.0		Totals	47	100.0

Sources: Adapted from Guthrie *et al.* (2012) and Dumay *et al.* (2016)

Table VI. Analytical framework of IC in education articles

3.1 Educational context

The first criterion concerns the educational context of the articles, which is important because as Dumay *et al.* (2015) argue, researchers need to concentrate on all forms of education, not just universities. However, as Table VI shows, the vast majority of the articles (about 81 per cent) continue to deal with universities and HEIs. This means that the management and disclosure of IC has not yet been perceived by scholars as relevant to research centres or schools which still remain an important part of the overall education systems in developed nations. Additionally, it is interesting to observe that four articles investigated IC issues by considering more than one sphere of education. Specifically, three articles (Secundo *et al.*, 2010; Carayannis *et al.*, 2014; Secundo and Elia, 2014) focussed on universities (or HEI) and research centres, while Bornemann and Wiedenhofer (2014) adopted a value chain perspective to investigate the relationship between universities and schools.

In several contexts, schools were urged to enhance their relationships with the local community and industries, which translates to developing their relational capital. Along the same lines, schools were also encouraged to improve their teachers' abilities, supporting the growth of human capital (Oliver, 2013). Accordingly, we would argue that more research in the school context would be highly desirable. Such research could provide useful insights for headmasters and school managers allowing them to better understand how to manage IC.

3.2 Country of research

The country of research criterion is important because universities openly compete on the national and international stage for rankings and prestige. Additionally, if there is not a breadth and depth of IC in education research from around the globe it is impossible to compare the impact of using IC in different contexts. Table VI clearly shows that both America and Australasia contributed little to IC education research with four and eight articles, respectively. The majority of articles (35 out of 47, i.e. about 75 per cent) focus on Europe. The Spanish and Italian university contexts are particularly prevalent, as Figure 1 illustrates.

At least two considerations emerge from this analysis. First, even though IC reporting is only mandatory for Austrian universities, a mere five of the 35 articles concern this topic (Leitner, 2004; Leitner *et al.*, 2005; Habersam *et al.*, 2013; Bornemann and Wiedenhofer, 2014; Piber *et al.*, 2018). They mainly explore managerial issues and disclosure policies. This result may be explained by considering that the Austrian Ministry of Science, Research and Economy was, and currently is, the main addressee of the "knowledge balance sheet".

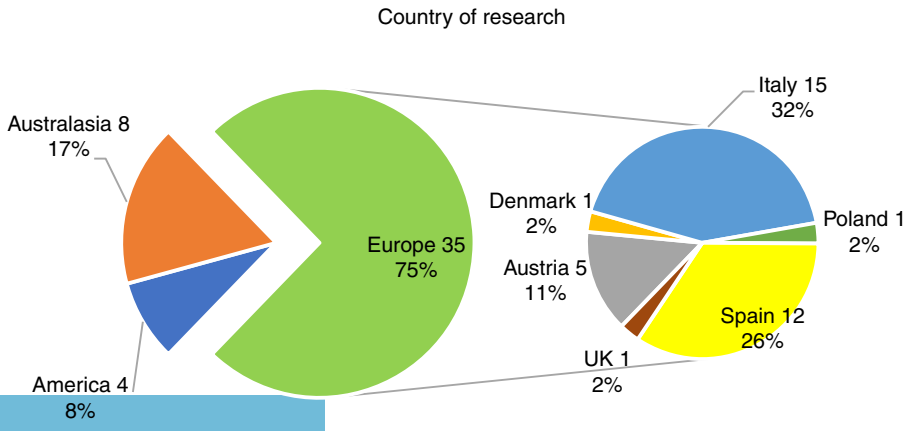

Figure 1.
Articles by country of research

Hence, a, knowledge balance sheet is not a major issue outside Ministry-university relationships, as highlighted by Piber *et al.* (2018).

Second, why do Spanish and Italian researchers give so much attention to IC in education, and especially universities? A possible explanation could be because the central governments of both countries have implemented reforms surrounding the financial resources assigned to public universities, and these reforms are largely based on performance (Turri, 2014; Ramírez-Córcoles *et al.*, 2016). In fact, four of the ten articles by Italian scholars deal with IC measurement. The emphasis on measuring is because there is more focus on university performance, and most indicators for performance align with IC components, especially human capital, thus stimulating researchers to further develop models for measuring, managing and disclosing IC in universities (Secundo *et al.*, 2015, 2016). Additionally, some scholars have been involved in government sponsored research projects and networks. For example, Sánchez (e.g. Sánchez and Elena, 2006) was involved in the MERITUM research project that led to interest in IC research in Spanish universities. However, there are several articles that are based on the same methodological approach and/or the same tools (e.g. Ramírez-Córcoles *et al.*, 2011; Ramírez-Córcoles and Gordillo, 2014) or have interchangeable research objectives (e.g. Cañibano Sánchez, 2008, 2009). These articles provide the most recent new knowledge from the perspective of Spanish universities.

The Italian community of IC researchers appears to be growing both in terms of scholars and articles, often proposing innovative views on IC issues (e.g. Secundo *et al.*, 2015, 2016; Vagnoni and Oppi, 2015; Mariani *et al.*, 2018), while Spanish scholarship in the topic has waned recently. Italy's flourishing interest in IC could be explained by the growing institutional pressure on Italian universities to improve their performance. Additionally, the stimulus to improve their efficiency and effectiveness because of the reforms implemented from 2010 onwards (Law 240/2010; Decree 18/2012), Italian public universities are trying to revamp their legitimacy with the general public. As highlighted by Di Bernardino and Corsi (2018), there is a need to re-interpret the results achieved by universities through the lens of the social and economic value creation to allow stakeholders to assess those results in light of the resources used to achieve them.

3.3 Focus of IC in education

The focus of IC in education is important because it shows where researchers are concentrating their efforts and helps identify which areas are covered well by research, and other areas which may be neglected and deserve additional attention. This is especially important in Europe because many universities are now being measured on how they comply with third mission outcomes (Di Bernardino and Corsi, 2018), and are still required to report on their outcomes to stakeholders. While, reporting on IC is not mandatory other than in Austria (Piber *et al.*, 2018), most outputs of universities are intangible and are a result of how universities strategies and manage their operations (Secundo *et al.*, 2018).

As Figure 2 highlights, the majority of the articles concentrate on management and strategy (31 articles; e.g. Chua, 2002; Ramírez-Córcoles *et al.*, 2007; Secundo *et al.*, 2016), followed by external reporting/IC disclosure (nine articles; e.g. Leitner, 2004; Cañibano and Sánchez, 2009), and IC measurement (seven articles; e.g. Siboni *et al.*, 2013; Veltri *et al.*, 2014). Our analysis by research stage in Section 3.6 reveals that these articles principally belong to the third stage of IC research. Such a strong focus on IC practice may be attributed to increasing competition between universities, which in turn increases the need to attract students, researchers, and funders. Accomplishing those goals requires more attention on managing and disclosing IC. Most of the studies focus on limited aspects of practice, either management and strategy, or measurement, or external reporting and disclosure, as the following subsections illustrate in more detail. However, several articles can be classified into multiple categories because they deal with both the management and effects of IC and its disclosure.

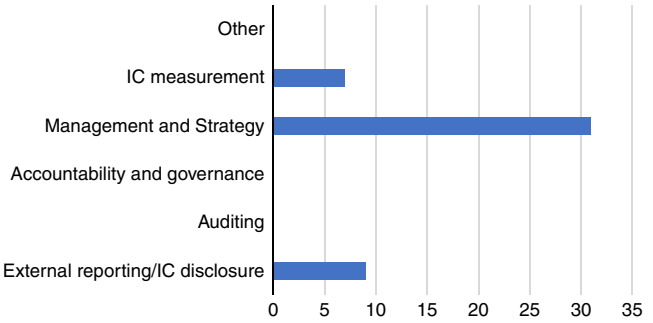

Figure 2.
Focus of the articles

Some also highlight the effects of governance (Habersam *et al.*, 2013; Bornemann and Wiedenhofer, 2014). Notably, there were no published articles concerning accountability and governance or auditing. The voluntary nature of IC reporting, except for Austria, may provide an explanation for the lack of auditing research. Even when hypothesising about the increasing relevance of IC-based reporting, it should be noted that auditing requires standardised rules. However, according to the fourth stage of IC research, ad hoc indicators may be more appropriate for demonstrating an awareness of monetary, ethical, social, and environmental impact by organisations (Piber *et al.*, 2018). Additionally, research is also absent on assuring IC disclosures, which is arguably necessary to demonstrate the reliability of information disclosed to stakeholders.

3.3.1 External reporting and IC disclosure. Issues related to disclosure have been largely debated along the second and the third stage of IC research. As noted by Bezhani (2010), universities have faced an increased demand for transparency regarding the use of public resources over the years. Therefore, they have had to make meaningful disclosures about their social and economic outcomes by adopting different metrics, whether discursive, numeric, or quantified in monetary terms. Broadly speaking, scholars have only detected a small amount of disclosure when analysing IC in practice (Bezhani, 2010; Low *et al.*, 2015; Ramírez-Córcoles and Manzaneque-Lizano, 2015) and research investigating alternative tools, such as websites or social reports, has been encouraged (Sangiorgi and Siboni, 2017). The need for disclosures that are able to meet stakeholders' information needs has been also underlined (Ramírez-Córcoles *et al.*, 2011). These calls are grounded on the premise that traditional financial measures tell management nothing about how well the policies, processes, and practices of the institutions are working to enhance IC.

Similarly, Habersam *et al.* (2013) consider the consequences of mandatory IC disclosures to management, namely, the knowledge balance sheet introduced in Austria in 2002 and modified in 2010. They highlight that value creation based on IC is "hidden" because it is non-financial and it does not have to be reported. Moreover, they discuss the interconnectivity of IC with other assets and resources. Empirical studies also reveal that IC disclosures receive a different kind of attention, and that IC disclosures are not only entity-specific but also country-specific. Notwithstanding, all scholars agree on the need for a specific report, but they are still discussing pros and cons of mandatory vs voluntary IC disclosure.

3.3.2 Management and strategy. Most of the articles discussing IC management and strategy are based on empirical analysis. They are, generally, grounded in a single country (Bornemann and Wiedenhofer, 2014; Lu, 2012; Melián-González *et al.*, 2010; Sánchez *et al.*, 2009; Di Bernardino and Corsi, 2018) and sometimes on a single case study (Kim and Kumar, 2009; Secundo *et al.*, 2010; Vagnoni and Oppi, 2015; Mariani *et al.*, 2018). The strategic relevance of managing IC is underlined by Melián-González *et al.* (2010), who consider IC components as

fundamental for achieving a university's mission and vision. Mariani *et al.* (2018) add further insight regarding the contribution of university investments make in transferring technology to economic development and social engagement by examining the role academic spinoffs play. Additionally, Passaro *et al.* (2018) emphasise the role of universities in supporting entrepreneurship, urging universities to pay more attention to defining programmes, policies, and instruments to effectively pursue the third mission.

Vagnoni and Oppi (2015) propose an IC report obtained through an action in research approach as a suitable tool to support strategic thinking. Kim and Kumar (2009) present a theoretical model suitable for prioritising IC indicators in research centres and apply it to a Korean case.

The relationship between IC and university performance is at the core of several articles. Lu (2012) discusses the consequences of IC management on resource allocation and competitive advantage, while Parshakov and Shakina (2018) investigate corporate universities from a strategic investment perspective. They use resource-based view theory to shed light on the conditions that provide universities with competitive advantages investors can recognise.

The role of evaluation systems has been also examined. Focusing on the Italian context, Di Bernardino and Corsi (2018) deal with a quality evaluation system in an Italian university, empirically proving the role of IC components in the value creation process and how they are used to achieve third mission goals. Martin-Sardesai and Guthrie (2018) investigate the effect of university performance measurement systems on academic human capital, underlining that measuring academic research performance in a predefined manner is not adequate to gauge true academic performance. They recommend training and resources to enhance, support, and maintain the overall well-being of academics.

Bornemann and Wiedenhofer (2014) proposed a different approach based of IC value chains in their investigation of four different levels of education. They also suggest that IC management can provide an effective methodology to support governance mechanisms. This article, together with the study from Secundo and Elia (2014), analyse IC in different educational organisations.

Secundo *et al.* (2015) proposed a flexible model for managing IC in different contexts. In a subsequent study, Secundo *et al.* (2016) further underline the role of IC in ensuring that a university's strategic orientation and performance are aligned while contributing to regional and economic development. Similarly, Greco *et al.* (2018) analyse university performance from an IC perspective in Columbian public universities, revealing the importance of size and international mobility in obtaining outstanding results in research and innovation. Oliver (2013) presents a different perspective, investigating an IC knowledge flow model inside the classroom, thus offering insights at the micro-level.

What emerges from these studies is that managing IC is not simply "yet another management tool" (Secundo *et al.*, 2015, p. 429). IC should be at the core of the decision-making process (Secundo *et al.*, 2015) and can be developed especially to improve relational capital along the value chain (Bornemann and Wiedenhofer, 2014). Piber *et al.* (2018, p. 16), while investigating the consequences of a decade's use of the Austrian knowledge balance sheet, suggest adopting a "communicative culture first" approach rather than a "tool-box" approach. Promoting a communicative culture means setting strategic objectives and developing cooperation to facilitate the take-up of disclosure procedures guided by "sense making" experiences.

To summarise, a fully mature system should be at the heart of strategic and operational decisions taken by the university. Managing IC should be considered as pivotal for:

- Technology transfer and the achievement of the third mission (Secundo *et al.*, 2015, 2016; Di Bernardino and Corsi, 2018; Mariani *et al.*, 2018; Passaro *et al.*, 2018). In this respect, relational capital plays a fundamental role.

- Teaching and research, for the benefit of university performance and for disclosure (Kim and Kumar, 2009).
- Producing change in governance and accountability mechanisms (Habersam *et al.*, 2013; Bornemann and Wiedenhofer, 2014).
- Promoting a communicative culture, to facilitate the awareness of the monetary, social and environmental impact of the educational organisations (Piber *et al.*, 2018).

3.3.3 IC measurement. Articles dealing with IC measurement mainly propose adopting a set of indicators. In doing so, scholars either elaborate on previous models (e.g. Siboni *et al.*, 2013; Bornemann and Wiedenhofer, 2014) or propose new models. In some cases, those models are the result of observing practices (e.g. Esposito *et al.*, 2013; Lu, 2012; Ramírez-Córcoles and Gordillo, 2014; Villasalero, 2014). What is underlined is the need to keep models flexible and to adapt them to the changes occurring within the organisation, and to specific managerial and strategic needs.

In our data set, Bornemann and Wiedenhofer (2014) focus on reporting, underscoring the need for auditable measures that support comparability and benchmarking. Secundo and Elia (2014) adopt an IC perspective to support performance measurement systems for academic entrepreneurship, while Villasalero (2014) explores the strategies adopted by universities in accumulating technological capital and managing IC. Later, Secundo *et al.* (2016, p. 310), while proposing a "collective intelligence approach" to manage IC, rely on a set of indicators for entrepreneurial competence development. These indicators were further developed and applied in a business school in Secundo *et al.* (2018).

The work of Habersam *et al.* (2013) differs from the others because, while focusing on reporting, it considers the consequences of measurement. In particular, they investigated the dysfunctional and functional effects deriving from a process of "accountingization" (see Dumay, 2009). While a standardised report supports benchmarking and is linked to formal budgets and performance agreements, highly-developed measurements may "victimise" managers (Mouritsen, 2004). However, there is no a common view on how to apply measurement models, nor on the usefulness of mandatorily adopting IC indicators. Thus, further critical contributions by scholars are required (Dumay, 2009). According to Piber *et al.* (2018), the key question on the agenda is still whether standardised or individualised indicators should be used when communicating results.

3.4 Research methods

This criterion refers to the research methods used in the selected articles. These attributes were developed by Guthrie *et al.* (2012) and Dumay *et al.* (2016) and remain unchanged. The first three research methods relate to studies that are empirical in nature: D1: Case and field study (e.g. Sánchez and Elena, 2006; Veltri and Silvestri, 2015); D2: Content analysis/historical analysis (e.g. Siboni *et al.*, 2013); D3: Surveys/interviews/other empirical methods (e.g. Ramírez-Córcoles and Gordillo, 2014; Martínez-Torres, 2006). The next methods are normative: D4: Commentary/normative/policy (e.g. Leitner, 2004; Cañibano and Sánchez, 2008); and D5: Literature review. It is worth noting that no literature review concerning IC in education has been published so far (and this paper not included in the sample). Therefore, a critical review of studies in the field is needed and hence a reason behind this paper.

Table VI shows that the most commonly employed research method is case and field studies (26), followed by commentary/normative/policy (9) and surveys/interviews/other empirical methods (8). Content analysis/historical analysis were not very popular methods of investigating IC in the education field (4), although it "can make valid inferences from texts" (Dumay and Cai, 2015, p. 143) if correctly adopted.

In a way, the prevalence of the case-study approach is not surprising considering its predominance in accounting research (Merchant and Van der Stede, 2006). Case studies are particularly fruitful when researchers need to locate (management) accounting practices in their social, economic, and organisational contexts (Scapens, 1990). In the IC field, a case study method lends understanding to the complexity of the issues being investigated, while providing a good picture of "what is going on". Additionally, it makes engagement with organisational processes possible and allows the researcher to discover practical implications. This is particularly important when human resources are involved, confirming what Guthrie and Dumay (2015, p. 260) refer to as "practice turn". In fact, the majority of the articles concerning the third stage of IC research (15 out of 22) rely on this approach because they need to interpret how IC is used and managed within organisations. This trend was confirmed by numerous case studies in our sample that relate to both third- and fourth-stage IC research. For example, Martin-Sardesai and Guthrie (2018) use a case study to provide a critical and performative analysis of IC practice in action by highlighting the unintended consequences of a research evaluation and assessment system for academics.

The predominance of case study research, especially in universities can offer a sample of convenience for IC researchers because these are organisations that are likely to give researchers access to data. Thus, there is a danger of over-doing case study research where other empirical research using national and international data sets may potentially give insights to universities and other educational institutions in general (e.g. Di Bernardino and Corsi, 2018). However, because of the close affiliation researchers may have with their respective universities and employers, they may be reluctant to critique current practices. Oppositely, universities who are research subjects may also restrict researchers reporting good news only. For example, one potential paper for this special issue was not completed in time because the researchers reported issues with critiquing their findings because the Rector at their research site would withdraw permission for the research if any negative findings were reported. Anonymising the university would not help as it would be easy to identify the university due to the case study context.

3.5 IC models and frameworks

The development of IC models and frameworks is important to understand because it shows how new ideas about IC are first proposed, and then put into practice. One issue that applies to all IC research is that there are now so many models and frameworks that it is confusing for researcher and practitioners to decide which one to use (Dumay and Roslender, 2013) However, the development of new frameworks is also indicates that the research is developing new insights that needs new models to explain and apply new research findings (Dumay and Garanina, 2013). Thus, it is quite interesting that more new models/frameworks were proposed in recent articles (e.g. Secundo *et al.*, 2015; Vagnoni and Oppi, 2015; Secundo *et al.*, 2016; Greco *et al.*, 2018; Sultanova *et al.*, 2018). These papers and new models confirm how important it is to develop new approaches to systematise previous studies while offering a stronger theoretical base for further research.

More generally, it should be noted that several scholars based their conceptualisations on official IC measurement models proposed by legislators (as in Austria with the University law UG, 2002) (e.g. Fazlagic, 2005; Ramírez-Córcoles *et al.*, 2007) or by international organisations and working groups (e.g. MERITUM Protect, 2002; INGENIO, 2002; Mouritsen *et al.*, 2003; RICARDIS by the European Commission (EC), 2006; PRIME project by the Observatory of European University (OEU), 2006). For example, Fazlagic (2005) presents the Poznan University of Economics IC report, based on Mouritsen *et al.* (2003) methodology, to showcase IC resources, activities, and results.

Conversely, other scholars have developed their own models. In this group, Secundo *et al.* (2016) proposed a new model to manage IC through a collective intelligence approach, which was then applied to Ca' Foscari University of Venice (Secundo *et al.*, 2018).

Passaro *et al.* (2018) proposed a model to assess the impact of higher education on the development of entrepreneurship-related human capital to exploit and develop new opportunities. This innovative trend in research explores the internal and external effects of IC management and strategy.

3.6 IC research stages

IC research is constantly evolving, and scholars identify four different stages of IC research (Guthrie *et al.*, 2012; Dumay and Garanina, 2013; Dumay, 2013). Hence, this criterion classifies the articles according to research stage. The categories are: F1: The first stage generally focuses on defining IC's potential for creating and managing the value creation process (e.g. Joia, 2000; Mrinalini and Nath, 2000); F2: In the second stage, evidence starts to be gathered to justify the strategic management of IC (e.g. Leitner, 2004; Leitner *et al.*, 2005); F3: The third stage is characterised by a strong impetus to discuss how organisations understand, adapt, and apply IC as a management technology inside universities (e.g. Sánchez *et al.*, 2009; Veltri *et al.*, 2014); F4: The fourth stage reflects the pivotal point of how to create bridges between knowledge inside and outside the organisation, i.e., how to connect human capital with relational capital (e.g. Villasalero, 2014; Secundo *et al.*, 2016, 2018; Mariani *et al.*, 2018; Piber *et al.*, 2018).

3.6.1 First stage. In the field of education, the first stage is variegated, dealing with particular issues that, quite surprisingly, are not discussed later. A common characteristic of the five articles belonging to the first stage is their focus on a single perspective as part of the wider idea of IC (Joia, 2000; Mrinalini and Nath, 2000; Chua, 2002; Fine and Castagnera, 2003; Hellström and Husted, 2004). Human capital receives the most attention. Both Joia (2000) and Mrinalini and Nath (2000) underline the innovative role of human capital to support the more appropriate use of physical capital. Chua (2002) examines the influence of social interaction on the process of knowledge creation through three different dimensions: structural, relational, and cognitive. Hellström and Husted (2004) discuss the function of knowledge mapping as a tool to enhance human capabilities and, thus, IC. Fine and Castagnera (2003) consider a different perspective on IC, which is not further debated in following studies on IC but is included in research dealing with knowledge management. They examine the policies relating to intellectual property rights adopted by universities, and their findings reveal an interest in protecting the results of academic research. According to Demartini and Paoloni (2013, p. 74), this can be considered the "entry stage" of IC research in education, which focussed on perceiving ongoing problems regarding human resources.

3.6.2 Second stage. By the second stage, IC research has become established as a legitimate field (Petty and Guthrie, 2000). Hence, this stage is characterised by the development of a vast number of models for managing and disclosing IC and by the recognition of IC as an approach to strategic management, in particular in universities. As Table VI shows, about 25 per cent of the articles are classified in this stage. Definitions provided by the Austrian legislation, which break IC into human capital, structural capital, and relational capital, seem to have prevailed (Leitner, 2004; Leitner *et al.*, 2005) coupled with those developed in Spain and by the Observatory of European Universities (Sánchez and Elena, 2006; Cañibano and Sánchez, 2008). Moreover, this stage sees some of the first attempts to exploit IC's role in the strategic management of universities (Martínez-Torres, 2006). In this context, the first definition of the three primary constituents of IC with specific regard to universities emerges. As stated by (Ramírez-Córcoles *et al.*, 2007, p. 734):

- Human capital – the set of explicit and tacit knowledge of the universities' personnel acquired through formal and informal educational and actualisation processes embodied in their activities.

- Structural capital – the explicit knowledge related to the internal process of dissemination, communication and management of scientific and technical knowledge in the organisation (can be both organisational and technological).
- Relational capital – gathers the wide set of economical, political and institutional relationships developed and maintained by universities.

However, other alternative elements are outlined, such as Rodríguez Castellanos *et al.* (2004) who consider research-development-transfer capital as the most important part of IC in universities, and they discuss the main drivers for these forms of capital. Cañibano and Sánchez (2009) highlight the external pressure for change in education, and specifically in universities, asking for more autonomy and more accountability at the same time. Cañibano and Sánchez (2009) also recommend adopting specific measures for IC components, which may reduce internal tension between teaching and research, and take entity-specific issues into account.

3.6.3 Third stage. Studies related to the third stage of research discuss how organisations understand, adapt, and apply IC in their managerial processes (Guthrie *et al.*, 2012). As Table VI shows, about 47 per cent of the articles (22 out of 47) were classified in this stage. Scholars proposed advanced models aimed at capturing the dynamic dimensions of intangibles assets and resources based on knowledge to identify how universities can create value and evaluate performance (Lu, 2012; Sánchez *et al.*, 2009; Veltri *et al.*, 2014; Greco *et al.*, 2018; Parshakov and Shakina, 2018). Even though the typical IC components remained the main basis for discussions (Martínez-Torres, 2006; Siboni *et al.*, 2013), a slightly different definition was adopted by scholars that were more directly involved in the European project PRIME Network of Excellence (OEU, 2006; Sánchez *et al.*, 2009; Secundo *et al.*, 2010). Their discussions reflect organisational capital, as opposed to structural capital, which includes elements related to both infrastructure and innovation/knowledge.

Meanwhile, some authors began to focus on the relationships between the different components IC or on identifying new components, whether subcomponents of the existing capitals or entirely new ones (Bezhani, 2010; Ramírez-Córcoles *et al.*, 2011; Vagnoni and Oppi, 2015; Veltri *et al.*, 2014). Bezhani (2010), for instance, investigated IC in UK universities through the analysis of annual reports and identified not only human, structural, and relational capital but also "research", "commercialising" (related to spinoffs) and "services" (as laboratory services). Moreover, Ramírez-Córcoles and Gordillo (2014) proposed a distinction within structural capital that would be preserved in later studies by identifying "organisational" and "technological" resources (Ramírez-Córcoles and Manzaneque-Lizano, 2015). Veltri *et al.* (2014) proposed a method for combining the management and measurement of IC through a fuzzy logic expert system, which recognised that IC structures can significantly differ among universities. Vagnoni and Oppi (2015) highlight that relational capital also comprises human and structural capital when stakeholders are considered. Similarly, Bornemann and Wiedenhofer (2014) integrate IC resource management within education value chains and found a higher agreement on the drivers of human capital than for structural and relational capital.

All these studies suggest adopting an open-minded approach while investigating "IC practices in action" in educational institutions (Guthrie *et al.*, 2012, p. 69; Manes-Rossi *et al.*, 2016) since a common view on the content of different IC components is difficult to detect. According to Dumay, Guthrie, and Rooney. (2017), identifying the IC components is only a part of the problem since it is important to define the context in which IC is applied. This also means the entity-specific nature of IC needs to be considered (Melián-González *et al.*, 2010) and empirical research that investigates IC practices inside educational organisations should be promoted (Bezhani, 2010; Ramírez-Córcoles *et al.*, 2011; Lu, 2012; Greco *et al.*, 2018).

In summary, the rich strands of research characterising the third stage provide support to managers of educational institutions in understanding how IC affects and enhances their performance and contributes to value creation. Such insights may also be useful for standard setters and politicians in understanding how IC is developed and prompt actions that support the educational sector.

3.6.4 Fourth stage. The main pillar of the fourth stage of IC research is the need to discriminate and connect the human capital inside an organisation with relational capital outside the organisation (Borin and Donato, 2015; Dumay, 2013; Dumay and Garanina, 2013). This stage considers the social dimension of IC, which is extremely important for universities considering their third mission. As shown in Table VI, eight articles were classified in this stage (Villasalero, 2014; Secundo *et al.*, 2016, 2018; Di Bernardino and Corsi, 2018; Mariani *et al.*, 2018; Passaro *et al.*, 2018; Piber *et al.*, 2018; Sultanova *et al.*, 2018).

In this more mature stage of research, a further definition of IC's components emerges. Secundo *et al.* (2016, p. 302) define the elements of IC as follows:

- Human capital: referring to the intangible value that resides in the people individual competencies, this includes the expertise, knowledge and experiences of researchers, professors, technical and administrative staff and students' competencies.
- Structural capital: referring to the resources found in the organisation itself, i.e., what remains without the employees, this includes the databases, the research projects, research infrastructure, the research and education processes and routines, the university culture, image and reputation, and so on.
- Relational capital: referring to the intangible resources capable of generating value linked to the university's internal and external relations. This includes its relations with public and private partners, position and image in (social) networks, the brand, involvement of industry in training activities, collaborations with international research centres, networking with professors, international exchange of students, international recognition of the universities, attractiveness, and so on.

These definitions identify the main features of each IC component and, at the same time, provide a deeper understanding of the relationships between each element and with technology transfer in the pursuit of the third mission. Di Bernardino and Corsi (2018) discuss the role of different IC components in promoting the third mission and conclude that structural assets contribute significantly to the value creation process in universities. In the same vein, Passaro *et al.* (2018) emphasise the role of entrepreneurship education on the IC components concerning the accumulation of entrepreneurial knowledge, abilities, and skills. Accordingly, they argue that these personal attributes, and more specifically "entrepreneurship-related human capital", plays a pivotal role in early entrepreneurship intentions and, in turn, the entrepreneurial process. These results may lead universities to develop specific programmes to support entrepreneurial activities.

Articles belonging to the fourth stage of IC research also underline the relevance of promoting a more communicative culture, which would allow universities to disclose their results by adopting less standardised but more individualised indicators (Piber *et al.*, 2018). Oppositely, another innovative turn is undertaken by Sultanova *et al.* (2018) since their main aim is to examine the effect of teacher expertise on student employability in the context of Kazakh and Spanish academia by developing specific performance indicators. Here they develop measures for improving human capital and then transfer the IC into student employability thus increasing society's human capital.

The growing use of interdisciplinary approaches is another characteristic of this stage of research. Secundo *et al.* (2016, 2018) discuss the interconnections between IC and collective intelligence, highlighting the role of universities in supporting growth and innovation in society.

In this discourse, the bidirectional relationship between human and relational capital plays a pivotal role, paving the way for the development of a fifth stage of research (Dumay, Guthrie, Ricceri, and Nielsen, 2017a, b) that explores the role of IC in everyday life beyond individual organisations in wider social environments.

4. The future of IC research in education: developing future research paths

This literature review was motivated by the need to systematise the state-of-the-art, by critically analysing the issues discussed in the literature, and identify its gaps to reveal new paths of fruitful research. As mentioned by scholars, the growing opportunities to communicate value creation and attract more resources, both financial and human, have created a need in educational organisations to manage and disclose knowledge production and diffusion. Thus, outlines some paths for future research by identifying gaps.

4.1 Educational context

Research on IC in education mainly deals with universities; few studies examine schools and research centres. However, these kinds of organisations may have some peculiarities that affect the management and the disclosure of IC. Future research might explore their unique characteristics, or embrace a more holistic view of how a wider range of educational institutions can contribute to the growth of society. Such research may provide insights into the consequences of IC management at the macro- and meso-levels (Dumay, Guthrie, Ricceri, and Nielsen, 2017a). It would also be worth investigating the effect of policies aimed at enhancing the relationships between educational organisations and private firms or local communities to determine whether they improve relational capital.

Another intriguing question that deserves attention is the impact of evaluation systems. For instance, Martin-Sardesai and Guthrie (2018) examine the effect of performance measurement systems on the human capital of a university. Similar research questions could be asked about schools and research centres, which may also unveil some unintended consequences of evaluating research for teachers and researchers.

Finally, future research could adopt a holistic view by considering the relationship between schools and universities, as in the case of Bornemann and Wiedenhofer (2014), as we need more understanding of how policies and the educational system as a whole affect society. This approach would be coherent with the ongoing fifth stage of IC research, discussed in more detail in Sections 4 and 5.

4.2 Country of research

It is noteworthy that a large number of empirical studies address IC in European settings, with far fewer articles from other continents. This attention can be justified by the "Bologna Process" and the idea of creating a European research space. Nonetheless, more contributions from other countries, particularly from American and Australasian entities, might provide new approaches to managing and disclosing IC. As stated by Dumay, Guthrie, and Rooney (2017b, p. 22), broadening IC research beyond Europe "will raise awareness and expand the potential of IC research". In kind, this special issue includes three papers on emerging contexts (Greco *et al.*, 2018; Parshakov and Shakina, 2018; Sultanova *et al.*, 2018). However, we would argue that additional effort is required. For example, it would be interesting to examine the effects of managing IC components in developing countries, especially human capital, where education is frequently not accessible to the poorer social classes. Further, it would be worth understanding why contexts other than Europe pay so little attention to IC, especially the North American countries.

Focusing on empirical analyses of IC disclosure, a range of results in different contexts show that comparative analysis would be beneficial for understanding the influence of

country-specific factors on managing, measuring, and disclosing IC in education (Bezhani, 2010; Low *et al.*, 2015; Ramírez-Córcoles *et al.*, 2007, 2011; Siboni *et al.*, 2013; Sangiorgi and Siboni, 2017). Cooperation among scholars from different countries would enhance the quality of comparative research and offer a deeper understanding of the managerial issues related to IC in higher education. Although international cooperation among authors is emerging, a systematic strand of research comparing international experience is only embryonic (e.g. Sánchez *et al.*, 2009; Low *et al.*, 2015). We argue that such collaborations would also be beneficial for theorising about strategies to support developing IC in universities and providing suggestions for legislators and standard setters in the higher education domain, especially in countries like Italy where ongoing reforms focus on the performance and the achievement of the third mission. More extensive involvement by top managers in research dealing with IC in educational organisations may provide a more holistic view of the strategies that need to be adopted when managing and disclosing IC (e.g. Leitner *et al.*, 2005; Bezhani, 2010; Secundo *et al.*, 2015).

4.3 Focus of IC in education research

More investigation is needed on the dilemma of voluntary vs mandatory IC disclosure. In the Austrian context, mandatory reporting, through the knowledge balance sheet, was adopted as a tool for managing intangible assets and to provide stakeholders with adequate information on IC use (Leitner, 2004). The link between the KBS non-issue and external disclosures meeting stakeholder needs is tenuous (Piber *et al.*, 2018). Therefore, the debate between voluntary and voluntary disclosure deserves further empirical research to understand how disclosures should meet stakeholders' information needs (Ramírez-Córcoles and Gordillo, 2014). For instance, it would be interesting to investigate why some universities provide IC information on a voluntary basis. Are they trying to gain legitimacy with external stakeholders? Do the various voluntary reports support the definition and implementation of strategies? Does information on human capital support their recruitment processes?

Further, as claimed by Low *et al.* (2015), it would also be beneficial to examine IC in the disclosures on university websites and other kinds of documents, such as the social reports produced Italian universities (Sangiorgi and Siboni, 2017). Universities are increasingly using their websites as a means of communication (Bisogno *et al.*, 2014). Therefore, the determinants and the consequences of these kinds of IC disclosure are worth considering at a strategic level. Top managers, central governments, and policymakers would all benefit from insights into the relationships between educational institutions and the development of society. However, the information reported on IC components needs to be reliable and this, once again, raises the debate on standardised vs individualised indicators. Additionally, would assurance processes add reliability to IC disclosure?

Additionally, future research could investigate the possible determinants and consequences of IC disclosure in education based on these different channels of disclosure. The former may take into account different performance measurement systems or different ways to fund schools, universities, and research centres. Future studies on the determinants of IC disclosure might consider different approaches developing the third mission. It is necessary to more thoroughly investigate which levers can be applied while managing IC to develop appropriate strategies and enhance stakeholder engagement. Research that investigates the consequences of IC management could support the development of these strategies. The findings would not only be useful to universities but also at the meso- and macro-levels, as some studies have highlighted (Secundo *et al.*, 2016, 2018). Finally, it would be interesting to investigate the effects of IC management on entrepreneurial intention beyond universities (as in Passaro *et al.*, 2018; Di Bernardino and Corsi, 2018; Mariani *et al.*, 2018) to research centres and other types of educational institutions.

While the above discussion mainly focuses on mandatory and voluntary disclosures, another evolving and applicable theme in IC research is investigating involuntary IC disclosure (Dumay and Guthrie, 2017). Dumay and Guthrie (2017) define involuntary disclosure is defined as "what external stakeholders and stakeseekers disclose about a company". However, involuntary disclosure is equally applicable to IC education research because education involves many stakeholders and news about universities is widely reported in numerous communication channels from traditional printed and broadcast news to the internet. The involuntary disclosures produced by stakeholders and stakeseekers identify the opportunities and threats to educational institutions, and to the policymakers who institute reform. For example, in Australia funding reforms at all educational levels have been and continue to be widely debated in the press and the internet (e.g. Blake, 2013; Donnelly, 2012). These debates are political and affect Australia's future human (students), structural (education system), and relational (all stakeholders) capital. This continuing discourse flowing from involuntary disclosures about Australia's education system impacts on public opinion and subsequently, public policy.

4.4 IC models and frameworks

In considering the models adopted by previous studies, a pivotal question was raised in several articles (e.g. Sánchez *et al.*, 2009; Ramírez-Córcoles *et al.*, 2011): Is there a need for a standardised model for disclosing IC, supporting comparisons, and benchmarking? All authors agree that a unique standard is still a long way off, yet determining the right trade-off between comparability and the need to show the uniqueness of each institution is a difficult and important consideration (Habersam *et al.*, 2013; Low *et al.*, 2015). Understanding how management change has occurred in universities that are obliged to apply a particular IC model, as in the Austrian context (Habersam *et al.*, 2013; Piber *et al.*, 2018) offer a basis for further reflection. As previously stated, studies belonging to fourth stage IC research consistently call for further research on standardised vs individualised performance measurement blueprints.

Additionally, it would be worth investigating the usefulness of new frameworks, as proposed by Veltri and Silvestri (2015). Integrated reporting is an obvious candidate. This framework combines related information into a wider perspective to, arguably, better capture and disclose the value creation process (see International Integrated Reporting Council, 2013). According to Dumay, Guthrie, and Rooney (2017b), IC reporting may attract more attention by focusing on "value" creation rather than "wealth" creation. Moving beyond organisational boundaries and placing universities as stakeholders in a larger ecosystem may help to solve broader social problems (Dumay, Guthrie, and Rooney, 2017b). For example, what is the role of universities in providing free or subsidised education in countries where university education is mainly only accessible to the wealthy and privileged social classes? This is coherent with the emerging fifth stage of IC research, which demands that scholars expand our idea of IC and its components and recognise that it is "a substantial part of what impacts us on a day-to-day basis" (Dumay, Guthrie, Ricceri, and Nielsen, 2017a, p. 4).

4.5 Research methods and stages

Scholars have embraced the case study method. Even though other approaches can be useful for investigating IC issues (e.g. content analysis while discussing disclosure issues), we would argue that case studies are particularly appropriate in this field. They allow researchers to discover the practical implications of the organisational processes under investigation, especially in terms of human resources, and they also foster understanding in third- and fourth-stage IC research.

As IC research now proceeds to its fifth stage, vastly broadening its view, future studies might adopt an interventionist approach (Dumay, 2010; Vagnoni and Oppi, 2015). Alternatively, IC researchers may wish to embrace an interdisciplinary approach as we expand beyond the boundaries of educational institutions into socio-political contexts. Other methodologies, such as ethnography and participant observation, may also be useful (Creswell, 2013). Further, the value of Big Data should not be overlooked. These vast data assets provide scope for more mixed-methods and quantitative studies to understand the socio-economic implications of IC-based policies in universities (Secundo *et al.*, 2017). Currently, there is ample Big Data available at national and international levels about the performance and impact of educational intuitions and policies that can be analysed from an IC perspective (e.g. Di Bernardino and Corsi, 2018). However, as we alluded to earlier, often the data resides with political or institutional holders who may not allow using the data to perform an open critique and stifle attempts to move forward based on rectifying past errors or less than desired performance.

To help develop more openness, we encourage IC researchers to develop, interpret, and discuss their research using a critical approach (Alvesson and Deetz, 2000) to help with understanding the value IC creates for society, not just individual institutions. More broadly, future paths should investigate why IC is worthy to a diverse range of stakeholders (Dumay, Guthrie, Ricceri, and Nielsen 2017a), how to take people into account, how to promote the well-being of all workers, and a wider range of human rights issues (Roslender and Monk, 2017).

5. Final remarks and limitations

To conclude this study, we encourage researchers to intensify their efforts in investigating IC in educational institutions. New knowledge on managing and disclosing IC in these kinds of organisations is required to benefit the field, students, and the general public. The fundamental goals of educational organisations are to teach, research, and transfer knowledge (i.e. the third mission); hence, scholars could investigate the effects of managing and disclosing IC in each of these strategic dimensions.

Studies based on the third stage of IC research could investigate how the components of IC are perceived in specific educational contexts and how IC is used and managed in different educational settings to understand the effects on these strategic dimensions. Researchers engaging in fourth-stage research are invited to investigate the social dimensions of IC, whose importance is progressively increasing especially considering the third mission of universities. Therefore, we want to encourage scholars to analyse the ethical, social, and environmental impacts of managing IC. Scholars leading the fifth stage of research could broaden their idea of IC by investigating how IC or its components help to improve value beyond the boundaries of educational organisations. While scholars have in the past been critical of developing new frameworks for measuring, managing and reporting IC we encourage future frameworks provided they develop new insights, rather than reinvent the wheel. Frameworks the outline new developments in understanding IC in education are important because they add new insights into emerging development in universities, such as third mission and we see these new frameworks offering ways forward and are the basis for future case study and empirical research.

This study is not free of limitations. First, while interesting points may have been captured in other papers, we restricted our analysis to articles published in journals that were classified in the Q1 and Q2 SCImago rankings. Therefore, our findings are limited to the breadth and depth of the data investigated. They rely on our interpretation of the results, and relevant contributions may have been excluded. The SLR methodology is based on a set of predefined steps to ensure it provides more reliable results than a narrative review, yet other researchers may have interpreted the data differently even when using the

same approach. Second, the validity of these results can only be considered at the time of the analysis. Future studies are likely to change the validity of these findings. Indeed, an SLR does not provide definitive answers. It aims to reveal gaps and propose pathways for future research that will hopefully be filled.

Note

1. Citations per year (CPY) were calculated according to the formula currently used in Harzing's Publish or Perish software (www.harzing.com/pop.htm), i.e., 2016 − Year Published. See Dumay *et al.* (2016).

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