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The association between sourcing skills and intertextual integration in lower secondary school students

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Abstract

Sourcing and intertextual integration skills are critical to the development of young students' digital literacy skills. Sourcing skills include identifying source parameters (e.g., recognizing the author, publication date, publisher) and analyzing the author's expertise. The objective of this study is to investigate which sourcing skills used by students in document selection are most associated with intertextual integration skills. A total of 165 students attending lower secondary school participated in the research. Students completed a sourcing inventory, an intertextual integration task (after reading multiple texts), and control variables measures (prior knowledge, prior beliefs, and text comprehension). The results of exploratory factor analysis showed three dimensions for sourcing, namely source identification, author's competence, and judgment on website choice. Furthermore, hierarchical regressions showed that author competence was the only sourcing factor associated with intertextual integration skills, after controlling for the effect of control variables. These results suggest that even younger students pay attention to author expertise when choosing texts to use for their assignments, and doing so enhances their competence in integrating information across sources.

Keywords Sourcing skills · Intertextual integration skills · Online multiple texts · Lower secondary school students

Introduction

The Internet has become a key medium for learning, and school projects increasingly require students to search, evaluate, and integrate information across sources. People, especially young people in industrial countries, generally read on digital devices (Balling et al., 2019; Ding et al., 2021). The rapid increase of the rate of online reading stresses the importance of critical evaluation processes, which depend on the reader's ability to assess the trustworthiness and relevance of the information. In other words, readers are required to

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attend to, represent, evaluate, and apply information about the source (i.e., author, publisher) of the text, a practice defined as sourcing (Braasch et al., 2018; Bråten et al., 2017). This set of skills allows students to select and read reliable online information for learning purposes (Scharrer & Salmerón, 2016). Importantly, sourcing skills need to be associated with intertextual integration for readers to create a coherent representation of a topic as discussed in multiple sources (Bråten et al., 2013).

To contribute to our understanding of the interplay between critical online reading skills, in the present study, we analyzed several sourcing skills in lower secondary school students, from 6 to 8th grade, with the purpose of identifying which of these is mostly associated with intertextual integration.

Sourcing skills

Since the seminal paper by Wineburg (1991), scholars interested in text processing have focused on sourcing skills. Wineburg (1991) found that experts in history implement more sophisticated sourcing skills than novice readers do when processing historical documents. Since then, research has made significant progress on the issue of sourcing skills (Bråten et al., 2019). However, results in this area are rather mixed. For instance, in a recent review, Anmarkrud et al. (2022) identified 21 different measures of sourcing across the studies included in the review ($N = 72$). In most studies, the researchers asked participants to rate the credibility or reliability of sources, counted the references to sources in written products (e.g., essays, written arguments), and examined participants' representation of source-content connections through questionnaires. Thus, not only authors have investigated different skills related to sourcing, but even when focusing on the same skill, they employed different types of assessments.

The sourcing skill that has received most of the attention is trustworthiness judgment, that is, the ability to discriminate between more and less trustworthy sources (Bråten et al., 2009; Strømsø et al., 2010). A first issue in the research on sourcing is that when assessing trustworthiness, readers may apply different criteria, from more (such as judging the reliability of an author) to less sophisticated ones (such as evaluating on the basis of personal opinion). Some studies have explored what type of sourcing criteria secondary school students generally apply when assessing trustworthiness of online sources. In a qualitative study, Coiro et al. (2015) examined students' ability to identify the author of a particular website, their level of expertise, their perspective, and the overall reliability of the website. The results showed that several participants mainly relied on unacceptable or superficial criteria (for example, participants' responses did not reflect any particular criteria for assessing the author's competence, assuming that the author simply knows what he or she is talking about) to determine the author of a website and their expertise or perspective or to provide reasoned evidence about the website reliability. This result suggests that sourcing skills are still suboptimal in secondary school students.

A second issue about sourcing refers to its nature: is sourcing a multi-componential construct? Kiili et al. (2022) sought to establish the structure of online text credibility assessment in sixth-grade students. Students read four online texts varying by credibility and assessed the sources by author's competence and benevolence and quality of evidence. According to the results, two latent skills, namely confirming the most credible texts and questioning the least credible texts, were positively associated with students' ability to rank texts according to credibility. Potocki et al. (2019) developed a tool called

Source Knowledge Inventory (henceforth, SKI) to assess three sourcing skills: identifying source parameters, assessing the competence and benevolence of authors, and using source parameters when making decisions about the relevance or usefulness of a document. With this instrument, the authors aimed to assess how familiar students are with sources in assignments and especially how familiar adolescents are with source characteristics, such as authors, dates, and places of publication, and whether they are able to assess authors in terms of knowledge competence and benevolence.

Overall, research has contributed to our understanding of the levels of sourcing skills in secondary school students and the multi-componential nature of sourcing. However, evidence on adolescents' use of sourcing criteria is mixed, probably because studies tend to focus on one sourcing skill at the time and sourcing skills are measured with different tools.

Sourcing skills are relevant to identify which new information readers should focus when reading text for their learning task. Through sourcing, readers select different texts and have to integrate content across them. In the next paragraph, we will discuss research that has analyzed the association between sourcing skills and intertextual integration.

Sourcing and intertextual integration skills

The Multiple-Document Task-based Relevance Assessment and Content Extraction (henceforth, MD-TRACE; Rouet & Britt, 2011) describes the resources and processes put in place in document-based activities. This model assumes that readers, at the same time that they accumulate information from multiple documents, also construct an overall representation of the content and sources of the documents that will serve as the basis for responding to the task assigned to them. The MD-TRACE model defines five main processing steps: (1) the construction of a task model, (2) the assessment of one's information needs, (3) the selection, processing, and integration of document information, (4) the construction of a task product, and (5) the assessment of product quality. The third step involves an evaluation of a document's source characteristics, such as author expertise.

Sourcing and intertextual integration skills are part of the overall process of understanding multiple texts. Sourcing facilitates intertextual integration across sources as it directs the reader's attention towards the reasons for different views and perspectives on the same issue (Bråten et al., 2019). As such, sourcing and intertextual integration should be intertwined at multiple steps in the MD-TRACE model, but more importantly during step 3, the selection, processing, and integration of document information. Indeed, as suggested by Perfetti et al. (1999), when people read multiple texts, they construct two separate mental representations: one representing the content of each text and one representing the relations between texts. The combination of these two representations constitutes an integrated representation on content, sourcing, and inter-text connections. This framework is defined as Document Model (Perfetti et al., 1999) that consists of two interconnected components. Firstly, the Intertext Model, which represents the relationships among sources (e.g., agreement or opposition) and between sources and text content (who said what). Reading multiple documents involves representing information about the sources and the links that exist between source information and content, as well as links between the sources (Perfetti et al., 1999). Secondly, the Situation Model, which refers to the interpretation of the situation described in the text, and the textual genre of the document, such as a scientific article or a textbook chapter. From this perspective, information integrated across documents can be organized as a model of the combined situation. In fact, the construction of a situation

model is particularly important for the ability to use text information productively in new contexts (Kintsch, 1998).

While sourcing and intertextual integration skills should be ideally co-activated throughout the reading process, according to List and Alexander's integrated framework of multiple text use (List & Alexander, 2019), sourcing skills should be prominently activated in the stage in which readers plan for the reading task (preparation stage) and influence intertextual integration in the execution stage.

While scholars agree that sourcing skills and intertextual integration skills are theoretically associated, only a few studies have tested this association. For instance, Strømsø et al. (2010) found that secondary school students' memory of sources was associated with their comprehension performance. After reading multiple texts on the topic of climate change, 233 students completed an intra- and intertextual inference test to measure document comprehension and a source memory test to measure source awareness. For the document comprehension, the intratextual inference task was used to measure participants' deeper, situational understanding of individual texts, while the intertextual inference testing task was used to measure the ability to make intertextual inferences, that is, taking parts of information presented in different texts and drawing inferences that connect them. The memory source task required participants to recognize sentences read in texts, indicating which text the information came from. The results showed that memory for sources positively predicted both students' intra- and intertextual understanding.

To the best of our knowledge, there is a lack of research directly measuring the association between sourcing skills and intertextual integration; in other words, no previous study has compared different sourcing skills to determine which was more strongly related to intertextual integration. The present study aims to contribute to this issue.

The present study

While there is a general agreement on the relationship between sourcing and intertextual integration, it is still unclear what is the differential contribution of sourcing skills components on intertextual integration skills. The analysis of the literature suggests that sourcing and intertextual integration skills are important and crucial skills for reading on the Internet (e.g., Salmerón et al., 2018). Sourcing and intertextual skills are separate skills but highly related. However, sourcing skills are often studied by analyzing only one component at a time (e.g., trustworthiness or relevance of sources).

Following the results in literature, PISA data also consider sourcing issues to challenge misinformation. Scholars who were part of PISA also focused on sourcing characteristics, arguing that comprehension of multiple online texts requires readers to be able to distinguish between facts and opinions and to learn strategies to detect distorted information and damaging content (Suarez-Alvarez, 2021). In addition, PISA data show that these skills differ among adolescents in different countries. Despite the importance of conducting more comparison studies on relevant skills such as sourcing, scales (e.g., Potocki et al., 2019) are generally developed in single countries and are little studied with other populations.

In addition, some studies have highlighted the importance of individual differences in source evaluation, such as basic reading skills and prior knowledge (Kiili et al., 2021). Overall, these individual differences may play a role in the identification, evaluation, synthesis, and communication of information from multiple online texts (Bråten et al., 2018).

For this reason, in studying digital literacy skills, it would be important to take these variables into consideration.

Therefore, the purpose of this study was to assess which factor of SKI is most associated with intertextual integration skills, controlling for participants' individual variables such as prior knowledge and beliefs and text comprehension. Moreover, we were interested in assessing the cross-cultural validity of a sourcing scale, by exploring its factorial structure in a population of Italian students.

Method

Participants

A total of 165 adolescents aged between 11 and 14 years old participated in the study (M-age [SD] = 11.96 [.99]). The students were 53% male, 46% female, and 1% preferred not to answer. Participants attended two Italian lower secondary schools in a city in Central Italy. Lower secondary school follows the definition of an International Standard Classification of Education (ISCED 2011) Level 2 school. The participants attended 6th grade ($N = 40$), 7th grade ($N = 69$), and 8th grade ($N = 56$). Students with any known special educational needs or developmental impairments/disorders were excluded from the database. Students were asked to report how often they read digital texts for the purpose of informing themselves. Most of them answered "when necessary" (34%) and "rarely" (25%), only 12% answered often.

The schools voluntarily agreed to participate in this study. School authorities and parents provided consent to participate in the study. The research design of this study followed all the indications set by the Declaration of Helsinki (World Medical Association, 2013). Both parents signed informed consent to participate in the study (98% of the contacted parents). The research is approved by Ethical Committee of University of Florence (Italy). All data were treated in adherence to the requirements of privacy and informed consent requested by Italian law (Law Decree DL-196/2003).

Procedure

The tests were conducted with the support of an educational web app developed by the research team in collaboration with a software development company. The students took the tests on the school's computer during class hours. A researcher was present in the classroom while the students were working with the app. Data were collected over two 1-hour long sessions by a trained research psychologist.

Measures

Sourcing skills

Sourcing skills were assessed through a translated version of the Source Knowledge Inventory (Potocki et al., 2019). This instrument includes the following scales:

Identification of source features: Students were asked to read five short texts and find source features such as the name of the author, date, place of publication, and editor and author's profession. For example, "From an ANSA news agency article,

May 25, 2012: 'The dike closing Saemangeum Bay in South Korea was completed in April 2010. On the polders that protect it from the Yellow Sea, the government wants to build a city, factories, etc. by December 2030. The project has met with strong protests from environmentalists in this rural area.'" "On what date was this article published?" Each student's response was coded 1 if correct, 0 if incorrect, and 0.5 if correct but not accurate (e.g., if participants do not provide the exact date, instead of May 25, 2012, they only mention 2012). The coding of scores was carried out by two independent raters, with 98–99% agreement. Each case of disagreement was discussed and resolved by the two raters.

Explicit evaluation of author dimensions: Students were asked to read five short texts and assess the author's competence and benevolence in relation to a given topic. For each text, source information was provided and two questions were asked to investigate their opinions on whether the author was competent on the topic and whether the author was benevolent towards a certain perspective on the topic.

For example, "Excerpted from an article written by Giulio Sarti, science journalist for Science and Junior Life magazine, April 2012: 'According to observations from the Topex-Poseidon and Jason-1 satellites, global warming is expanding oceans and melting ice caps. As a result, inflated by warmth and replenished with fresh water, the sea is rising by 3 millimetres per year since 1993.'" To assess the evaluation of the author's competence, we asked the participants the following question: In your opinion, is the author of this text competent to speak on this topic? Give your answer by circling a number from 0 to 10 that comes closest to what you think (from 1 = "Not at all competent" to 10 "Very competent"). To assess the evaluation of the author's benevolence, we asked the participants the following question: In your opinion, is the author of this text trying to defend a particular opinion on the topic? Give your answer with a number from 1 to 10 that is closest to what you think (from 1 = "Does not support an opinion" to 10 "Defends an opinion"). Each student's response was coded on a Likert scale from 1 to 10, obtaining two separate scores for the categories: competence and benevolence of the author. Therefore, the total scores express the judgment of the author's competence, understood as expertise on the topic covered in the short text, and the judgment of the author's benevolence, understood as the author's potential (conflict of) interest regarding the topic covered.

Source evaluation without prompts: Students were presented with a web search activity for school purposes in which they were given the results from a search engine for two specific topics: "fresh water in the world" and "biodiversity," for each topic, four websites' links were presented to the participants. For example, "After an Internet search on the topic of 'Fresh Water in the World,' the following results are obtained (...)" "Would you use site number 1 to prepare your presentation? Express your answer with a number between 1 and 10 depending on whether you would definitely not use this site or whether you would definitely use it." For each website link, each student's response was coded on a Likert scale from 1 = "I would certainly not use this site" to 10 = "I would certainly use this site." In addition, for each answer given, the student was asked to give a justification for the website choice (e.g., "Now explain your answer in one sentence"). Responses were coded as follows: 0 if the response does not report source information (e.g., "I like the topic"), 0.5 if the response reports source information but incomplete (e.g., "the source seems reliable to me"), and 1 if the response is complete about source references (e.g., "I choose the site because it is concerned with the topic and is nationally recognized").

Intertextual integration skills

Students read four texts and were then asked to answer a series of questions. Four texts were presented according to two factors: source expertise (non-expert vs. expert) and arguments (favorable vs. opposing), each text representing a cross-condition. Authoritative texts (i.e., expert source) included references to reliable sources, i.e., those published by publishers or authors who are considered reliable and authoritative in relation to the subject under consideration: this clarification is particularly important, since a source (a site, a book, and so on) should not be considered reliable in itself, but in relation to what it is used for. Non-authoritative texts (i.e., non-expert source) included unreliable references, for example, a text written by a person who is not an expert in that field or the collection of information not from knowledgeable people. The texts were between 480- and 510-word long. The texts were also similar for readability (ranging between 50 and 60, Gulpease index; Tonelli et al., 2012).

Following Bråten et al. (2009), we created a Sentence Verification Task (henceforth, SVT) to measure students' intertextual integration skills. SVT is a task in which students were asked to identify whether a sentence (each item) was stated in the text. A total of 19 items categorized into four types were administered: (a) original sentences, which were copies of sentences that appeared in the text/s; (b) paraphrases, which were constructed by changing words in sentences extracted from the texts without altering their meaning; (c) meaning changes, which were constructed by changing words in original sentences in a way that the meaning of the sentences was altered, and (d) distractors, which were similar to the original sentences but were unrelated in meaning to any of them. Moreover, we added intratextual and intertextual inference sentences Intratextual inferences are sentences that combine information from different sentences within one of the texts to form an inference. While, intertextual inferences are sentences that come from pieces of information presented in different texts and draw inferences that connect them. The total score for each subject is obtained from the sum of the correct answers. Cronbach's alpha was .52.

Control variables

Prior beliefs

Participants' prior beliefs were assessed by asking them to report their agreement with 14 statements on the issue "evaluation in school" (this was the topic discussed across the texts), using a Likert scale (ranging from 1, totally disagree, to 6, totally agree, see Maier & Richter, 2012). Seven statements argued that schools should promote excellence (e.g., I believe that schools should act to value those who have excellent achievements in school) and seven statements argued that social inequalities affect educational outcomes (e.g., I think that if a student is poor he or she cannot succeed in school). Cronbach's alpha was .67.

Prior knowledge

We developed a multiple-choice test with 8 items to assess the participants' topic knowledge about Evaluation in school (example: "Educational excellence refers to: (a) excellent educational achievements in a given school setting; (b) the socioeconomic background of students; (c) the value of teachers; and (d) the value of the educational institution").

Participants' score on the prior knowledge measure was the total number of correct responses out of the eight items. Cronbach's alpha is .57. While lower than desirable, this score is still considered acceptable for research purposes.

Text comprehension

To assess students' comprehension skills, we administered them a standardized reading comprehension test (the MT Test; Cornoldi & Colpo, 1995; Cornoldi et al., 2010) designed for Italian students. Participants were required to silently read a 466-word expository text and answer 10 multiple-choice questions, choosing one of four possible answers. Through questions, students are asked, for example, to capture the literal meaning of a sentence, then be able to paraphrase a concept, or draw semantic or lexical inferences. The final score was calculated as the total number of correct answers for the read text and ranged between 0 and 10.

The MT Test has several standardized versions, one for each grade of Italian compulsory school and one for high school. It was validated on a large population of Italian children sampled in different areas of Italy.

Data analyses

To calculate the factors to be used in the regression model, Exploratory Factorial Analysis (EFA) with principal axis factorization and Oblimin rotation were performed by checking, preliminarily, the prerequisites of the correlation matrix (Kaiser- Meyer-Olkin-KMO index; Kaiser, 1970, 1974) and the significance of Bartlett's (Bartlett, 1950) test of sphericity. Factor saturation values were considered adequate if they were greater than 0.30 (Osborne et al., 2008). The number of factors extracted was determined as a function of eigenvalue (greater than 1.0) (Hair et al., 1995; Kaiser, 1960; Sharma, 1996). Cronbach's alpha was calculated to assess internal consistency. Correlation analyses were carried out to ensure the test parameter of having significant correlations between predictors and criterion (see Supplementary Materials for the results of the correlational analysis). Hierarchical regression was used to test the association between the factors of sourcing skills and intertextual integration skills. Prior beliefs, prior knowledge, and text comprehension were included in the first step to control for their effect. The percentile bootstrap was used to derive robust estimates of standard errors and confidence intervals for regression coefficient estimates.

Results

Factorial structure of the sourcing knowledge inventory

Preliminarily, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy values and Bartlett's test of sphericity were calculated (KMO = 0.66, Bartlett's test $p < .001$ [$\chi 2$ (66) = 237]). The KMO and Bartlett's test values suggest that the sample size is adequate and that some of the variables are inter-correlated, and thus, the data are suitable for factor analysis (Sharma, 1996).

Table 1 Factor loadings

	Factor			Uniqueness
	Source identification	Authors competence	Judgment on web site choice	
Item 2 (place of publication)	.38			.79
Item 3 (editor)	.56			.69
Item 4 (author's name)	.57			.64
Item 5 (author's job)	.51			.58
Item 6 (date of publication)	.70			.53
Item 8 (author's competence)		.98		.01
Item 9 (author's competence)		.42		.69
Item 11 (author's competence)		.48		.80
Item 14 (web site choice)			.60	.64
Item 15 (web site choice)			.36	.85
Item 18 (web site choice)			.57	.68
Item 19 (web site choice)			.46	.77

"Maximum likelihood" extraction method was used in combination with a "oblimin" rotation

Items 2–6 are derived from Potocki et al.'s "Identification of source features" scale; items 8–9–11 are derived from the "Explicit evaluation of author dimensions" scale; and, items 14–15–18–19 are derived from the "Source evaluation without prompts" scale

Items 1, 7, and 13 are not included because they are familiarization items

Items 10, 12, 16, 17, 20, and 21 were not shown in the table because the factor loading value was less than .30

A trifactorial scale structure emerged from the EFA, explaining 50.76% of the total variance. Table 1 shows the factorial saturations of the SKI: all items showed values greater than 0.30 on the corresponding factor. After having analyzed the content of the items, a label was assigned to the three subscales: (1) "Source identification" consisting of 5 items which detect the students' ability to identify source characteristics in the text (e.g., authors' name, date of publication, journal/website of publication). This first factor included scores related to source identification skills and accounted for 24.77% of the whole common variance; (2) "Authors competence" consisting of 3 items that investigate the student's ability to evaluate the authors' competence. An example of text item concerns a science journalist talking about global warming versus the president of a tennis club talking about a nuclear plant. The second factor included scores related to ability to detect the author's competencies and accounted for 14.44% of the common variance; and (3) "Judgment on web site choice" consisting of 4 items that investigate the students' ability to decide on the use of one site over another to use in preparing his/her presentation/homework for school. The third factor included judgment on web site choice and accounted for 11.35% of the common variance.

The three subscales showed a moderate degree of internal consistency: Source identification (α =.64), Authors competence (α =.60), and Judgment on web site choice (α =.61). Based on Taber (2018), these coefficients indicate from moderate to adequate reliability.

Table 2 Hierarchical regression (dependent variable: intertextual integration skills)

		β	R^2	ΔR^2
Step 1	Prior beliefs	.11	.21*	
	Prior knowledge	.33*		
	Comprehension text	.20		
Step 2	Prior beliefs	.09	.39*	.18*
	Prior knowledge	.16		
	Comprehension text	.16		
	Source identification[1]	.23		
	Authors competence[1]	.31*		
	Judgment on web site choice[1]	.14		

β values indicate the standardized regression weights; *p < .05; [1]resulting EFA factors

Associations between sourcing and intertextual integration

Table 2 shows the results of the hierarchical regression. Individual control variables were entered in model 1, and independent sourcing ability variables were entered in model 2.

In model 1, only prior knowledge accounted for significant variations in intertextual integration skills, $R^2 = .21$, $F(3, 37) = 3.30$, $p = .031$. In model 2, only the authors' competence factor accounted for significant variations in intertextual integration skills ($R^2 = .39$, $F(3, 34) = 3.32$, $p = .031$). The change in R-square from model 1 to model 2 was .18, which reflects a significant increase in the explained variance ($R^2 = .39$, $F(3, 34) = 3.32$, $p = .031$). In line with Preacher & Hayes (2008), bootstrapping results showed that the effect of authors' competence search skills on intertextual integration skills was significant (.01; .10), since zero was not included in the 95 % confidence interval.

Discussion

The main aim of this study was to test the impact of lower secondary school students' sourcing skills on their intertextual integration skills in the context of multiple texts. Specifically, the study aimed to examine which sourcing factor is more strongly associated with students' intertextual integration skills. This study contributes to analyzing sourcing and intertextual integration skills in the context of multiple-document comprehension in lower secondary school students, a population that has received less attention by prior studies. The three measures of sourcing skills identified in the exploratory factor analysis of Potocki et al.'s (2019) Source Knowledge Inventory were the following: (1) "Source identification", (2) "Authors' competence", and (3) "Judgment on web site choice."

In terms of involved psychological process, prior studies suggest that sourcing is a multi-componential construct. As suggested by Bråten et al. (2017), readers need (1) attention to source information, that includes analyses of navigation patterns (e.g., Stadtler et al., 2015), eye-tracking data (e.g., Braasch et al., 2012), think-aloud protocols (e.g., Barzilai et al., 2015); (2) source evaluation, that includes the evaluation of sources such as trustworthiness, expertise, pertinence, usefulness, or benevolence (e.g., Braasch et al., 2013; Rouet et al., 1996); and (3) use of source information, indirectly assessed by judgment of

web-site, which assesses intention to use sources. However, research has mostly focused on one component at the time (e.g., Braasch et al., 2013). In this study, we provided support to the existence of such components as independent factors. Of notice, according to our data, these three factors are unrelated to each other. This scenario is suboptimal: readers need to coherently integrate these processes to construct a source model, as indicated by the Documents Model framework discussed above (Perfetti et al., 1999).

As for educational implications, sourcing intervention needs to address each of these components through targeted activities. Intervention research is moving in this direction. For instance, Bråten et al. (2019) tested the efficacy of an intervention targeting sourcing skills when selecting, when reading, and when writing. Participants developed adaptive sourcing that enabled them to place more value on source information when selecting texts to work with multiple documents on different topics and in different situational contexts, for different purposes. Moreover, the SKI appears to be a tool with a validity across languages and as such it can be used to conducted cross-cultural comparison studies.

The internal consistency of the three subscales appears to be at least moderate, providing sufficient support for the reliability of the questionnaire in the Italian context. These factors partially corresponded to the ones identified in Potocki et al.'s study (2019). The first scale identified is totally in accordance with that proposed by Potocki and colleagues. However, the second and third scales report discordances. Indeed, the second scale of the instrument used in our study captured the authors' competence evaluation, but not their benevolence evaluation. The third scale captured the evaluation of site choice only, leaving out the explanation of the choice. These results suggest that more work is needed to create a comprehensive assessment of sourcing skills. Future studies should develop instruments built on multi-componential theories of sourcing, encompassing skills such as identification, evaluation, and use of source information (e.g., trustworthiness, benevolence, competence) to comprehend and integrate information across texts.

Identifying sources and judging the choice of a web site are crucial processes. Critical readers should detect source features to be used in the critical evaluation of its content, such as the author (including author credentials and affiliation), type of text (e.g., a textbook, a blog), place of publication, and date of creation (Britt & Aglinskas, 2002; Rouet et al., 1996). However, detecting the author's competence in a particular topic seems a particularly crucial skill for intertextual integration, over and above the contribution of relevant control variables (prior knowledge and prior beliefs). It involves the student's judgment of the author's domain-specific expertise (for instance, by considering a crime reporter a very reliable source for the topic of home violence).

In terms of involved psychological processes, that author's competence was significantly associated with intertextual integration suggests the involvement of relevance processing. While merely identifying source information or evaluating sources seems not to activate intertextual integration, reflecting on the competence of the authors may trigger a reflection on the extent to which information is consistent with the readers' needs and capacities (McCrudden & Schraw, 2007). The determination of text relevance is a key process fundamental to the Multiple-Document Task-based Relevance Assessment and Content Extraction (MD-TRACE; Rouet & Britt, 2011). Considering an author as competent on the topic may guide readers' attention to the issues discussed in the text, regardless of their own prior beliefs or prior knowledge. Strømsø et al. (2010) found that memory for sources is associated with intertextual comprehension. The present study extends this result in two different directions, by (1) suggesting that it is assessment of competence, more than awareness, that influences intertextual integration, and (2) attention to source information influences not only comprehension but also the implementation of intertextual integration

strategies. Thus, in line with Strømsø et al. (2010), we suggest that readers' interpretation of authors' competence facilitates the construction of a coherent representation of the texts' content.

As for educational implications, the fact that it is authors' competence that is mostly associated with intertextual integration suggests the importance of relevance processing involving not only skills but also goal awareness. According to the MD-TRACE model, the first step in understanding multiple texts is the construction of a task model, based on which the reader decides how to approach the task. More emphasis in educational practices should therefore be given to this step. As demonstrated by Schraw et al. (1993), a significant impact is that of relevance instructions on memory for text. Indeed, instruction should clarify what is the goal, based on which it is possible for the reader to assess whether or not the sources are relevant.

These results are in line with the literature. First, some studies have shown expert readers assess the author's competence and intentions as sourcing criteria (Britt et al., 1999), as well as other characteristics, such as whether the information is up to date (Pérez et al., 2018). In addition, this result supports the claim that younger students may also be disposed towards using expert sources, but only if they are able to identify them (e.g., Macedo-Rouet et al., 2013; Salmerón et al., 2016a).

That neither source identification nor judgment in site choice was found associated with the process of integrating multiple texts could be due, for example, to the fact that they are two more superficial sourcing skills. For example, source identification seems to be a preliminary activity rather than a critical thinking act. The judgment of site selection may not be critical unless there is underlying deeper knowledge about the other sourcing factors involved in the decision. However, this result is suboptimal because it suggests that these skills are not fully developed in this population. On the other hand, research confirms that they are related to integration skills. Based on the above mentioned Documents Model, Britt et al. (1999) suggest that when students form an overall representation of multiple texts, they do so by linking their integrated mental model with their intertextual model, with varying degrees of effectiveness. As indicated by the Intertext model of the Documents Model, without a representation of the nodes, readers are only able to create a mush model, that is, they merely integrate content as if it was source-less. Since students fail to label information according to its origin, they are unable to successfully determine the reliability of different information or satisfactorily reconcile conflicts or disagreements between texts read. Conversely, in the separate representations model, information is associated with its source of origin in the intertextual model, but integration is poor, so students fail to integrate the information presented in different texts in a meaningful way.

Limitations of the present study

Some limitations of the present study should be noted. Firstly, we were not able to replicate the factorial structure of the source knowledge inventory (Potocki et al., 2019). We did not detect some of the dimensions that Potocki and colleagues identified in their study, for example, author benevolence, which were left out in the regression analyses.

Another limitation might be the topic chosen to perform the task of intertextual integration. One aspect that has been identified as important among the characteristics of texts is familiarity with the topic. In fact, McCrudden et al. (2016) have already shown that familiarity with the topic influences the extent to which people consider source information. In

addition, Strømsø et al. (2010) investigated the association between topic interest and the comprehension of multiple texts. Indeed, there are indications that topic interest influences multiple-text comprehension as it induces readers to engage more and elaborate more deeply the written texts (Krapp, 1999; Schiefele, 1998, 1999), qualities that are often necessary when a reader seeks to integrate information from different sources. With this in mind, it would be desirable to further explore the association between sourcing and intertextual integration with high- versus low-interest topics.

Conclusion

The main conclusions of the present study are that (1) sourcing is a multi-componential skill; and (2) among sourcing skills in lower secondary school, authors' competence is particularly relevant in supporting intertextual integration. Of notice, the lack of an association between the other two sourcing factors (source identification and judgment on web site choice) and intertextual integration is concerning. Findings from previous studies suggest that prompting students to engage sourcing activities led to differences in processing multiple texts (List & Du, 2021). Paying attention to source information may induce readers to engage more with text content, critically evaluate information, and create a more integrated representation of the issue explored. Indeed, students' awareness of source information is associated with their comprehension of multiple texts even when reading about complex topics (e.g., Britt & Aglinskas, 2002).

Our findings could have implications in the educational context. In fact, they may be a basis for thinking about building targeted educational interventions to improve multiple-document comprehension skills in lower secondary school students. The results of previous studies (Kullberg et al., 2023) also suggest that students need guidance in intertextual integration. Many interventions separately enhance sourcing skills (Brante & Strømsø, 2018) and intertextual integration skills (Barzilai et al., 2018). It would be desirable to develop an integrated intervention that simultaneously scaffolds both skills.

Declarations

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Incognito, O., Tarchi, C., & Pinto, G. (2022). The association between school-level SES and emergent literacy in Italy (La relación entre el nivel socioeconómico a nivel de centro escolar y la alfabetización emergente en Italia). *Culture and Education, 34*(1), 102-139.

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Most relevant publications in the field of Psychology of Education:

Tarchi, C., & Mason, L. (2022). Learning across media in a second language. *European Journal of Psychology of Education, 1*-26.

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