

Multiple viewpoints increase students' attention to source features  
in social question and answer forum messages

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Social question & answer forums offer great learning opportunities, but students need to evaluate the credibility of answers to avoid being misled by untrustworthy sources. This critical evaluation may be beyond the capabilities of students from primary and secondary school. We conducted two studies to assess how students from primary, secondary and undergraduate education perceive and use two relevant credibility cues in forums: author's identity and evidence used to support his/her answer. Students didn't use these cues when they evaluated forums with a single answer (exp. 1), but they recommended more often answers from self-reported experts than from users under pseudonym when multiple sources discussed in the forum (exp. 2). This pattern of results suggested that multiple viewpoints increase students' attention to source features in forum messages. Experiment 2 also revealed that primary school students preferred personal experience as evidence in the messages, whereas undergraduate students preferred the inclusion of documentary sources. Thus, while children mimic the adult preference for expert sources in web forums, they treat source information in a rather superficial manner. To conclude, we outlined possible mechanisms to understand how credibility assessment evolves across educational levels, and discussed potential implications for the educational curriculum in information literacy.

In times of ubiquitous Internet access, social question & answer (SQA) forums have become a popular way to search for answers in any topic, from dining out to science & mathematics. It was recently estimated that Yahoo! Answers, one of the most visited SQA websites, has 250 million users worldwide and receives two questions and six new answers per second (Jeon & Rieh, 2013; Zhang & Deng, 2013). Many SQA users are students of different ages, including teenagers who are increasingly using social media as an information and communication tool (Madden et al., 2013). SQA is perceived as a fast and practical way to obtain answers on any question (Kim, Sin & Tsai, 2014; Shah & Kitzie, 2012; Zhang & Deng, 2013). However, since any user can say virtually anything about any topic in SQA, there is a great variability in terms of authors' expertise, message arguments and sources given to support the claims. Moreover, users have few cues on which to rely in order to assess information quality and credibility (Jeon & Rieh, 2013). A main concern is that answers may contain misinformation and inadequate advice, with potentially serious consequences especially when dealing with sensitive subjects such as health and sexual behaviors (Henderson, Rosser, Keogh, & Eccleston, 2012; Pelleg, Yom-Tov, & Maarek, 2012; Versteeg, Knopf, Posluszny, Vockell, & Britto, 2009). Thus, although SQA websites offer great opportunities for students, they also pose several challenges in terms of information processing.

How do students decide which answer is the best in a forum? How do they select recommendations? Do they really deeply elaborate on the forum messages to assess their reliability or are they mostly influenced by peripheral cues of credibility (cf. Petty & Cacioppo, 1981)? The goal of the present studies is to investigate the influence of two peripheral cues in students' decisions: author's identity (self-declared expert vs. user under pseudonym) and sources used to support his/her answer (external source vs. personal experience), in two different forum scenarios: one in which only one recommendation is provided (exp. 1), and another with multiple viewpoints (exp. 2).

In the next sections, we will review studies that investigated the main characteristics of SQA and its uses, the quality of answers provided in this type of service, and how users interpret author and message-content information in SQA. We will argue that most of the current studies present limitations for understanding users' interpretations and selection behavior, because they rely on self-declared data (surveys) and content analysis of real websites (where variables cannot be manipulated and controlled for). Moreover, only a few studies have

focused on children and teenagers, even though this population is becoming an intensive user of social media services and deserves more attention.

### **Social question & answering and its uses**

Social question & answer is a hybrid of traditional question and answering services such as library reference and ask-an-expert, and social media (Gazan, 2011). In SQA websites, users can post questions in natural language (e.g., “If I drink water and eat one meal a day, will I lose weight really fast?”) and get answers from other users. SQA share some characteristics with traditional question and answering services such as human intermediation, use of natural language for queries and provision of personalized answers (Jeon & Rieh, 2013). Unlike traditional services though, SQA allows anyone to answer any question, therefore answerers are not necessarily information professionals or domain experts (Oh, 2012).

People use SQA websites not only to obtain information, but also for conversation and socio-emotional support (Kim & Oh, 2009; Gazan, 2010; Raban, 2009). Kim and Oh (2009) categorized 465 comments made by askers on “best answers” in Yahoo! Answers and found that “socio-emotional value” was the most frequent category. Comments expressing socio-emotional value included statements of emotional support (e.g. “Your words really helped”), agreement (e.g., “Finally, someone who agrees with me”), and experience (e.g. “Thanks to the other person who posted the big list of symptoms”). Zhang and Deng (2013) conducted a survey with 1431 users of Yahoo! Answers and found that 69% of respondents considered SQA better than virtual reference library services for advice-seeking and opinion questions. Users appreciate SQA because it allows them to interact with “real people” in a fast and practical way. This quote from a college student illustrates the social value of SQA: “It feels a little more personal, like I’m actually talking to someone” (Jeon & Rieh, 2013, p. 6).

As in other social media, the content of SQA websites is user-generated and user-rated (Kim, 2010; Cheng, Liu, & Shieh, 2012; Jeon & Rieh, 2013). Several mechanisms exist for rating the answers in SQA websites. First, askers can select a “best answer” when at least one answer has been submitted to their question. When a “best answer” is selected the question is considered as resolved and is archived for consultation only. Second, users can rate answers with thumbs up/down or with stars ratings. As a result, answers are ordered as a function of their ratings (top-ranking answers appear first in the list). Third, users can leave comments to answers, or comments to comments, providing a more qualitative feedback on answer

quality. These mechanisms provide opportunities for “micro-collaborations” whose main characteristics are socialization and affective feedback among users (Gazan, 2010).

### **Answer quality in SQA websites**

Several studies have addressed the issue of answer quality in SQA websites. Two reviews of the literature concluded that answer quality in SQA is not worse than in virtual library reference and pay-per-answer services, but the authors also noted that some studies obtained conflicting results and used different methods to assess quality (Gazan, 2011; Shachaf, 2010).

Three studies on the quality of health advice provided to teenagers in SQA and other types of forums found that information quality in such forums is relatively poor (Henderson et al., 2012; Versteeg et al., 2009; Webber, 2014). One study of 64 websites and their related SQA found that the information is not precisely targeted at teenagers and many sites lack accuracy, relevance and expert provenance (Henderson et al., 2012). Another study of 317 forums (Versteeg et al., 2009) found that 42% of the messages shared a personal experience, but most of them were not medically appropriate (e.g., “Cocaine helps my asthma. I’ll snort a line and my breathing gets better.”). Moreover, 73% of the links provided in answers were commercial and/or not related to asthma. Finally, one study of a Q&A service on the topic of sexual assault with the participation of experts (social workers) and non-expert answerers, found that answers provided by non-experts lacked consistency, often failing to provide appropriate advice and resources (Webber, 2014). These studies suggest that SQA forums are not very reliable sources for health advice.

Other researchers investigated answer quality as related to the use of information sources by answerers (Bowler, Mattern, Jeng, Oh, & He, 2013; Oh, Oh & Shah, 2008; Savolainen, 2013). Oh et al. (2008) analyzed 5,391 sources cited in the source field of Yahoo! Answers’ answers in 2007. They found that the most frequent source category was “human sources” (56% of the answers), with “personal experience” (e.g. “Vegetarian for over 30 years”) and “professional background” (e.g., “French teacher since 1978”) as the most common types of source. Among 12 subjects of discussion, the three in which human sources were most used were: Home & Garden (71%), Society & Culture (62%) and Health (62%). The authors concluded that “in spite of the lack of familiarity, information seekers still preferred to obtain information from other human beings” (p. 9). A similar conclusion was proposed by Bowler et al. (2013) on the basis of a content analysis of 81 “best answers” about eating disorders in Yahoo! Answers. The authors found that askers prioritized answers which purported personal

experiences and emotional support, even for questions that asked factual information. According to the researchers, “the selection of answers based on personal experiences speaks to something else – a different understanding of what counts as evidence (...), [that is] evidence as interpreted by the patient” (p. 7). These studies show that the most frequent information sources in SQA are people’s personal experiences, a result that differs from Savolainen (2013), who found that external information sources were more frequently cited than personal experiences in answers about global warming in SQA websites. However, Savolainen’s study dealt with a controversial debate (global warming) in which the use of personal experiences is not as effective as the use of external sources to provide counter-arguments to previous answers, as the author acknowledges.

Altogether, these studies suggest that answers that cite the answerer’s personal experience and/or professional background as “information sources” tend to be perceived as good quality answers by users of SQA.

What seems clear from the studies reviewed is that the notion of information quality is complex, subjective and influenced by a number of variables, two of which are recurrent: the characteristics of the author/answerer, and the type of evidence/source provided in the message.

### **Cues to author credibility**

Answers in SQA websites come from authors with different degrees of competence in the topics of discussion, ranging from laypersons to domain experts, that may provide more or less credible advices. The question arises as to how users evaluate the credibility of an author. Do they take authors’ intentions into account? Do they use other cues, such as the fact that an author presents himself/herself as an expert? Do the use of these cues vary as a function of the education level of the reader?

Jeon and Rieh (2013, 2014) conducted a quasi-field study (journal writing, observations and interviews) with 20 undergraduates to understand what strategies students employ to determine credibility in Yahoo! Answers. They found that students valued authors’ firsthand experiences and opinions, as well as their attitude and engagement with the community. The mere fact of dedicating time to SQA was viewed as a positive sign of credibility and knowledge. Two participants stated that “the act of answering itself indicated that the person knew something and made an effort because that person spent time to write the answer” (p.

684). Other credibility cues cited by only a minority of participants were: having a picture in the personal profile and/or a “top contributor” badge. Most students found it difficult to assess the expertise of an author in SQA. They said they rely on the number of answers provided by the author on the same topic (by looking at their profile page), on self-declared expertise and how specific is the author in his/her answer.

Other studies with undergraduate students suggest that they are concerned by the credibility of SQA. Cheng et al. (2012) interviewed 41 undergraduates who were regular users of SQA, and students declared that the reliability of information providers were key issues when accepting advice from SQA.

One limitation of the studies cited above is that they are based on declarative data, not on users’ actual behavior. Although to the best of our knowledge no prior research has directly studied adults’ behavior in SQA, related studies have focused on their behavior in other types of web forums. Winter and Krämer (2012) found that university students rated as more credible and reread more often messages posted in a science blog by authors that self-reported being experts on the topic field than those posted by novice readers. In the same line, Casaló, Flavián, and Guinalú (2011) collected data from 456 adults using Spanish travel web sites. Perceived competence of the forum community was positively correlated with participants’ intentions to follow a particular advice from that forum. However, this effect was not replicated by Hu and Sundar (2010), who compared perceived credibility and behavioral intentions of two groups of undergraduate students after reading a health web forum including a single message from either an expert (e.g. Chris Park, MD) or a novice (e.g. “Chris Park” only, without using the “MD”). The between-group comparison failed to show a preference for a particular message. Note that in this case there was no real discussion in the web forum.

To what extent are these patterns observed in adults representative of youngsters’ behavior? To the best of our knowledge, no prior research has explored how students from primary and secondary education evaluate authors’ characteristics in SQA websites. Few related studies have explored how children and adolescents assess authorship from printed texts and web pages. Evidence from primary education students suggests that they can at least identify expert sources in texts. Macedo-Rouet et al. (2013) found that primary school students (grades 4th-5th) were for the most part able to recognize the most knowledgeable source (the “expert”) in short argumentative texts. However, the participants had more difficulty

justifying “why” he/she is most knowledgeable. The participants frequently used the content of what the author said or other irrelevant cues to justify expertise. This lack of a specialized knowledge about expertise may explain why children don’t show a strong trust on Internet web pages written by experts. This effect was reported by Eastin, Yang and Nathanson (2006), who found that after reading a web page about pets’ food 3rd to 5th grade students rated as less credible a version of the page that included explicitly the expert credentials of the author, as compared to a version without such information. The authors speculated that younger students may find a page more credible if they perceived it as coming “from the Internet” than if the page is perceived to be from an individual person.

A preference for expert information in on-line texts is apparently more salient in students from secondary education, although again evidence is scarce. Brem, Russell, and Weems (2001) requested secondary school students (grades 9th-12th) to evaluate the reliability of a set of web pages, including hoaxes, weak and strong scientific sites. Students reported on authors’ expert credentials to assess the credibility of the information, but they did so in a rather superficial manner. For example, just a minority of students questioned the credibility of the hoax pages (that claimed to be authored by expert scientists).

The above mentioned studies suggest that lay adult users are quite confident in the information provided by unknown authors in SQA. They rely on such cues as the number of answers an author has provided to the website and the author’s self-declared expertise and knowledge. Indeed, they tend to select more often recommendations coming from expert respondents than from laypersons. As for younger users, although research is scarce, there is evidence that children and adolescents can at least identify expert information. However, just relying on authors’ credentials is a rather superficial strategy, as it may be easily faked (as in the case of the hoax pages). We may expect, at least from older students, a more sophisticated approach to assess the quality of a recommendation, such as to evaluate the evidence included to support the claim (Britt & Aglinskias, 2002). The next section describes research on how users evaluate evidence in SQA, and how this may evolve from primary education to university.

### **Source use and the evaluation of evidence in SQA**

The message content, and specifically the evidence provided to support a recommendation, can play an important role in shaping students’ perceptions and interactions with SQA information. Bowler et al. (2013) reported that a high percentage of responses to requests in



SQA belong to two categories: evidence in form of an external source (e.g. ‘I read that claim in the class textbook’) and evidence as a personal experience (e.g. ‘I’ve had the same problem before’). Below we review to what extent the perception of SQA information may be related to students’ educational level.

Previous literature doesn’t provide a clear picture about adult’s preferences for claims in forums. On the one hand, some studies conducted in web forums suggest that descriptions of a personal experience with an issue have a greater influence on adults’ perceptions on a topic than a statistical description of the same issue. In this line, Betsch, Ulshöfer, Renkewitz, and Betsch (2011) asked undergraduate students to read a web forum that included messages posting statistical information and single case experiences about the occurrence and nonoccurrence of adverse events with vaccines. The number of experiences in the forum reporting problems with vaccines increased participants’ risk perception and reduced intentions to vaccinate. This increment was higher than that produced by changing the incidence rate in statistical information about reported problems with vaccines from 20% to 40%, which nevertheless also increased risk perception. In the same line, Peter, Rossmann and Keyling (2014) requested adults from the general public (requested to participate by e-mail and through social network sites) to read a discussion forum on a Facebook page. Two versions of the forum were constructed: in the pro-vaccination version four out of five messages described single experiences favoring vaccination and only one was against it, whereas in the contra-vaccination version this ratio was reversed. Participants with positive views towards Facebook discussions reported a higher intention to get flu vaccination when posts reported mainly pro vaccination cases, as compared to when posts were mostly against vaccination.

On the other hand, two studies contradict the previous findings on users’ preference for personal experiences. In the study cited above, Savolainen (2013) analyzed 100 threads on global warming from Yahoo! Answers and found that most of the answers used external sources as arguments to question the validity of other answers or challenge background assumptions. The author noted that messages reflected a “persuasive citation behavior” in which users favored authoritative sources such as reports published by top-level research organizations, which could be used as strong evidence in the argumentation. Personal experiences and beliefs were considered as less effective in this context. Similar results were found by Gazan (2006) who analyzed the ratings of 9.953 answers from “specialists” (self-declared experts with personal experience on the topic) and “synthesists” (those who make

explicit reference to other sources of information to support their answers) in the SQA Answerbag.com. He found that answers from synthesists were rated more positively than those of specialists. However, in some topics (parenting, divorce, criminal law, taxes, mormon religion and relationships) the answers from specialists were preferred to those of synthesists. These studies suggest that the use and preference for personal experience vs. external sources may be influenced by the topic of discussion, and possibly by the profile of users of such forums.

The few studies that analyzed children and adolescents suggest that they may prefer a recommendation based on the author's first-hand experience. The previously discussed study by Bowler et al. (2013) analyzed the best answers in a forum for teenagers. Data indicated that 47% of the best answers referred to personal experience (e.g. living with a person with an eating disorder, knowing somebody with a similar problem...) and only 17% to an external source (e.g. book, website). Similarly, Versteeg et al. (2009) found that the highest proportion of asthma-related posts in adolescent web forums "shared a personal story" (42% of the posts), typically about diagnoses, triggers, problems and experiences. Data on the exact age of the users was not available on those two studies, therefore we can't know if this pattern of results is more representative of primary, secondary or university students.

Children and adolescents' selections may also depend on the type of query that motivates their search. According to Gross' (1995) theoretical model of information seeking, a query can be either self-generated (e.g. a personal question) or imposed (e.g. a school assignment). When the query is imposed to the user, the standards for source selection are given by others (teachers, librarians, parents...). Primary school students are generally assigned search topics or even specific queries prior to conducting information search. They may also receive specific guidelines as to how to select information, for instance based on source characteristics (Gross, 1999, 2001). Gross (1999) argues that queries can be better understood when appropriate context and guidance are provided to children. Secondary school students may have more choice over the query content, but they still work under imposed school assignments and they are also likely to receive source standards to which they must adhere (Mardis, 2009). In answering imposed queries, young questioners look for answers to specific content-related questions (Mardis, 2009) and seek help in locating resources in the local library (Mon, 2009). On the contrary, self-generated queries allow the searcher to decide on the relevance of information provided (Gross & Saxton, 2002).

Since children and adolescents increasingly use a combination of Web-based services to search for information including for school purposes (Bilal, 2012; Mardis, 2009), imposed and self-generated questions probably co-occur in SQA forums. Indeed, Gazan (2007) has found evidence that some students just post their homework in SQA forums in the hope that they will obtain ready-made answers. These questions tend to be rejected by experienced answerers, as shown by Gazan, but other questions from students perceived as “seekers” not “sloths” do get answers from the forum. Unfortunately, Gazan’s study does report how students judge the relevance of these answers. There is a need to understand how the different types of query influence children and adolescents’ choice of “best answers” in SQA.

In sum, students vary in their perception of what constitutes good evidence to justify claims. While some students may favor personal testimonials as evidence, other students prioritize a justification that includes support from additional sources of knowledge. Research suggests that adults have no clear preference for claims in SQA forum and that teenagers tend to prefer personal experiences at least in contexts of self-generated queries. However, these conclusions require further evidence because studies with young students are lacking, and research with adults has focused mainly on health issues.

### **Rationale for the present study**

Prior research suggests that adult users of SQA (typically undergraduate university students) favor messages authored by self-declared experts (Casaló et al., 2011; Jeon & Rieh, 2013; Winter & Krämer, 2012). In addition, research shows that adult users tend to value messages that report personal experiences (Betsch et al., 2011; Jeon & Rieh, 2013; Peter et al., 2014) and to some extent those that include external sources (Gazan, 2006; Savolainen, 2013).

An open question is to what extent younger students may use those cues as well to assess the credibility of sources in SQA forums. Unfortunately, while the development of the ability to critically use sources across childhood and adolescence has been extensively studied in the context of face to face interactions (for reviews see Harris, 2012; Mills, 2013), it has been scarce in the context of reading. For this reason, we took an exploratory approach to study the use of source cues in SQA by adolescents. Based on evidence from related studies looking at different on-line scenarios, we expected that students from last years of primary and secondary education follow the recommendations by experts or by external sources more often, because they are already able to discriminate expert sources in texts (Brem et al., 2001; Macedo-Rouet et al., 2013). But we didn’t expect that young students value more messages

including external sources, because they tend to assess sources in a rather superficial way, e.g. they have difficulties explaining why a text from an expert author is generally credible (Brem et al., 2001; Macedo-Rouet et al., 2013).

In contrast, we expected undergraduate students to display a more balanced approach, valuing messages that are authored by an expert, but also messages that cite external sources, because such citations are a sign of credible argumentation (Savolainen, 2013) and allow readers to corroborate the authors' claims (cf. Britt & Aglinskias, 2002; Bromme, Thomm & Wolf, 2015).

To explore those hypotheses we run two controlled experiments with students from primary education (10-12 years-old), secondary education (13-15 years old) or university (18-19 years old). Students interacted with several forums about daily life topics, in which a user requested information to solve a problem and additional users provided answers, that varied in terms of authorship (self-reported expert or user under pseudonym) and on evidence provided (external source or personal experience). Participants judged to what extent the user requesting information should follow a single advice (experiment 1) or to what extent he/she should follow a particular advice over another (experiment 2), and provided reasons for their judgments.

## **Experiment 1**

### **Method**

**Participants.** 137 students participated in experiment 1 (see Table 1). Participants from primary and secondary education were from four intact classrooms from a school located in the region of Valencia (Spain). Undergraduates were students from the school of Education of the University of Valencia. For the analyses, we grouped participants in their corresponding educational levels according to the Spanish system: primary school (5-6 grades), secondary school (8-9 grades), and undergraduates.

The school and children were recruited to participate under a specific agreement of collaboration between principals, regional educational authorities and the research team. The study was part of a larger assessment program, which included tests of reading speed and text comprehension. Schools received individualized reports of students' performance, together with recommendations for improving literacy. Students' data was collected using school generated IDs, and therefore it was anonymous for the researchers. The results didn't have

any impact on schools' scores or future budget. Undergraduate students volunteered for class credit.

The participating school was located in a middle class neighborhood of the metropolitan area of Valencia. All children had computers with Internet access at home. On average, they had ample prior experience using computers (Primary education: 4.8 years,  $SD = 1.1$ ; Secondary education:  $M=7.6$ ,  $SD = 1.6$ ). While most students used the Internet for various purposes 'once or twice a week' (Primary) and 'almost every day' (Secondary), they only used Web forums 'once a month or less' (Primary and Secondary).

*Table 1. Descriptive statistics for the participants of experiment 1*

	Primary	Secondary	University
N	50	41	46
Age	10.9 (0.7)	14.3 (1.1)	20.5 (3.5)
Female	58%	45.5%	86.9%

## **Materials.**

**SQA forums.** We developed four short scenarios (125-161 words) dealing with different daily life topics from real web forums for youngsters publicly available on the Internet. We selected topics on four different categories: health ('I can't speak in public, help'), sports ('Skiing in Andorra, which equipment?'), gardening ('Replant a Christmas tree in my garden'), and pets ('I depart on vacation... What should I do with my pet?') The topics were familiar for children and adolescents from the region.


The forums followed a similar structure: first, a user requested advice on a particular issue, and explicitly questioned the audience to address a particular solution to his/her problem. Then, one message followed that proposed an alternative solution. Across forums, advices varied on authorship: they were written either by a self-reported expert on the field (i.e. professions with a close connection to the topic: doctor, sky monitor, gardener, veterinarian), or by a user under pseudonym (e.g. 'Qwerty'). Advices also varied in regards to the evidence provided to justify a claim: advices either included an external source (e.g. 'I recommend you to follow the advice of the General Hospital website: breathe slowly and deeply before speaking'), or they mentioned a personal successful experience (e.g. 'When I was a student I

also had to cope with these fears. I advise you to do what I used to do to then: take something in your hand while you speak’.

Figure 1. Screenshot of a forum used in experiment 1.

[Responder a la pregunta](#)

## Foro Jóvenes (2/4)

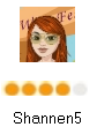


**Esquiar en Andorra: ¿qué material?**

Hola, ¿qué tal? Bueno, en vacaciones me voy a esquiar a Andorra durante 10 días, y me pregunto, al ser yo de Canarias, como es normal no tengo nada para esquiar y eso... Me han dicho que puedo alquilar los esquís y las botas... pero, ¿y la ropa, se puede alquilar? ¿O sería mejor comprármelo todo? Pienso que podría alquilar los materiales para evitar los costes de cargar con el material en el avión. Pero no lo tengo nada claro.

Publicado: Mie 29 Sep 18:45

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Hola Betrix82. Muchos se hacen esa pregunta la primera vez que van a la nieve. En un artículo reciente de la página web más importante de esquí los expertos del tema han discutido el tema. Ellos recomiendan lo siguiente: comprar en los centros comerciales que ofrecen material económico. Además, la web te ofrece una comparación de precios de tiendas que ofrecen material económico, tanto de esquís como de snowboards.

Fuente(s): Web 'Guía de Material y Equipo para Esquiar'

Publicado: Jue 30 Sep 13:10

In order to avoid confounding the actual advice and the experimental manipulations, across participants a particular piece of advice was provided approximately 50% of the times by the self-reported expert and 50% by the user under pseudonym. Similarly, a particular advice was used 50% of the times in the external source message, and 50% in the personal experience message.

**Reading prompt.** To ensure that students would read the forum before evaluating the recommendation we asked them to answer to following question: “Which of the following statements corresponds to [name of the author] advice?” Students could revisit the forum while answering the question.

**Recommendation task.** In this task, students had to answer the question ‘Do you think [the user] should follow the recommendation from the forum’, in a 4 point likert scale from ‘I really think he/she should follow it’ to ‘I really think he/she should not follow it’

**Explanation for recommendation task.** In this task, students had to provide reasons for their judgment of the recommendation given to the imaginary user requesting information.

Specifically, the instructions read: “Write a short message to [the user] to explain your reasons why she should follow or not the recommendation from the forum”.

## Procedure

The study took place in the school/university computer lab during a session of approximately 35-45’. First, students practiced with a forum that followed the same structure of the experimental ones. They performed the same kind of tasks as those required in the experimental forums. During the practice forum the research assistants responded to questions regarding the procedure, until students felt confident with the task. Then, students interacted with each of the four experimental forums, where they first answered the reading prompts, then they performed the recommendation task, and finally they wrote an explanation for their recommendation.

## Results

### Recommendations across educational levels

We run a mixed ANOVA with author (self-reported expert or user under pseudonym) and evidence (external source or personal experience) as within-subject variables, and group (primary, secondary and undergraduate students) as a between-group variable, and students’ ratings in the recommendation task as dependent variable (see Table 2). Contrary to our expectations, none of the main effects or the interactions were significant (all main effects  $F_s < .33$ ; all interactions  $F_s < 1.65$ ).

Table 2. Mean recommendation ratings with standard deviations (in brackets).

	Self-reported expert		User under pseudonym	
	Uses external source	Uses personal experience	Uses external source	Uses personal experience
Primary	2.12 (.68)	2.22 (.73)	2.12 (.68)	2.18 (.82)
Secondary	2.26 (.77)	2.07 (.91)	2.24 (.62)	2.07 (.64)
University	2.17 (.82)	2.02 (.77)	2.04 (.72)	2.19 (.75)

Note. Scale used for the recommendation ratings: ‘I really think he/she should follow it = 3’, ‘I think he/she should follow it = 2’, ‘I think he/she should not follow it = 1’, and ‘I really think he/she should not follow it = 0’

### Explanations for recommendations’ ratings

For each condition we classified students' responses according to the explanation provided to support their judgment following this rubric: a) only contained students' own opinion different from that of the messages in the forum, b) only mentioned the content of the forum advice, or c) included content and source attributes, such as authority, experience or use of external sources (Table 3). Two raters coded the responses of 21 students, obtaining good inter-rater agreement (Cohen's Kappa = 0.88). After resolving disagreements, the remaining data was coded by one of the raters. First, we analyzed students' responses in the different conditions including participants from the three educational levels. Responses that only mentioned the content of the selected message were more frequent as compared to the other types of justifications in all conditions: self-reported expert & external source (SRE-ES),  $\chi^2(2)= 129.06, p < .001$ , user under pseudonym & external source (UUP-ES),  $\chi^2(2)= 120.55, p < .001$ , self-reported expert & personal experience (SRE-PE),  $\chi^2(2)= 140.08, p < .001$ , and user under pseudonym & personal experience (UUP-PE),  $\chi^2(2)= 134.43, p < .001$  (see Table 3). Indeed, across conditions and educational levels, students seldom included source attributes ( $M = 5.50\%$ ,  $SD = 3.51\%$ ). Next, we analyzed the extent to which students' justifications in their responses varied across educational levels. There were group differences in the percentage of responses that only mentioned participants' opinion in the conditions: SRE-ES,  $\chi^2(2)= 12.97, p = .002$ , and UUP-ES,  $\chi^2(2)= 12.23, p = .002$ , but not in the SRE-PE,  $\chi^2(2)= 5.43, p = .066$ , or UUP-PE,  $\chi^2(2) < 1$ . Results indicated that when the forum message included an external source, students from primary education justified their recommendation ratings to a higher degree based on their own opinion than the other two educational groups, which did not differ from each other. Conversely, there were group differences in the percentage of responses that only mentioned content in the condition SRE-ES,  $\chi^2(2)= 6.42, p = .002$ , although no significant differences were found in the other conditions (UUP-ES,  $\chi^2(2)= 5.21, p = .074$ , SRE-PE,  $\chi^2(2)= 2.34, p = .31$ , UUP-PE  $\chi^2(2) < 1$ ). Results suggest a trend towards a higher inclusion of justifications based just on content for undergraduate students than for primary school students. Finally, due to the low percentages of justifications that included both content and source attributes, we refrained from testing group differences on this variable.

*Table 3.* Percentage of different types of justifications included in students' responses (only opinion, only content, or content and source attributes), as a function of condition and educational level



	Self-reported expert – Uses external source			User under pseudonym - Uses external source		
	Only opinion	Only content	Content and source	Only opinion	Only content	Content and source
Primary	30.00	68.00	2.00	30.00	66.00	4.00
Secondary	13.63	77.27	9.09	11.36	79.54	9.09
University	4.25	89.36	6.38	6.38	85.10	8.51

	Self-reported expert – Uses personal experience			User under pseudonym - Uses personal experience		
	Only opinion	Only content	Content and source	Only opinion	Only content	Content and source
Primary	20.00	78.00	2.00	24.00	76.00	0.0
Secondary	15.90	75	9.09	20.45	77.27	2.27
University	4.25	87.23	8.51	17.02	80.85	2.12

### **Conclusions**

Results from experiment 1 indicated that students, regardless of their educational levels, tend to accept and endorse or to reject single advices in forums independently of the author or evidence provided. Justification data suggest that students most often focused on the content of the message, and tended to ignore source attributes in their reasons to follow or not to follow an advice. Finally, younger students from primary education include more often only their personal opinion in their justification than older students, while the reverse holds true for the use of content to justify a recommendation. We observed these patterns when authors of the forum messages used an external source.

Results do not support or expectation that students will endorse more often messages from expert authors (Casaló et al., 2011; Jeon & Rieh, 2013; Winter & Krämer, 2012). Participants do not seem to use the different source cues present in the forums, as indicated by their same level of agreement on the advices, no matter the author or evidence provided, and by their rather scarce use of source attributes in their justifications. This lack of effect is similar to that found by Hu and Sundar (2010), that report that participants don't show any sign of preference for expert messages in a forum that only provided a single advice.

A potential explanation for the lack of effects of source cues on participants' recommendations is that participants may have perceived the fact that only one person responded to the forum as a sign of high benevolence (cf. Jeon & Rieh, 2013). This fact would have prevented them from critically using some of the source attributes available in the scenario (such as author or evidence used) when judging the advice. The lack of source effects is in line of the Discrepancy-Induced Source Comprehension effect (Braasch, Rouet, Vibert, & Britt, 2012), that predicts that students look more often to sources' descriptions in texts and include more source attributes in a summary task when there are multiple sources providing discrepant views about an event, than when sources provide coherent views. Building on these results, we hypothesized that including multiple sources with discrepant recommendations in the forum would prompt students to use source attributes to judge the messages. Experiment 2 examined this possibility.

## **Experiment 2**

### **Method**

**Participants.** 277 students participated in the experiment (see Table 4). Participants from primary and secondary education belonged to eleven intact classrooms from three schools located in the region of Valencia (Spain). Undergraduates were students from the school of Education of the University of Valencia. We grouped participants in their corresponding educational levels according to the Spanish system: primary school (5-6 grades), secondary school (7-8 grades), and undergraduates.

Participation of schools and students followed the same procedure described in experiment 1. Two of the schools were located in middle class neighborhoods located at the metropolitan area of Valencia, while a third one was located in a rural area of the region. Most children had computers (96%) with Internet access (91%) at home. They had prior experience using computers (Primary education: 4.4 years, SD = 2.4; Secondary education: M=7.7, SD = 1.9). As in experiment 1, a majority of students used the Internet 'once or twice a week' (Primary) and 'almost every day' (Secondary), but only used Web forums 'once a month or less'.

*Table 4. Descriptive statistics for the participants of experiment 2*

	Primary	Secondary	University
N	136	97	44

Age	11 (0.7)	13.3 (0.9)	18.9 (3.3)
Female	44.4%	48.8%	68.2%


**Materials.**

**Internet SQA forums.** We used a modified version of the scenarios used in experiment 1 (256-306 words). Specifically, we added two more responses to the request for advice. New forums had the following structure: first, a user requested advice in a particular issue. Then, two messages followed that proposed conflicting advices: one from a self-reported expert on the field, and another from a user under pseudonym. One of the advices included an external source and the other mentioned a personal successful experience. Finally, a third user under pseudonym wrote a supportive message, without providing any advice.

Figure 2. Screenshot of a forum used in experiment 2.

Responder a la pregunta

### Foro Jóvenes (1/4)




Andro88

**No puedo hablar ante público. ayuda**

¡Hola! Me considero un chico normal. No soy introvertido ni mucho menos... El problema que tengo es que me pongo súper nervioso si tengo que hablar ante mucha gente. Cuando tengo que exponer en clase me pongo a temblar, no me salen las palabras, el corazón me late a cien por hora. ¡es una pesadilla! Me gustaría que me contarais si a vosotros os pasa igual y qué hacéis en estos casos.

Publicado: Mar 15 Oct 15:44

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Dixie\_XV

Estimado Andro88. En el Hospital te dirán que es fácil aprender a lidiar con estos miedos. Te aconsejo que sigas la recomendación de la web del Hospital General para hablar en público: lo mejor es dedicar un minuto a respirar lenta y profundamente antes de hablar. Ya verás como esto te ayuda a relajar tu cuerpo y tu mente.

Publicado: Mie 16 Oct 10:31

Fuente(s): Web del Hospital General

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Dr. Sanz (Médico general)

Hola Andro88. Al empezar mis estudios también me pasaba lo mismo, y verás que tiene solución. Hablar en público es algo que nos acompaña toda la vida. A mí lo que me funcionó bien para combatir este problema fue llevar algo en las manos mientras expones, como un bolígrafo o algo similar. Eso te ayudará a centrar tu atención en ese objeto y no en tus nervios.

Publicado: Mar 15 Oct 23:12

Fuente(s): Mi propia experiencia

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di90

¡Hola Andro88! Siento mucho que tengas este problema. Quería escribirte un mensaje de ánimo y desearte que soluciones tu problema cuanto antes. ¡Seguro que lo consigues!

Publicado: Mar 15 Oct 20:44

Fuente(s):

In the “redundant” condition, the self-reported expert advised using an external source, whereas the user under pseudonym mentioned a personal experience. In other words, both the expert status and the external source were combined in a unique recommendation, while the

alternative recommendation did not include any sign of expertise. In the “competing” condition, the self-reported expert advised using a personal experience, and the user under pseudonym recommended using an external source. Thus, in this condition the credibility cues are not redundant, because they are present in both pieces of advice: author expertise supports one advice, whereas use of an external source supports the other. Students interacted with two forums in each condition. Finally, in order to avoid a confounding between the actual advice and the experimental manipulations, across participants advices were counterbalanced across experimental conditions.

**Message selection task.** In this task, students had to specify ‘which recommendation do you think should follow [the user requesting information]?’ from a list of the three names of the respondents, and a four option ‘none of the three’.

**Explanation for message selection task.** In this task, students had to provide reasons for their source decision to the imaginary user requesting information. Specifically, the instructions read: “[User] just wrote a new message, that says: ‘It’s great to have many and different recommendations! I can’t decide for myself. Please, could somebody that didn’t participate yet tell me which recommendation from the forum should I follow and why? Thanks!’ Help [the user] to make a decision by indicating which opinion from the forum she should follow and why.”

## **Procedure**

Except for the message selection and explanation tasks described above, the procedure was identical to that of experiment 1.

## **Results**

### **Message selection across educational levels**

In each condition, we computed students’ responses in the message selection task. Selections of the self-reported expert and the user under pseudonym accounted for a majority of selections (92.95%). Due to the low percentages, we collapsed the responses to the third user providing a supportive message –but not an actual recommendation–, and those to the category ‘none of the three’, into a single, ‘other’ category.

First, we analyzed participants’ source selections at each educational level as a function of condition (redundant and competing) (Table 5). To do so we performed Wilcoxon paired-

comparisons for each group both within and between conditions. Students from the primary education group selected more often the recommendations from the self-reported expert than those of the user under pseudonym, regardless of the evidence used by the self-reported expert (redundant:  $z = -2.65, p = .008$ ; competing:  $z = -4.38, p < .001$ ). In addition, students selected more often the recommendation from the self-reported expert when they were based on the authors' personal experience than when he/she used an external source,  $z = -2.04, p = .041$ . The selection of the message from the user under pseudonym did not vary as a function of evidence used ( $z < 1$ ).

*Table 5.* Percentage of students' message selection (self-reported expert, user under pseudonym, or other), as a function of condition and educational level

	Redundant (self-reported expert mentions an external source)			Competing (self-reported expert mentions personal experience)		
	Self-reported expert	User under pseudonym	Other	Self-reported expert	User under pseudonym	Other
Primary	52.6	36.4	11.0	60.7	32.7	6.6
Secondary	55.7	37.1	7.2	57.7	35.1	7.2
University	65.9	30.7	3.4	51.1	42.0	6.8

Students from the secondary education group also selected more often the recommendations from the self-reported expert, both when he/she included an external source ( $z = -2.70, p = .007$ ) and when he/she included a personal experience ( $z = -3.32, p < .001$ ). In addition, contrary to the group of primary education students, their selection of the self-reported expert or the user with a random username did not depend on the evidence used in the messages (both  $z < 1$ ).

Finally, undergraduate students endorsed more often the recommendations from the self-reported expert than those from the user under pseudonym, only in the forums in which the self-reported expert used an external source ( $z = -3.47, p < .001$ ), but not when he/she mentioned her personal experience ( $z < 1$ ). Additionally, the selection of the message from the self-reported expert was higher when he/she used an external source than when he/she mentioned a personal experience ( $z = -2.01, p = .045$ ). Note that this is the opposite pattern than that found for the group of primary education students. The selection of the message from the user under pseudonym did not vary as a function of the evidence used ( $z = -1.54, p = .123$ ).

Second, we analyzed potential variations of message selection as a function of educational level. To this aim, we computed separated Kruskal–Wallis one-way analysis of variance using educational level as ranks, for each type of message and condition. Results revealed that message selection did not vary significantly across educational levels in any of the conditions. There was only a non-significant trend in the redundant condition, showing that university students tended to select the message from the self-reported expert to a higher extent than students from primary and secondary education,  $\chi^2(2)= 4.68, p = .096$ . No other significant differences were observed (all  $ps > .2$ ).

### Explanations for message selection

As in experiment 1, we classified students’ explanations in just opinion, just message content, or content and source attributes (Table 6). Two raters coded the responses of 30 participants (Cohen's Kappa = 0.79). After resolving disagreements, the remaining data was coded by one or the raters. Across conditions and educational levels, students included a higher number of source attributes (as compared to experiment 1) with a great variability within participants ( $M = 14.13\%, SD = 27.64\%$ ).

We first analyzed students’ responses in both conditions including participants from the three educational levels. Responses that only mentioned the content of the selected message were more frequent both in the redundant,  $\chi^2(2)= 186.83, p < .001$ ; and competing condition,  $\chi^2(2)= 241.87, p < .001$ , as compared to the other types of justifications. Next, we analyzed the extent to which students’ justifications in their responses varied across educational levels. There were no group differences in the percentage of responses that only mentioned the content of the selected message (both  $\chi^2 < 1.2$ ), but there were significant differences on the other two types of justification. Specifically, undergraduate students included less personal opinions on their justifications, both in the redundant,  $\chi^2(2)= 13.07, p < .001$ , and competing condition,  $\chi^2(2)= 11.23, p < .01$ , than the other groups. Conversely, undergraduate students included more sources attributes in their responses than the other groups, both in the redundant,  $\chi^2(2)= 12.93, p < .01$ , and competing condition,  $\chi^2(2)= 25.83, p < .01$ .

Table 6. Percentage of different types of justifications included in students’ responses (only opinion, only content, or content and source attributes), as a function of condition and educational level

	Redundant (self-reported expert	Competing (self-reported expert
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	mentions an external source)			mentions personal experience)		
	Only opinion	Only content	Content and source	Only opinion	Only content	Content and source
Primary	23.16	65.07	11.76	19.49	70.96	9.56
Secondary	19.07	68.04	12.89	14.95	71.65	13.4
University	3.41	70.45	26.14	3.41	67.05	31.82

Next, to further explore the use of source attributes as justifications for students' message selection, we analyzed to what extent those justifications varied as a function of students' message selection (either the self-reported expert or the user under pseudonym). Including responses from both conditions and participants from the three educational levels revealed that the inclusion of source attributes in the justification varied as a function of the message selected,  $\chi^2(2) = 11.03, p = .01$  (Table 7). Specifically, students included source attributes in their responses more often when they selected the message from the self-reported expert than when they selected the message from the user under pseudonym, in both the redundant ( $z = -2.29, p = .02$ ) and competing ( $z = -2.38, p = .01$ ) conditions. By educational level, this difference was consistent in the three groups analyzed. Nevertheless, the effect was significant for primary school students ( $\chi^2(1) = 6.58, p = .01$ ), but there was just a non-significant trend for secondary ( $\chi^2(1) = 2.42, p = .12$ ), and university students ( $\chi^2(1) = 2.70, p = .1$ ).

Table 7. Percentage of students' responses that included source attributes as justification, as a function of students' message selection, condition and educational level

	Redundant (self-reported expert mentions an external source)		Competing (self-reported expert mentions personal experience)	
	Selected self-reported expert	Selected user under pseudonym	Selected self-reported expert	Selected user under pseudonym
Primary	15.44	9.18	13.69	4.44
Secondary	15.04	9.72	16.38	10.29
University	31.03	18.52	33.33	21.62

## Conclusions

Results from experiment 2 indicate that when SQA forums include at least two alternative answers, students from primary, secondary and undergraduate education selectively analyzed the source characteristics to make a decision about what to recommend. Specifically, data

from the message selection task indicated that participants recommended more often the message from self-reported experts than alternative messages from users under pseudonym. This result supports the claim that even young students may prefer expert information provided that they are able to identify expert sources in written discourse (e.g. Macedo-Rouet et al., 2013).

This pattern was qualified by a developmental shift regarding the type of evidence valued by students in self-reported experts' messages. Students from primary school preferred expert messages that reported a personal experience as compared to experts who cited an external source. Students from secondary school did not prefer a particular type of evidence but selected the expert author more often than the user under pseudonym. Undergraduates valued more expert authors that included an external source as compared to expert authors that included a personal. Overall, this pattern suggested that forum users don't treat author information and evidence as separated pieces, but they combine that information to judge the answer. This combination varies across formal education, during which students develop a preference from less reliable evidence (i.e. first-hand experience) to more reliable ones (i.e. documentary sources; Britt & Aglinskis, 2002; Bromme et al., 2015).

Finally, data from students' explanations evidenced that they tended to justify their message selection mostly on the basis of the message content, and they used to a lesser extent their opinion or sources' attributes. This pattern aroused in the three educational levels and in both forum conditions. Across educational levels, undergraduate students included more often than younger students source attributes and less often their opinion to justify their message selection. Finally, participants tended to refer more often to source attributes in their explanations when they had selected a message from a self-reported expert, than when they had selected the message from a user under pseudonym.

### **General conclusions**

In two experiments, we assessed primary, secondary and college students' evaluation of recommendations in SQA forums. Experiment 1 featured a single piece of advice per topic, whereas in experiment 2 students had to choose between three pieces of advice. In experiment 1, students' assessment of the quality of the recommendations was unrelated to source features, whereas in experiment 2, students appeared to favor recommendations issued by self-described experts over those by contributors with no explicit credential. In addition,



across educational levels students' preference shifted from recommendations backed by personal experience to those supported by external references.

In this section, we discuss how the use of source characteristics is related to the degree of discussion present in the forum. Next, we interpret our results in light of the “source awareness assumption” and the “social awareness of information purposes assumption” (Britt & Rouet, 2012), and provide some potential explanations for the development of source competencies across primary and secondary school. Finally, we suggest some perspectives for future research.

### **Use of source attributes and level of forum discussion**

Experiments 1 and 2 showed contrasted pictures regarding how students use source attributes in SQA forums. While the first study shows no students' preference for source attributes (author or message evidence), experiment 2 reveals that students at different educational levels prefer messages from a particular combination of author and evidence. A reason for this discrepant picture may come from the level of forum discussion in both experiments: while in experiment 1 only one user responded to the request for advice, in experiment 2 two users provided alternative and partly conflicting advices (while a third user included a supportive message without an actual advice). Interestingly, the degree of forum discussion has a clear effect on students' responses. When there is no discussion in the forum (exp. 1), participants do not use source attributes to judge its pertinence, or to explain their judgment (Hu & Sundar, 2010). A potential cause is that they may perceive author's participation as a sign of high benevolence (cf. Jeon & Rieh, 2013; Oh, 2012), which prevent them from critically analyzing other source characteristics.

However, when there is some level of discussion (exp. 2), participants use source attributes, such as declared expertise of the author, to recommend one message over the other, and to justify their recommendation. This pattern of results suggest that students mostly use and refer to source attributes from SQA recommendations when there is some level of discussion in the forum. This selective use of source cues in SQA forums is in line with the Discrepancy-Induced Source Comprehension effect (Braasch et al., 2012), that proposes that readers mostly check and use sources as a way to qualify discrepant information. It also supports the findings from Gazan (2006) and Savolainen (2013) that users recognize the value of sourcing mostly in SQA discussions with multiple answers and debate, such as in health and sustainable development topics. As Gazan (2010) puts it, “social Q&A sites are

particularly fertile ground for synthetic, collaborative approaches to information seeking” (p. 695), meaning by “synthetic” the approach that consists of making explicit reference to other sources of information to support someone’s answers.

### **Source attributes and message selection from primary to undergraduate education**

Results show that when there are alternative recommendations in a forum (exp. 2), students from primary, secondary and undergraduate education show a systematic bias towards messages from self-reported experts. Note that this expert bias can’t be attributed to the actual content of the messages, because we have counterbalanced the message and the author across participants in a way that each message was reported approximately 50% of the times by a self-reported expert, and 50% of the times by an anonymous user. This pattern of results replicates the effects found in previous forum studies with adults participants (Casaló et al., 2011; Jeon & Rieh, 2013; Winter & Krämer, 2012), and extend them to primary and secondary education students. Corroborating previous studies using other types of on-line texts, results indicate that students as young as 11 years old are able to identify expert sources in forum scenarios, which is in line with results found in texts and web pages (Brem et al., 2001; Macedo-Rouet et al., 2013), and they are ready to use them when they have to select between alternative advices.

However, the data also suggest that young students may just use source cues in a superficial way, without reflecting about how information is distributed on the Internet and how source parameters help to assess its quality (Britt & Rouet, 2012; Rouet & Britt, 2014). This is evidenced in three findings from experiment 2. First, undergraduate students selected self-reported expert messages more often than younger students. Second, undergraduate students included more often source parameters in their justifications for their message selection than younger students. Third, primary school students valued personal experience more than undergraduate students, who preferred expert answers that provide a documentary source to support their claim. Those patterns suggest that undergraduate students, as compared to younger students, value to a higher degree source attributes to assess messages in forums, and that they combine some cues (author and evidence) in a way that maximizes the reliability of the piece of advice. This effect is in line with the view that the interpretation of evidence in SQA is a rather subjective process linked to individual characteristics (Bowler et al., 2013).

Several explanations may contribute to the pattern of effects observed in our experiments. Although we don't have any empirical basis to support a particular interpretation, we offer two possible explanations here as a speculation and a perspective for future work.

A first tentative explanation is related to cognitive load theory and the management of cognitive load during document-based learning (Rouet, 2009). One of the sources of cognitive load during reading is the lack of prior knowledge in a domain. As proposed by Rouet (2009), prior knowledge should include not only content knowledge, but also expert strategies and document literacy in a domain. Following this line, we speculate that young students experience increased cognitive load when deciding which advice to pick from a number of sources in SQA because they lack the necessary strategies and literacy to build an integrated model of source (author) and message content (evidence presented). Choosing the expert instead of an unidentifiable author (user under pseudonym) helps reduce the cognitive demands of the task because it "frees" readers from integrating source and content. And it is not a bad strategy after all, because an expert can be deemed to be a cognitive authority (Rieh, 2005) whereas an unidentifiable user does not provide any cue to authority. However, this strategy prevents young readers to consider other elements of credibility, such as the evidence provided by external sources.

A second factor that can explain the differences between younger and older students is the development of epistemological beliefs (Bråten, Britt, Stromso & Rouet, 2011; Hofer and Pintrich, 1997). Among the dimensions of epistemological beliefs, "source of knowledge" is the belief that knowledge either originates outside the self, or is actively constructed by the person. Believing in active construction of knowledge is typically considered a more sophisticated belief. However, Bråten et al. (2011) note that "viewing knowledge as personal construction rather than transmitted from experts may be maladaptive because readers concentrate too much on subjective interpretation at the expense of figuring out precisely what the authors and texts say" (p. 54). We speculate that younger students hold the belief that knowledge originates outside the self and therefore choose the expert always. On the one hand, their behavior is not maladaptive, as suggested by Bråten et al. (2011). On the other hand, they don't dedicate as much attention as older students to the evidence provided by the authors in their messages. Even though the fact of choosing the expert lead readers to a less subjective interpretation, it does not necessarily encourage further analysis of the evidence provided in texts.

## **Educational curriculum and recommendations for practice**

The results of our study have important implications for the design and implementation of educational curricula targeting information literacy skills. First, they suggest that instructional interventions focusing on students' evaluation of source features could be fruitfully introduced in the elementary grades. In many countries, there a number of information literacy programs and resources available (Horton, 2013), but the lack of critical thinking approaches is still a significant weakness, at least in the Spanish context (Gómez & Pasadas, 2003). Our study suggests that children and adolescents are not well prepared to face the challenges of source selection in collaborative Web 2.0 forums. They could benefit from programs that promote reflection on sources and help understand the nature of credibility and cognitive authority on the Web. A reflection on concepts such as misinformation and disinformation (Karlova & Fisher, 2013) could also contribute to this debate.

Second, our results suggest that educators should broaden the range of search scenarios used at school to encompass more informal contexts of information search (such as critical analysis of forums). For instance, educators could promote the comparison of answers to a forum question, encouraging students to pay attention to source parameters and reflect on what constitutes “evidence” in messages. Other studies corroborate this view by showing promising results with interventions that are based on self-generated information needs (Gross & Latham, 2013), the assessment of source expertise (Macedo-Rouet et al., 2013), and authentic problem-based searches conducted by children (Kuiper, Volman & Terwel, 2008). Moreover, children and adolescents might also benefit from intelligent systems that provide feedback in an automatic and timely manner (Beheshti, Cole, Kulthau & Bilal, 2013).

Finally, in line with recent debates in information sciences (Radford, Shah, Mon & Gazan, 2011), our study suggests that virtual reference library services (VR) might benefit from a hybridized approach inspired from SQA. The advantages of SQA (high speed, wide community of answerers) could be successfully applied to VR if users of different ages were provided with adequate cues to evaluate sources and evidence in messages.

## **Limitations and future research**

While our studies provide a clear picture of how important credibility cues are used in SQA forums, they leave several open questions regarding the generalizability of the results, source processing, forum topics, and credibility cues, that should be addressed in future research.

In these studies we used SQA forums with imposed queries, which allowed us to create innovative and controlled experimental manipulations. However, as discussed above, students answering imposed queries may use standards for source selection appropriate for the school context, that may not represent the standards used to answer self-generated queries (Gross, 1995). Therefore, caution should be taken not to overgeneralize our results to self-generated searches.

Other important aspects remain unanswered in our studies. How do users process source information in SQA? Our results reveal that users consider source attributes when they interact with SQA forums that provide alternative responses to a request, but our studies don't clarify how users process source cues. At least two processing strategies are possible. On the one hand, students may just first look at sources and/or the evidence provided to filter out which message they will attend, to subsequently read only those written by sources perceived as credible. Alternatively, students may look at source attributes only when they have trouble deciding which alternative message to follow based on their own personal judgment (cf. Braasch et al., 2012). The use of on-line methods, such as eye-tracking or think aloud protocols, may inform about the actual role that the author of a message plays while students interact with SQA forums.

How does topic affect the use of source information in SQA? Our study draws a complex picture of information use in SQA. On the one hand, sources may have an influence on the acceptance of recommendations from SQA forums, provided that multiple views are provided in the forum. On the other hand, readers do not explicitly elaborate on sources when justifying their choice of an advice. Some topics seem to enhance the role of external sources and evidence in the acceptance of recommendations (Gazan, 2006; Savolainen, 2013), but topic alone does not explain readers' behavior. While we have used four different topics from different areas (health, gardening, sports and pets) in an attempt to maximize the generalization of the results, future studies should focus specifically on the role played by source attributes in specific topics. Two characteristics of forum topics may be relevant for students' use of source information: perceived topic complexity and scientific amenability. On the one hand, Thomm, Hentschke and Bromme (2015) found that when students are confronted with multiple expert viewpoints on an issue, they tend to solve this conflict, in part, by thinking that the issue still deserves further research and can't be solved with a single view. We may expect that when students perceive a topic as rather complex, they may not favor expert advice in SQA forums over another. On the other hand, Munro (2010) has

proposed the “scientific impotence discounting hypothesis”, that assumes that students perceive different topics as amenable or not amenable to scientific research. Thus, students may discard expert advices in SQA forums that go against their own opinion if they perceive that science can’t provide answers to that particular topic.

How do other credibility cues affect source evaluation in SQA? Our study has focused on two main credibility cues of SQA answers: author declared expertise and type of evidence provided. Other author characteristics may also be relevant, such as perceived benevolence. For example, Willemsen, Neijens and Broner (2012) found that undergraduates rated self-proclaimed experts in an e-commerce forum as less trustworthy than laypeople, because of a suspicion of persuasive intent. The way perceived benevolence and competence shape users’ evaluation of answers in SQA forums is a discussion open for future research.

Critically interpreting advices from SQA forums is an essential skill for Millennials. We believe that our experiments represent a significant step toward understanding how the characteristics of the scenario (number of viewpoints in the forum) and students' educational level contribute to an efficient use of this skill. This issue, however, remains largely open for future investigation.

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