What to look for in students' own texts construing open schooling encounters

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Summary: In open schooling collaboration focusing on sustainability challenges, students are likely to grapple with complexity, as different people perceive the problem in different ways (thus there might not even be an agreement regarding what a relevant question to ask is). Conflicts of interests and dilemmas may be at the forefront, rather than the scientific knowledge alone. Scientific knowledge may not even have an obvious role or self-evident authority in societal concerns involving science. Recognizing how students connect with and transform contextual resources as encounters with texts, places, social events, people and institutional settings is important for supporting students in their inquiries. The model introduced aims to support teachers to notice important nuances and opportunities for learning.

Introduction

Students learn through experiences of phenomena and through interacting with texts in all their variety. Learning science (as well as other school subjects) is to a large degree connected to mastering ways of representing and communicating in and about scientific practices. Students learn the aims and purposes of these practices while 'doing science', as they solve problems and explain phenomena through scientific methodologies and apply scientific knowledge on issues relevant in school science. The practices of science are reshaped in school as an institution with its own set of aims, tools and social norms. As students learn science, they are starting to perceive the world in new ways and mastering representations, expressions, and genres as part of the learning processes. These learning experiences also have the potential to develop students' agency and socialize students towards roles in relations to nature, societal challenges, and expertise.

In the teaching of science concepts and methods, a lesson may aim to teach students the basic principles of for instance the greenhouse effect by offering a demonstration of the phenomenon. Using textbook resources, students may be asked to visually represent what happens in the experiment using scientific terms and representations, thereby offering a challenge for inquiry: how to transform their experience of the experimental setup and a textual resource (textbook) into a scientific explanation of own experiences (Knain et al., 2021). This is a challenge that most students would recognize as typical to science, at the core of disciplinary science's aim to explain phenomena by scientific concepts and mechanisms. The knowledge involved is an established body of scientific theory. The way the students work has clear similarities to the ways disciplinary scientists work, not least in how they use representations to explore phenomena and questions related to the natural world.

Consider then when students are confronting the same textbook as in the greenhouse effect, but now with a different aim. This time they are grappling with different type of questions:

> What will be the consequences for nature and society from global warming? For their local community?
>
> What action and change can they make in their local community?

They are likely to encounter the complexity in answering such questions, as different people perceive the problem in different ways (thus it may not even be agreement regarding what a relevant question to ask is). Conflicts of interests and dilemmas may be at the forefront, rather than scientific knowledge. Scientific knowledge may not even have an obvious role or self-evident authority in societal concerns involving science.

The example below is from a classroom in Italy, where a student elaborates on the choice of challenge. The excerpt is taken from a module where the cCHALLENGE platform and a role-play activity called c-ROADS were set together to activate a back and forth dynamic between individual action and collective impact (Tasquier et al., 2022). The students were 17-18 year old.

> In my challenge I have chosen to reduce the consumption of meat. What makes it difficult is that my parents don't particularly agree with my choice, but I have vegetarian friends who are supporting me, so I'm happy. To tell the truth, it doesn't seem like a particularly difficult choice to make, my friends have lent me some books and reading them I inquired about how to have a balanced diet even reducing meat ... I have made a food culture thanks to these books are not books by radical people ... I liked them and they gave me a lot of confidence because they are books by university professors who are experts in nutrition, all balanced people who made me find a way to approach a diet with little meat. .. in the end it is not such a difficult challenge.
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> The only doubt I have concerns the fact that I don't know if acting on food is really an effective choice ... something that really has an impact on the environment ... well, I have doubts about this.

We see in this example that the there is a factual core present in the excerpt, of academic knowledge about nutrition and diet. However, the student contextualizes science in this text in a way that illustrates that trusting science it is not a matter of facts alone. The book as a source of knowledge is approached in the service of a personal concern, which is also socially grounded in personal relations, and contested (by his parents). It is related to social trust and support, and a sense of self (confidence). The book itself is judged in terms of trust and credibility, beyond its merit in the academic community. The merits of an academic community are implicitly valued. All this complexity

arises because the knowledge, in its bookish mediation, has become part of making change in social life and part of one's own narrative.

Narrative is the most fundamental pattern of sense making. In its most basic form, it represents an ordering of experience unfolding through time. Within SEAS, learning trajectories are conceptualized as a "*meaning-making*" trajectory that shapes and is shaped as learners participate and engage in "*socio-scientific issues*" in diverse settings during their everyday life. If students in their narratives describe and reflect on change processes, they may be held as *narratives of change*. If these narratives of change include students' engagement with science (i.e., knowledge, methods, mode of inquiry), such narratives of change are also evidence of scientific literacy, when they relate to individuals and communities to "*meaningfully*" engage and define sustainability issues, drawing upon scientific knowledge. Scientific literacy entails the ability to productively, yet also critically and reflexively, engage with different forms of knowledge and traditions of practice.

In open schooling teaching designs, where students encounter ideas, knowledge resources, perspectives and values both in- and out of school, students' use of resources also become potentially more varied and complex, putting new demands on the teacher in terms of what to look for in students' texts, and make an assessment that can become useful for the students' further efforts. In the first case above (i.e., explaining the greenhouse effect through drawing), 'what to look for' is more straightforward, as the basic challenge is to compare students' representations with a scientific account. In the second case (i.e., climate change as a challenge to individuals and society), students bring experiences from several settings (i.e., family life, being with friends, academia) along with issues of personal concern in everyday habits, brought together in the ambition of making change. These are encounters taking place in or relating to more varied contexts, and students potentially bring a multitude of voices and incidents together in texts that they create.

This means that there is a need to look for other, or a larger range of qualities in students discourse and writing. Recognizing how students connect with and transform contextual resources as encounters with texts, places, social events, people and institutional settings is, in open schooling, just as important as recognizing how students interact with instruments and everyday objects in the science laboratory in teaching a topic in specialized science.

Such phenomena can be considered in the light of intertextuality. Bazerman (2004, p. 86) has defined intertextuality as "The explicit and implicit relations that a text or utterance has to prior, contemporary and potential future texts". However, intertextuality is concerned with not only texts, but also the contexts associated with them. Text and context are interdependent; when we encounter textual expressions, we shape expectations about the situations where it was uttered, and for a given situation, we have expectations regarding what might likely be said. Thus, intertextuality is also about evoking events, encounters with phenomena in social settings, in-person conversations and other texts on paper or screen (Pappas et al., 2003; Scollon et. al., 1998).

To map the richness and finer nuances of such phenomena, we have established two sets of categories. Reference to texts (in all their richness and varieties), and to social events. These are in some sense intertwined, as texts are produced and used in social events of some kind, and social

events are made up of textual relations. However, students may emphasize one over the other. See Table 1, where examples of the different categories are given.

Table 1.

A. Connections to texts:	Example
1. Hyperlinks that involve connection to specific texts, written and visual, in various media	Here is the recipe for today's dinner: https://www.tine.no/oppskrifter/ndag-og-hovedretter/pizza-og-pai/italiensk-pai
2. A prior text is drawn on as a source of meaning to be used at face value, for instance by citation or by reiteration, content referred to etc.	By the way, check out this article on item placement. These are quite interesting things… https://www.klikk.no/kvinneguiden/penger/derfor-star-varene-der-de-gjor-2626642 Maybe not so strange that several of them may be tempted to buy both one and the other?
3. A prior text may use as background, support and contrast (not focused but present)	There is a lot of veggie-inspo to be found on @greenbonanza or @vegetarbloggen
4. Beliefs, issues, ideas, statements circulated within culture regarding the practices and values of that culture	Some just throw those «left-overs» away even though those are clean and still edible. That's called food waste. Imagine how people are starving in some parts of the world and while here you are, just taking for granted the grains and pieces of food you have.

B. Connections to social events	Example
a. Referring to explicit statements, utterances from social events	"But it's not long now, and I'll do it!" so does that mean you go back to eating nougat when the challenge is over, Anita?
b. Referring to an explicit social event	On Monday I had lunch with Heather, you see one of the reasons I chose this challenge was the social aspects of it, even though we often talk during lunch it was even better when we took out the food mixed our salads, talked and laughed like crazy all throughout our lunch.
c. Referring to explicit social events – generalized	I don't understand why I have bothered to spend so much money on salads that is so simple to make at home. I believe that when I have completed this challenge, I will buy something in the store once a week at most. I plan to test other packed lunches next week that I will share with you!!

d. Connections to "implicit" social events or discourse as vague associations.	Great, Bryan! There has been a noticeable improvement! Nice to see your face more and that your gaze does not disappear into the mobile as soon as the opportunity arises. I hope you continue like this! It is not always the change itself that is so difficult, but the surroundings - like when your family drinks soda with you on the weekends.

Within each category there is a descending order of specificity and foregroundness (1. and a. being a foregrounded resource, whereas 4. and d. would be more backgrounded), indicating different ways of position the voice brought in.

These categories were developed on texts that are narrative as a genre – the temporal report of events and reflections in an everyday, diary-type manner, as part of a 30-day challenge to change a habit in personal, everyday life, and reporting and reflecting on the experiences in a platform through entries, with support to reflect on their experiences. However, the categories in Table 1 should be expected to be useful for other types of texts as well.

To apply these categories to notice how students bring other voices and experiences into their own texts, it may be useful to ask:

- What encounters with texts, places, people, ideas and practices can be found in students' texts?
- What are foregrounded and explicit, and what are backgrounded and implicit in their encounters?
- Looking into what encounters students have chosen to include, and the way they construe the encounters into their own text, what does it say about students' learning?

Let us now take a second look at the example introduced above, where a student elaborates on the choice of challenge, and see how we can discern nuances of open schooling relations, categories are now inserted:

> In my challenge I have chosen to reduce the consumption of meat (Bc). What makes it difficult is that my parents don't particularly agree with my choice (Bd), but I have vegetarian friends who are supporting me (Bd), so I'm happy. To tell the truth, it doesn't seem like a particularly difficult choice to make, my friends have lent me some books (Bb) and reading them I inquired about how to have a balanced diet even reducing meat (A2) ... I have made a food culture thanks to these books (A2) are not books by radical people ... I liked them and they gave me a lot of confidence because they are books by university professors who are experts in nutrition, all balanced people who made me find a way to approach a diet with little meat (Bc). .. in the end it is not such a difficult challenge.

> The only doubt I have concerns the fact that I don't know if acting on food is really an effective choice (Bc) … something that really has an impact on the environment … well, I have doubts about this.

We see that action in relation to the challenge chosen is a generalized change in pattern of nutrition (Bc), against a background of sceptical parents and supportive friends (Bd). The encounters with books and their content (A2) introduced by friends (Bb), are events that enable a change. In the further data set, there are more examples of this pattern, of explicit events or texts being important to change in patterns in the social world. However, the student is still concerned about the effectiveness of the challenge chosen, expressing doubt and uncertainty. This is also an opening for further inquiry and thus for teaching.

Having noticed these patterns of change in relations to connections to a broader world of ideas and relationships, the teacher can consider options for new learning experiences. Heuristic questions that can be asked as a follow up:

- Are there resources that should or might be included that is not present?
- Would re-framing or shifts in foreground/background configurations enhance student's learning by bringing some elements to the forefront? I.e., are there some traces of a particular idea or practice that could be made more important?
- Questions to pose to the student:
    - Knowledge: What are the important ideas in the book? Are they reliable, what does other sources say on the matter?
    - Politics: What makes it easy/difficult to make a choice?
    - Different interest groups: Could the student find other groups where support could be gained?
    - Ethical and values positions: Why do the parents disagree? Are there others that think similarly (e.g., among your peers)? Why do they?

Three spheres of transformation

As mentioned at the outset of this report, our various articulations depart from the model on the three spheres of transformation (O'Brien & Sygna, 2013). According to this model, transformation is a process that takes place across three closely related, yet interdependent spheres: i) a practical sphere, which includes both technical and behavioral changes that contribute to the solution of climate change and sustainable issues; ii) a political sphere, which highlights the systems and structures that facilitate or hinder transformation and which includes the social norms, rules, regulations, institutions and infrastructure that define how society is organized; and iii) a personal sphere, which highlights the importance of individual and collective worldviews, values, beliefs and paradigms that are at stake and which drive people's motives for practical and political action.

Through the movements across social events and texts, it is possible to identify and encourage interaction across the three spheres. In the example above, the student made a food culture in the

practical sphere, and the reflection on trust and viability indicated that the personal spheres were also involved. The political sphere is involved in the expressions of doubt and uncertainty about the change selected, pointing to broader systemic structures in society.

Literature

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