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'Digitality For Future'? – The Potential of Digital Practices for Transformative Education in the Area of Climate Change

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Abstract

The *Fridays For Future* movement brought the issue of climate crisis an enormous boost in public awareness and generated great interest in climate-related topics among students. The particular way in which issues of climate protection or climate adaptation are negotiated by social media communities ensures their appeal. Two questions arise from this: Which digital practices do activists of *Fridays For Future* use to disseminate knowledge on climate and climate change? How do these practices affect informal learning processes in the knowledge domain of climate and climate change? Results obtained from a qualitative content analysis of posts and documents created by members of digital communities of the *Fridays For Future* movement and interviews with activists show that processes of identity formation take place in the communities. If these knowledge practices are taken up and reflected upon in the classroom, they can be transferred to formal educational processes, in terms also of transformative learning.

Keywords:

digital condition, social media, education for sustainable development, transformative learning

1 Introduction

The movement *Fridays For Future* (*FFF*) mobilizes a huge proportion of its followers by activities on social media, through both campaigning and sharing climate knowledge. For knowledge-sharing, activists evaluate scientific sources and re-present the information for social media platforms. They then use the platforms' mechanisms for distribution. The contribution of social media activities by *FFF* and other groups to climate and sustainability education is substantial. In a survey of 129 geography student teachers at Goethe University Frankfurt in 2022, 74% of the respondents stated that they often or very often obtain information about climate change from social media. The answer "university" as the source of information came only in third place, with 31%. 6.4% of the respondents had already produced their own content on social media about climate and climate change; 32% had shared posts.

These findings pose a great challenge for schools and universities, because learners, as users of social media, must be taught the necessary literacies to be able to recognize misinformation as such.

Knowledge is produced and shared on social media in two dimensions: that of the creators and active disseminators of content, and that of the consumers.1 This paper will focus on the first level, namely how climate knowledge is disseminated through social media, and how learners can improve their competences when they produce posts about climate and climate change on social media. This will be illustrated by the example of the group *FFF*, which regularly serves as a source of information about climate and climate change for almost 31% of the students surveyed.

The practices of *FFF* include selecting, reflecting on, and sharing knowledge. These activities are interdependent with the dimensions referentiality, communality and algorithmicity in Stalder's concept of the "digital condition" (2018) (see section 2 below).

This leads to the two questions that this paper explores: What digital practices do *FFF* activists use to disseminate knowledge on climate and climate change? The second question depends on the first: Do the practices identified initiate informal learning processes in the field of climate and climate change when activists make use of them? I explore these questions by analysing social media posts and other documents produced by *FFF* activists. I deepen the insights gained with the help of four interviews with students who describe themselves as climate activists. First, the theoretical references to the 'digital condition', and its influence on both climate activism and transformative education that forms the basis of the research, are established below.

2 The digital condition

As Jörissen and Marotzki pointed out as long ago as 2009, the world in which students live today is characterized by a comprehensive 'mediality'. The development of the Internet of Things, ubiquitous digital devices such as smartphones, tablets, and wearables, and the use of algorithms to facilitate everyday life have led to media determining the structures of worldviews. Consequently, we do not behave *towards* media, but *in* media. In the process, the relationship between one's self and the world ("self–world relations"; Jörissen & Marotzki, 2009) change, and mediality becomes the basis of all educational processes (Jörissen, 2013).

The all-encompassing mediatization described by Jörissen and Marotzki is also thematized by Felix Stalder (2017), a media scientist. In his outline of the digital condition, he deliberately does not speak of the process of digitization, since he considers digitization to be so far advanced that our everyday world is already permeated by digitality. Even if we do not interact with digital technologies in some areas of life, they are a constitutive element of cultural practices and processes of subjectivation.

[1] By viewing and 'liking' posts, a consumer also contributes to dissemination through the platform's algorithms.

There are various definitions, made by media scientists, of digital or "media" practices that take place in the digital world. Mattoni and Treré (2014), for example, describe them as "routinized and creative social practices in which activists engage and which include, first, interactions with media objects […], through which activists can generate and/or appropriate media messages and, second, interactions with media subjects […] who are connected to the media realm" (p. 259). Stalder (2018) chooses a slightly different approach and labels the practices "referentiality", "communality" and "algorithmicity". Cultural actors, such as artists or musicians, have always referred to each other's works in their own works, valorized them and changed them (referentiality). The all-encompassing availability of cultural material and digital access to it now make it possible for everyone to generate new meanings on computers or smartphones by selecting and rearranging existing material. Within a particular community, for example the Wikipedia community, the resources and options for action are available to the cultural producers, and only through these resources can the meanings created become permanent (communality). At the same time, dynamics of network power that configure voluntariness and coercion, autonomy and heteronomy in a new way are at work in the community (Stalder, 2018, p. 13). Automated decision-making processes in the form of algorithms reduce the flow of information and select what is made visible to human perception. Algorithms ultimately decide what becomes the basis of human action, thus also what is taken up and reproduced artistically (algorithmicity). These three currently dominant practices that constitute culture, as described by Stalder, are also particularly relevant for the study of educational processes in the digitalized present. They mark the end of the "Gutenberg Galaxy" as Stalder calls it in reference to McLuhan (1995), in which the printed word was the leading medium.

The dimensions of the "digital condition" outlined above are particularly suitable for capturing the practices used by *FFF* activists in social media and analysing them in terms of their educational potential. They also serve as the basis of the category system with which the data collected for this study were analysed.

3 Climate activism in the digital condition

Since 2019, the number of research papers on climate activism on social media and *FFF* in particular has increased significantly (Baran & Stoltenberg, 2023, p. 465). It is not only because of the restrictions on people's movements brought about by the COVID-19 pandemic that the *FFF* climate movement relies on social media networks to recruit participants in demonstrations; other forms of "forced digitalisation" (Sorce & Dumitrica, 2023) have also resulted in a significant increase in their recruitment online. Sorce and Dumitrica identify four clusters of action tactics used by *FFF* activists during the pandemic, when in-person action was largely prohibited: contentious digital actions (e.g. digital strikes or online campaigns); digital partnership development; online community engagement; online information and education (e.g. webinars on climate topics, live events and online news) (Sorce & Dumitrica, 2023, pp. 576–78).

The activists use scientific knowledge about climate change "as relevant for their engagement within the movement in general" and "favor arguments that are based on scientific knowledge"

(Soßdorf & Burgi, 2022, p. 10). According to these authors, the movement's success can be explained in part by the use of this scientific knowledge, as it legitimizes their cause. The authors differentiate between strategic and spontaneous use of scientific knowledge. The former might be citing scientific findings in a social media post in order to draw attention to the urgency of one's own concern. "Spontaneous" uses would include, for example, activists taking part in online discussions and providing arguments in favour of their position. *FFF* activists can therefore be described as "alternative science communicators" (Faehnrich et al., 2020; Maeseele, 2009).

As well as the contents of the posts, just how activists use the mechanisms of social platforms was analysed. Sorce (2023) focuses on the way in which *FFF* uses algorithms to pursue its own goals. Through interviews with *FFF* activists, she identifies the following ways of dealing with algorithmicity, which she divides into four main categories:

- Algorithmic Consciousness: understanding, functions, issues, pitfalls and misinterpretations
- Algorithm as Stake: contentious importance, tactical politics
- Algorithm as Repertoire: role in activism, algorithmic campaigning
- Data Contention: data analysis, contentious digital tactics, uncritical uses. (p. 223)

Another way to generate attention for climate issues, especially among people who are not very politically involved, is through memes – i.e. digital units, based on imitation and adaptation, that are created and shared via social media (Shifman, 2013). They are an example of Stalder's dimension of referentiality. In their study, Johann et al. (2023) state that memes "lower the threshold for participation by highlighting the relevance of socio-political issues and fostering active user involvement" (p. 234). They therefore have "agenda-setting potential" (p. 234) in online discourses.

The research presented here demonstrates a variety of forms of activism and tactics used by *FFF* activists in social media. The question remains as to what extent educational processes are initiated among the creators of the posts.

4 Transformative education

In order to be able to define these educational processes in more detail, the concept of "transformative education" is helpful. Criticism of an instrumental Education for Sustainable Development (ESD 1) has led to an emphasis on the importance of a more reflexive and emancipatory form of ESD (ESD 2) (Gryl & Budke, 2016; Vare & Scott, 2007). This highlights the need to question one's own positions and attitudes and to uncover the contradictions and uncertainties that can hinder or prevent sustainable action. Transformative learning also aims to recognize global interdependencies and implicit power relations in the sustainability discourse, to reflect on one's own positions, and thus to enable the formation of one's own opinions and attitudes (Sterling, 2011). The aim is thus a qualitative change in self-image, worldview and opinion formation, which also includes, for example, questioning established economic forms (such as the neoliberal green growth narrative) and considering alternative

forms of economic activity (such as post-growth approaches, or the economy for the common good), but without introducing these from a monoperspective.

A central aspect of the transformative learning process is the ability to analyse the social discourse on sustainability. This requires the identification of actors, social narratives and practices, as well as reflection on one's own positioning. The power and interpretation structures uncovered should be made negotiable in a reflexive process and, in principle, accessible for transformation (Pettig, 2021).

In order to implement transformative learning in the classroom, Pettig proposes a triad of positioning, reflecting and experimenting. The first step involves articulating and actualizing one's own perspectives on a worthwhile problem case. Learners express their positions in an unbiased manner and relate them to each other.

In the second step, the learners' preconceptions should be challenged by alternative points of view. An example of this could be the inclusion in the discussion of alternative economic forms, such as degrowth. This confrontation may prompt learners to question their own position and reflect on where their convictions come from. The aim is also to focus on positions in the sustainability discourse that are marginalized and counter-hegemonic.

By familiarizing themselves with alternative perspectives, learners can re-evaluate a problem and discuss the relevance of the perspective for their own lives. Other standards can then be used, for example for the question of what constitutes a good life. Finally, the various alternatives should also be actively tried out, if possible, in order to expand learners' own articulation options (Pettig, 2021, pp. 12–13). In practical terms, this might mean trying out the concept of "degrowth" in the school's fair-trade shop.

5 Methods

The exploratory basis for answering the research questions was the analysis of documents and posts created by supporters of *FFF* in social networks and on other internet platforms. This analysis generated initial indications regarding the use of digital practices within the community. The insights gained were then deepened with the help of interviews.

To recruit interview partners, a digital survey was first conducted among 129 students in the geography teaching degree programmes at Goethe University Frankfurt. The survey focused on the topic of informal learning, within social media, in the knowledge area of climate and climate change. The criterion for selection as interview partners was that the respondents had already created or at least disseminated posts on social media in this particular knowledge area. Four students were identified as interviewees. The interviews, which lasted about 30 minutes, comprised questions that were largely derived from the theoretical explanations of the dimensions of Stalder's "digital condition" and dealt primarily with the students' digital practices, their role within the *FFF* community, and their own learning in relation to the topics of climate and climate change.

The transcribed interviews were analysed using qualitative content analysis (Kuckartz, 2016). The category framework was first derived deductively from the theoretical explanations of the

"digital condition", then supplemented inductively by means of the information from the interviews. The following categories were identified:

- RQ1-1: Referentiality
- RQ1-2: Communality
- RQ1-3: Algorithmicity
- RQ1-4: own informal learning
- RQ1-5: own formal learning
- RQ1-6: Knowledge dissemination
- RQ1-7: Own action competence
- RQ1-8: Provide action competence/motivation

The results of the analysis and interviews are summarized below and discussed in terms of their potential for (transformative) education.

6 Practices of digitality and informal learning in the *Fridays For Future* community

FFF activists want to reach both the members of their community and outsiders, for which they use various strategies

6.1 Practices of digitality and informal learning in the *Fridays For Future* community

The distribution of climate knowledge within the community serves to provide members with the necessary knowledge to argue for the goals of *FFF* in social media. The content shared can also be used to create social media posts. Posts are prepared with images and concise language that will appeal to as many users as possible, while conforming to social media platforms' algorithms. These practices can be understood as a form of "online community engagement" (Sorce & Dumitrica, 2023, p. 574).

The most important platform for knowledge sharing is Discord, on which *FFF* hosts several servers. Anyone can become a member here, as long as the appropriate netiquette is complied with. For example, discriminatory language or reference to radical right-wing content will be penalized by expulsion from the servers. Scientific facts and figures require references (e.g. articles in peer-reviewed scientific journal articles, or Wikipedia articles). Facts and figures on political topics, however, are not allowed, "as articles on political topics are often very one-sided" (author's translation). A violation of these rules leads to a warning and, in cases of repeated offences, to removal from the platform. Administrators and moderators are responsible for ensuring compliance with the rules.

Figure 1 shows a forum ("infoverteilung: channel for distributing *FFF*-related actions/projects and for sharing sources/argumentation aids"; author's translation) on Discord in which users share, for example, media contributions about climate topics. These contributions should both add to the community's knowledge base regarding climate topics and be further shared via

social media. The community, which also exists in a similar form on the WhatsApp platform, thus offers activists the resources they need to mobilize for climate protection outside the community. At the same time, it is regulated in the sense of Stalder's dimension of communality, in that users must accept certain rules.

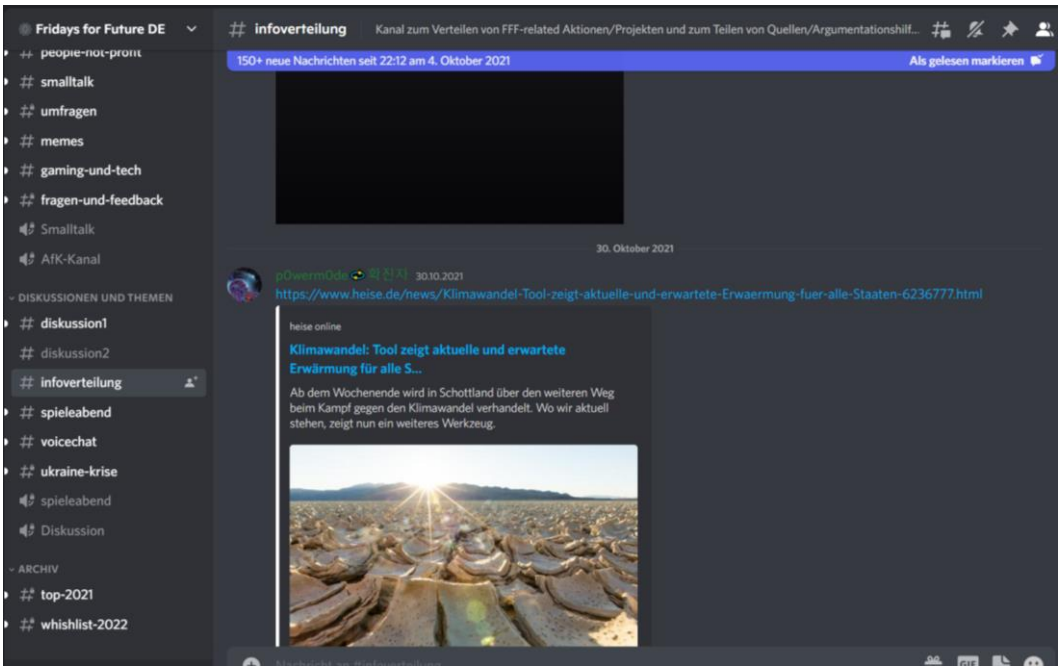

Figure 1: . Server "infoverteilung" by *FFF* on Discord. Screenshot by author, February 2023

Possible learning processes

Participation in the collaborative practices of the online *FFF* community serves as training in, and therefore promotion of, competences that are also relevant for climate education in schools. The acquisition of subject-specific knowledge, for example in the field of climatology, climate impact research and climate adaptation, is needed to understand the core of (scientific) articles and summarize them if necessary, before making this knowledge available to the community.

In her interview, student G talked about how she had researched climate issues in depth in order to write an article:

"So, I notice when I create a post, okay. I knew a little bit about it in general, but when I look at the IPCC report, for example, the information becomes more in-depth. I suddenly have concrete figures at my fingertips and have many more examples. So I would definitely say that it is the case that you go deeper into the subject." (Interviewee G, 27 years; author's translation)

This is where evaluation abilities come into play: participants need to assess articles for their scientific quality, for example, in order ultimately to comply with Discord's netiquette. It is

clear how important the strategic and spontaneous use of reliable scientific knowledge is to the activists, because they use it to legitimize their goals and actions (Soßdorf & Burgi, 2022).

Equally – or arguably more importantly – activists should also be able to assess the viral potential of an article, but also that of memes and images, so that the information is disseminated as widely as possible by users and the algorithms. Users should be able, as shown by Sorce (2023), to see algorithms as part of a "repertoire in activism" with the potential to spread their messages.

In discussions within the community, for example on suitable climate protection measures, subject-specific knowledge, supported by communication competence, helps the members of the community to assert themselves convincingly. In addition to these technical and social competences, which according to Allert and Richter (2017) also include the ability to work in a team for the organization of the community, personal competences are also required and promoted. These include, above all, **self-formation**. If one understands learning as a dynamic process of participation in open, non-closable, social contexts and practices (Hörning, 2017, p. 76), then a further component is added. This is not so much an ability as a characteristic of identity: our self is constituted through socio-material practices, which also take place in a particular form in the *FFF* community. This can lead to identification with the community, so that it becomes part of one's own identity. In this context, Hörning (2001) speaks of the appropriation of lifestyles, which emerge with greater prominence the more complex and tone-setting the community practices become (Hörning 2001, reproduced in Allert & Richter, 2017). Student G confirms this in that the climate movement has become "*an important part of [her]*" through her practices inside and outside social networks. Also in relation to Pettig's (2021) three dimensions of transformative learning, positioning, as part of the self-forming process, is particularly important. The creators of the posts update and express their own perspectives on questions of climate change by including the communities' perspectives.

6.2 Dissemination of climate knowledge outside the community

Through activities on the social networks *Instagram*, *X*, *Facebook*, *YouTube*, *Snapchat* and *TikTok*, *FFF* activists – in addition to mobilizing their own supporters – try above all to reach users of these networks who are outside the community, for example to win them over for participating in demonstrations, or to motivate them to change their (unsustainable) way of life.

In order to generate as great a reach as possible and to be favoured by the platform's algorithms, posts are designed using images and videos, are interactive, and use certain hashtags *"to practically generate a wider reach with the algorithm or also to simply be found more quickly in searches"* (Interviewee G, 27 years, author's translation).

Figure 2: *FFF* post about Tuvalu on Instagram. Screenshot by author, July 2024

Hashtags are used by activists to disseminate information about local initiatives. Figure 2 shows the example #tuvalu. Here, the hashtag creates a spatial reference to the Pacific island and draws attention to the existential threat posed by climate change. Spatial references are repeatedly made in posts. Recent examples include the 2024 flood disasters in Kenya and Brazil, as well as posts about Israel's attacks in Gaza. *FFF* also exploits the reach of certain hashtags. For example, #NiemehrCDU went viral in the debate around Article 13 of the copyright law in Germany and immediately found great resonance on platforms such as Facebook and X. The Christian Democratic Party (CDU) played a key role in pushing forward the Coypright law, which was rejected by large parts of the Internet community. In the eyes of *FFF* activists, the CDU also regularly blocked climate protection measures. By using the hashtag, which members have done very frequently over the last two years, *FFF* are effectively hijacking the discourse around reform and using its extensive reach to spread their own interests.

The activists are thus playing the "visibility game" (Cotter, 2019), which is characterized by the fact that algorithms "structure, but do not unilaterally determine user behaviour" (p. 895). Despite the power of algorithms within social media platforms, Cotter concludes that influencers are aware of the rules of algorithms, and of how to use them for their own interests without violating them (p. 908).

Tactics include making posts particularly eye-catching, for example, or using provocative headlines to encourage engagement with a contribution. However, the students interviewed are concerned to meet academic standards in their external communications as well:

"*But otherwise I'm also always a bit uncertain and prefer to look again somewhere else, or refer to something that I'm sure of before I spread any false reports...*" (Interviewee S, 22 years, author's translation)

Figure 3: Memes by *FFF* U.S. published on Twitter 11/2022 (*Fridays For Future U.S.*)

Figure 3 shows an *FFF* post that is also directed at users outside the community. It uses memes, i.e. draws on photos, videos or short animations circulating on the net, which are then modified to spread their message via social media.

This example illustrates the observation by Johann et al. (2023) that memes can be used to present political issues in a particularly impressive way and thus encourage people to engage with them. Activists share draft memes on the Discord channel, as shown in Figure 4.

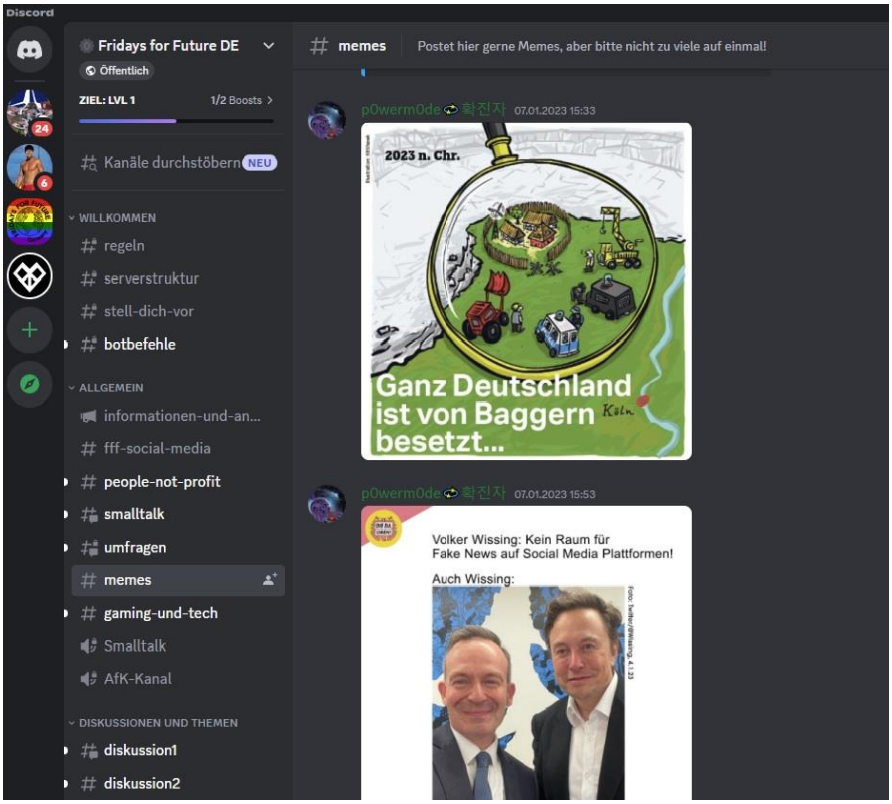

Figure 4: Memes by FFF on the Discord server © Screenshot by author, February 2023

As well as creating posts, liking and sharing posts are also among the communication practices directed at users outside the community. Interaction with a post is recognized by the algorithms and results in a stronger distribution.

In addition to communicating to users outside the *FFF* community, the students interviewed also address their own circles of friends:

"*social media gives you reach, especially reach in an environment where I know it will make people think, at least in my community, in my social media bubble.*" (Interviewee S, 22 years, author's translation)

In this case, the student limited herself to her "social media bubble", i.e. users whose interests and attitudes are more or less in line with her own, as more likely to reflect on the content and possibly even change their behaviour.

Possible learning processes

With regard to subject-specific knowledge and its dissemination through argumentation and discussion, the same competences (evaluation and communication) are required for communication outside the community as within it. However, convincing sceptics and deniers of man-made climate change in particular requires a higher level of communication competence than when it is only one's own followers who need to be convinced. The ability

to use scientific knowledge spontaneously (Soßdorf & Burgi, 2022) is also helpful in discussions. Student G, for example, reports on the discussion with her trainer, who feared that climate protection would destroy German industry: "*We really had an opinion or discussion duel for several days, we had a very strong discussion*" (author's translation).

Student S also reports difficulties in convincing outsiders:

"*You quickly get into such extreme debates where thinking is either black or white, which in my opinion makes it difficult to find a compromise or to somehow open people's eyes to this.*" (Student S, 22 years, author's translation)

Additionally, several more competences need to be acquired: spatial reference in the thematic area of climate and climate change is of course extremely relevant and, as shown, is also found frequently in the posts by *FFF*. Spatial orientation skills are necessary for creating these references.

Memes are a form of strategic use of scientific knowledge to spread one's own agenda (Soßdorf & Burgi, 2022). Their creation requires the ability to understand scientific knowledge in order to extract its core messages, which are then implemented in the form of graphics and texts.

The argumentative efforts to convince others of one's own attitudes and goals are supplemented by strategies of adaptation and manipulation that use the platforms' mechanisms for one's own ends. In attempting to hijack hashtags, to otherwise trick an algorithm, or to use algorithms as a resource (Sorce, 2023), creativity is required (Allert and Richter, 2017). Such creativity is also a dimension of a maturity-oriented education (Dorsch, 2022). Creative practices in this sense refer to "collectively reproduced patterns of action and interpretation for dealing productively with situations that are indeterminate, ambivalent, open to action and interpretation" (Allert & Richter, 2017, p. 28, author's translation). These practices include bringing one's own perspective into confrontation with alternative views and deconstructing them, as Pettig (2021) calls for in the dimension of reflection. At the same time, however, activists also experiment with their own, possibly updated, perspectives and present them for discussion on the platforms.

In addition to the strategies designed to increase an organization's reach, more subtle practices within social networks can also trigger educational processes and, in particular, processes of subjectification. Introna (2017) illustrates this with the example of online advertising. The goal of advertising companies is to generate 'impressionable subjects'. So-called ad servers make it possible to track which type of hyperlink users prefer to click on and which internet pages they visit. Advertisements can thus be increasingly personalized using algorithms to 'impress' the subject. Introna emphasizes that the strategy always presupposes the active participation of the user, who 'curates' the content displayed by clicking on it or ignoring it. The user thus actively co-develops their own subjectivity, their own self. This theory can also be applied to liking and sharing posts on social media, as is the case in the *FFF* community: with every 'like' and every retweet, users relate to the content and develop their own self accordingly. This is another form of positioning in the context of transformative learning.

5 Conclusions and practical indications

For school pupils and older students, social media are an important source of knowledge in the field of climate and climate change. They not only consume but also favour and share posts, or create their own. In doing so, students consciously or unconsciously use practices of a culture of digitality, which are crucial for the ability to participate in social networks and to promote their own interests. The *FFF* community considered in this paper provides activists with resources and scientific knowledge to create posts that are read, shared and liked by as many users as possible.

The practices trigger various informal learning processes that are also relevant to transformative learning in more formal learning environments. These transformative practices, however, have still to be taken up fully in formal education. Although certain practices of digitality can be imitated in school or university (e.g. organization in online communities, feedback culture, enriching e-portfolios with videos, memes, etc.), the practices of the learners observed in the process quickly seem contrived. Just because a teacher or lecturer instructs students to give each other digital feedback does not create communality. Specific knowledge practices are also inevitably generated in schools and universities, and for this very reason the teaching of them is not neutral (Allert & Richter, 2017, p. 24), mainly due to assessment practices in formal educational contexts.

Nevertheless, schools and universities should not ignore the practices used in social networks. Their educational potential, as discussed in this paper, should be taken up. Learners should be familiar with the practices and be able to apply them in order to participate in digital negotiation processes in social media. Key to this is reflecting on the experiences made in social networks: 'project weeks' offer suitable conditions for implementing this at school, because these periods are usually free of assessments, and pupils decide for themselves on a topic they want to deal with. In the first phase of the project week, pupils' focus could be on acquiring knowledge in the field of climate and climate change. They would then carry out experiments or implement projects on an aspect of climate protection. Posts on social media can also be used as a tool for transformative learning, confronting learners with alternative perspectives and allowing them to reflect on their own position.

In the second phase of the project week, the focus is on disseminating the subject-specific content learned or the ideas developed via social media. This phase also serves to test and experiment with the new findings in discourse. Here, the students should become active themselves, if possible without any demands or assistance from the teacher. They should set their own goals in order to experience the corresponding practices and try them out for themselves. It is then up to students to decide which platform to use, whether to use spatial references, or whether to include hashtags in their posts. They also have to decide whether they want to inform other users about the topic with their posts, or prefer to discuss climate action in existing communities dedicated to the topic. Through this form of uncertainty about how to proceed, when well-rehearsed routines fail and new courses of action are needed, learners may suffer "experiential crises" (Oevermann, 1991, p. 306). At this point, practices of digitality can be seen as a "spontaneous adjustment reaction" (Hericks, 2006, p. 83, author's translation), crisis-solving – for example when students have collectively been able to convince

a climate-change sceptic or trick algorithms to favour their own posts. In such successful cases, the corresponding practices can be included by the students in their repertoire of actions.

In the final phase, students should reflect on their experiences, determining for example which strategies were successful on which platforms in order to reach the greatest number of people, or how posts can be designed in a particularly convincing way. The reflection should also focus on content-related learning processes, e.g. whether students gained a better understanding of certain climate topics thanks to the use of social media, or which topics will have the greatest reach in terms of numbers of people. The aim is for learners to become aware of their own practices on social media platforms and to be able to use these practices in a targeted way, so that in the future they will be able to participate in digital negotiation processes.

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