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The building of pedagogical material, an alternative way to educate using educational commons

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Abstract: Based on the Je Fabrique mon matériel pédagogique project, this article aims to explore a way for teachers and children to develop pedagogical material through the lens of the commons approach. Beyond market-driven logic, in this article, we will explore two dimensions, appropriation and articulation, to explore this perspective as a way to think about education.

The building of pedagogical material, an alternative way to educate using educational commons

"Digital technology, whether in ecology, health or education, is a means that we have. Today, I define FabLabs as a second chance space for young people who cannot afford to go to school. They come to be trained and by giving them hope to impact their territory" (Médard AGBAYAZON, 2022, founder of BloLab, Benin)

Introduction

This communication is based on the case of the Je Fabrique mon matériel pédagogique project¹ within Francophonie. The aim of this project is to help teachers easily create the pedagogical material that they need or building materials that have already been made by someone else beyond market-driven logic. Indeed, understanding educational resources as common resources is an opportunity to give everyone the means to do, to experiment but also to be in a mutual aid logic by going beyond the competitive thinking of the market. If thinking education in common is perceived as a condition in a democratic and inclusive perspective (De Lissovoy 2011), a direct link has been made to think education as a common (Fee *et al.* 2021) or to think about education and commons (Korsgaard 2019; Means Ford & Slater 2017).

The project also finds its roots in the maker spirit (i.e., the Maker Faire², a gathering of makers and educators). The “Maker movement” emerged in the 2000s in the United States under the impetus of Dale Dougherty to bring together heterogeneous communities of people practising personal fabrication in various ways under a single name (Genatio 2019).

In this project, we do focus on **pedagogical material**; we mobilize contributions relating to *peer production* (Benkler & Nissenbaum 2006; Benkler Shaw & Mako Hill 2015), which they associate with a form of collective intelligence, with the *commons-based peer production* (Kostakis Latoufis Liarokapis & Bauwens 2018; Kostakis & Papachristou 2014) and *distributed manufacturing* (*ibid.*)³.

In this project, we are over two important dimensions:

- **appropriation**, in a sociotechnical meaning, the question of appropriation involves the inclusion of the object (here an educational common) in an artifactual process that begins with the discovery of the object studied, its functionalities, and its possibilities, before moving on to an eventual assimilation of the object into the operator’s daily life and then its appropriation. Once this stage is reached, the object can even become invisible in its context of use (Rabardel 2005). We would like to study the conditions of a wide appropriation of resources with a concern for cross-validation bringing together an academic community and civil society.
- And of **articulation**, here, how the educational common ‘fits’ into the professional activity and the culture of teachers, children or even parents to become established.

¹ <https://fabriqueedu.tierslieuxedu.org/>

² <https://makerfaire.com/>

³ Distributed manufacturing is a system in which the production of goods is carried out in geographically dispersed micromanufacturing units linked together by telecommunication tools. This system is now seen as a credible possibility, thanks in particular to the development of the Internet on the one hand, and to the fall in the price of numerically controlled machines on the other, which has led some authors to speak of the 'third industrial revolution' (Anderson, 2012; Rifkin, 2014).

Between the 29th of October 2022 and the 5th of November 2022, a series of interviews were conducted in Abidjan (Ivory Coast) during the MakeAfrica conference⁴ to animate a dedicated workshop with thirty teachers from all the country and with makers from other African countries. Through interviews from teachers and makers and with examples of what was made during this week, we performed research. In this work, we explore what educational commons are and how educational commons can be a way to answer day-to-day needs from teachers and students in the Ivory Coast and contribute to transforming education.

Indeed, commons in education could animate attempts to transform the substance of our relationship to teaching, learning, research, and institutions of education in accordance with the spirit of the commons. Education would be transfigured, then, into a collective good, which is created, governed, and enjoyed in common by all parties of the educational community. In this way, we can envision an education organized “as an institution of the commons” such that the management of knowledge and education will be a collective process and educational communities will organize and coordinate among themselves on the basis of the “democratic participation process”. Such a learning community should rely on the values of contingency, experimentation, and surprise in the sense that when learning is coproduced and comanaged by all members of the community, its trajectory cannot be developed in a linear and predefined way from one stage to the other; therefore, openness to the creativity of the community and trust in an outcome that cannot be fully anticipated is a prerequisite (Pechtelidis & Kiouпкиolis 2020).

In this way, we are moving from a conception of the school centred on itself to a school open to the **heart of the city** from the perspective of "**learning territory**", which is "a place, a time and a network where learning is encouraged in situ and in vivo, outside the walls of institutions, by associating with other actors in the environment. It is a situational process in which sharing knowledge through doing becomes a fundamental function for deploying an imagination, creating visions and participatory policies for the cross-development of individuals, organizations and territories and the well-being of all" (Gwiazdzinski & Cholát 2019). **Open to its territory, inclusive, the school forms citizens and becomes a place of concrete expression of democracy.**

Specific material for specific contexts and children

For the teachers, by constructing teaching materials designed as a common resource, it is then possible for them to reproduce it and, more particularly, to adapt it to the context in which they are working. For example, several teachers said that they did not necessarily have electricity or, outside the capital, even a lack of resources that could be used to create pedagogical material. The framework of the commons is therefore conducive to the appropriation and, above all, the adaptation of this resource to the contexts in which teachers work. The material can be built using the resources available to the teachers. This is essential if the context in which they work is to be considered.

Several other dimensions emerged from the interviews. Our interviews highlight

- 1) Teachers should involve children in the classroom and consider their way of learning.

By creating the material, for teachers, it's a means of “going to the real world” (Cirima, physique teacher). Indeed, the question of materialization comes up regularly in the

⁴ <https://makeafrica.net/>

interviews. This element is stimulating for teachers, as they feel proud of themselves: “The fact that I can recycle objects at hand, make a teaching tool to make it **easier for a learner to understand, that fascinates me**. It opens my mind to many other things” (Cirima, physique teacher). In addition, some teachers point out that this can be a way for them to gain more respect from their pupils and to answer one of their issues: “we do not have enough materials, apart from textbooks and notebooks” (Dominique, Spanish teacher).

Regarding the children, one teacher highlights that he would like to make them create their own material because, for him: “it’s a way of highlighting children's talents, working on their openness” (Yao, teacher). In addition, it is stimulating for teachers, as each year will be different, as they, or the children, can make different materials according to the context and their will (Kouakou, history and geography teacher).

- 2) The willingness of makers/teachers to create another environment (i.e., in a FabLab) where children (and even adults) with disabilities or difficulties at school can learn by doing, and this way regain confidence.

This approach is perceived as an experimental and concrete approach for teachers to:

- Create a space other than the institutional space to offer students other ways of doing things (“to the realities of my learners”). Moreover, by working with FabLab, they can do school outside of the school or in relation to their territory.
- An aid for orientation, indeed, this approach can be viewed as an alternative way to include people who do not have the dominant values of school.
- Interest in escaping the monotony of practice. Indeed, building the material is interesting, it allows you to observe it, to appropriate it and to think about how to transform it.
- It’s an interesting way to think something specific for children with disabilities (see Figure 1 after). Indeed, this question of disabilities was important for teachers, as there is no specific support system for them. Therefore, during the workshop, two projects, out of six, were dedicated to children with disabilities. Nearly 1/3 of the interviewees mentioned that this approach can help them this kind of pupil. In this way, it is possible to create something specifically rooted in the disability of the child.

To illustrate this dimension, Figure 1 represents a specific material created to let hearing-impaired children easily catch the attention of the teacher to say if he/she is following or not.

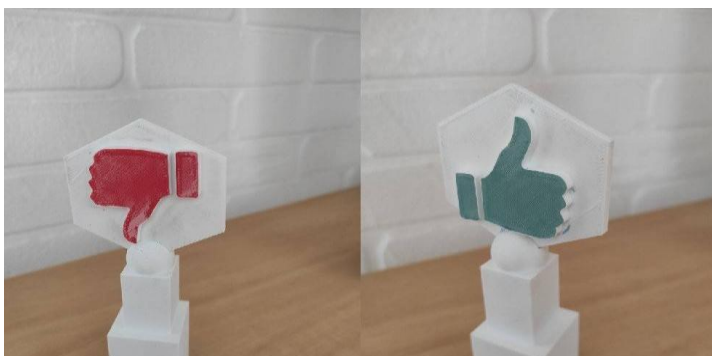


Figure 1 A materiel created to let hearing-impaired children easily catch the attention of the teacher. Created by Koffi Eulodie, Diakabia Kone, Kouassi Ettie J.P., Ouroubie Pascal Eric, Saliou Nassirou, Marie Auxiliatrice Da Silveira

Teaching material rooted in a sociotechnical context

Lauwerier (2010) emphasized the importance of **local communities** in the provision of **education for illiterate adults and out-of-school children** in the context of francophone West Africa. Therefore, to strengthen the learning network and equip education actors with resources that can be used in their context, we find this logic of anchoring education in the city, communities and networks. Here, pedagogical situations are described in light of the mobilized resources and networks (for instance, the ReFFAO (Francophone Fablab Network of West Africa))⁵. Both in terms of creating material adapted to the technical environment (resources, equipment, etc.) and to the context of the children. This element resonates with the important culture of resourcefulness in the country.

Teachers from the workshop had an important willingness to contribute at a larger level than individuals and to do something that can be helpful/adaptable for other teachers:

- Related to their constraints.
- The important number of children in class. How can they learn in a different way and, moreover, for children with disabilities?
- Regardless of the subject taught. For instance, language teachers (French, Spanish and English) were part of a project to help children learn language, and they easily saw how to adapt it to their own context.

From the sociotechnical perspective, we need to take into consideration **appropriation** and **articulation** to take into consideration their contexts (political, economic and social), their means and their needs to pursue their educational purpose.

Regarding appropriation, during this event, teachers were in a Fablab⁶ to help them think and realize a pedagogical tool that is rooted in their context and needs. In this approach, the discovery of the new artifact (here a pedagogical tool) occurred while the artifact was designed and then built (live instrumental genesis). It can then be experimented in the situation and improved through feedback. In this way, the output is depositary of their share representation system and experience in their teaching activity. Considering that the development of the pedagogical material is linked to its use, it finds itself in a situation that can be described as *incomplete by design* (Garud Jain & Tuertscher 2008). It remains incomplete from the point of view of uses, which remain fluid and unstable; this means paying close attention to actual, current uses, rather than potential or imagined ones.

Folcher (2015) refers to creators as “designers in use”. This design in the use allows easing the articulation with the current practice, i.e., Elodie (teacher of earth and life sciences) would like to print a 3D flower cut in half that is not withering.

This flexibility is allowed by an intrinsic dimension of the commons, which is a free resource that can be modified by anyone. Moreover, if someone transforms a resource (for example, to be used by blind people), then it is possible to share it broadly.

Limitations and questions

With this first work, we need to take into consideration some limitations and questions that have arisen.

⁵ <https://reffao.org/>

⁶ As they can need some expertise in creation, design (with specific software, i.e., Inkscape) or building (i.e., 3D printing)

- 1) Problems of scaling up (lack of infrastructure, capacity to set up the same approach on a whole territory, volunteers, etc.), what support(s)? Indeed, the commons approach has an interesting link with the local dimension. However, the question arises of scaling up a local educational common so that it can be disseminated and reappropriated in other contexts.
- 2) The question of trust. Indeed, some answers are based on trust. Trust is essential for bringing together heterogeneous groups (Wenger McDermott & Snyder, 2002) but also for encouraging them to share knowledge, resources and practices. In particular, this trust requires members to develop a sense of belonging to the community.
- 3) What measure(s) should be used to analyse the effects of this approach?
- 4) What validity for the resources produced? Governance?
- 5) This project makes an important link between FabLabs and schools. However, African FabLabs remain fragile and highly dependent on two elements (Liotard 2020):
 - a. the energy and personality of the fabmanager on the one hand;
 - b. and international aid in many forms to support these places.
- 6) As educational commons are part of knowledge commons, we need to take into consideration how they are organized. A specific focus can be placed on the input for knowledge organization (KO) and ethical questions related to KO.

Discussion and Conclusion

This project leads us to think about communities through the lens of education and commons. Indeed, the community can begin to live in common, with reciprocity that values the work of creation as well as the work of use. It is the people who value the contents of these platforms by making it possible to put their uses into a narrative and to more easily identify how to mobilize resources in a specific situation. In addition, it's also them that are going to help the community to survive.

We can work over the combination of organizational, community and individual levels to allow us to reach an understanding of the educational context situated in practices and usages from the individual to the global level. There, we can make the link with collective intelligence and the capacity to the people to change institutions or organizations through the deployment of their thought patterns (Henry 2021).

The creation of pedagogical materials directly by teachers or students makes a bridge between educational commons and the maker movement. Using this approach allows working over two important dimensions:

- appropriation to ensure that the material is grounded from the context and needs related to its use. In addition, as the environment/needs evolve, the materials can also be updated to take into consideration this new situation or by transformation by someone else to another context;
- and articulation to facilitate the fitting of the material to the environment (i.e., low resources) and within the culture of people.

According to the context, like teachers of Ivory Coast, this approach could help teachers and children (for instance, with specific disabilities) by fitting within the constraints that we can encounter. Children can also be part of the teaching by contributing, or even creating, to the production of their materials. To go further, thinking pedagogical material as commons is a way to allow all the stakeholders related to education to be a concrete part of it and build a more inclusive and democratic school.

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