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ARTICLE / ARTÍCULO

Textbooks and digital resources: current transformations in France

Libros de texto y recursos digitales: transformaciones actuales en Francia

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Abstract: Many discourses emphasize the great educational potential of digital technologies. These technologies can renew both the activities carried out with students, the management of their learning paths, working methods, etc. In theory, this will be beneficial for education. But the evolution of these technologies in the field of education does not necessarily lead to idyllic results. In reality, the changes observed in these areas are slow and are based on very localized, rarely convergent, and often incomplete. Several elements are likely to determine the uses of computer technologies: the strategies of publishers and links with «EdTech» companies; political choices (in terms of curricula, equipment, examinations, etc.); materials (tablets, smartphones, etc.); educational resources, their modes of production and exchange, the place of free educational resources; changes in national and European legislation about digital matters. In this paper, we will try to show how the French publishing landscape and access to educational resources is currently undergoing important changes, starting from a configuration where textbooks are central to sketch out the current situation, where the supply of online digital resources seems to open up alternatives. We will rely in particular on the case of a portal of resources financed by the Ministry of National Education and published by consortia bringing together publishers and EdTech structures.

Keywords: Educational Technologies; Portals; Resources; Textbook; Teachers.

Resumen: Muchos discursos destacan el gran potencial educativo de las tecnologías digitales. Estas tecnologías pueden renovar tanto las actividades realizadas con los alumnos, como la gestión de sus itinerarios de aprendizaje, métodos de trabajo, etc. En teoría, esto sólo puede ser beneficioso para la educación. Pero la evolución de estas tecnologías en el campo de la educación no conduce necesariamente a resultados idílicos. En realidad, los cambios observables en estas áreas son lentos y se basan en cambios muy localizados, raramente convergentes y a menudo incomplejos. Es probable que varios elementos determinen el uso de las tecnologías informáticas: las estrategias de los editores y los vínculos con las empresas de tecnología educativa; las opciones políticas (en términos de programas, equipos, exámenes, etc.); los materiales (tabletas, teléfonos inteligentes, etc.); los recursos educativos, sus modos de producción e intercambio, el lugar de los recursos educativos gratuitos; los cambios en la legislación digital nacional y europea. En este texto, trataremos de mostrar cómo el panorama editorial francés y el acceso a los recursos educativos están experimentando actualmente cambios importantes, partiendo de una configuración en la que el manual es fundamental para esbozar la situación actual, donde la oferta de recursos digitales en línea parece tomar el relevo. Nos basaremos en particular en el caso de un portal de recursos financiado por el Ministerio de Educación Nacional y publicado por consorcios que agrupan a editores y estructuras de empresas de tecnología educativa.

Palabras clave: Tecnologías Educativas; Portales, Recursos; Libros de texto; Profesores.

1. Introduction

1.1. *Digital technologies: a pedagogical revolution?*

In order to understand the current situation, it is useful to begin with a reminder of some stereotypes associated with technologies. We shall consider three speech productions, where speakers seem to oppose one another in every respect: the first is the result of an advertising publication published by equipment manufacturers (computers, interactive digital boards), the second is taken from a parliamentary report on digital education, the third from a speech given by a Minister of education:

«The computer is a highly motivating element, if we rely on interactivity, with media of the right technical and visual quality.» (Manifeste pour la réussite à l'école, 2006:4)

«ICT increase interest, attitude and motivation when pupils/students use computer applications [that are]:

- Inspiring;
- Developing their autonomy and self-esteem;
- Maximizing their chances of success;
- Fostering creativity and production;
- Allowing them to share their work with peers, teachers and parents.»

(Fourgous Report, 2012:35)

«Digital technology is an opportunity to make a deep change in the way schools teach, and to revise pedagogy, to give teachers a great freedom in pedagogical matters, and thus to motivate them. . .]» (Speech by Luc Chatel at the BETT, 2010)

Indifferently, «the computer», «ICT» or «digital technologies» are supposed to have the power to transform teaching practices, while promoting learners' activity. The fact remains, however, that surveys of teaching practices or the effects of particular educational technologies on learning do not reflect such a revolution. There are several reasons for this: on the one hand, the conditions for the «schooling» of technologies are complex and involve parameters on which it is sometimes difficult to act. As Baron, Bruillard & Lévy (2000, p.8) explain, material teaching conditions, the relative weight of disciplines (subject matters), teacher training, and the existence of teacher collectives play a determining role in teaching practices and limit the extent of the changes announced.

On the other hand, idyllic promises are useful to those who make them: they justify financial commitments from public actors, and promote the ambitions of industrial actors (especially equipment manufacturers) and innovation entrepreneurs, who claim to provide simple and radical solutions to old and complex problems.

1.2. *Changes: from textbooks to resource portals*

This does not mean, however, that nothing changes in educational systems, and we would like to show that the supply of resources is undergoing fairly deep changes at least in a limited field: the pedagogical resources produced for teachers in France. Since the socio-historical works of Alain Choppin (1992; 2005; 2008), we know the importance of textbooks in French education system. For several years now, however,

different ways of producing and circulating granular or sequenced resources have taken on considerable importance in teachers' practices, raising questions among both publishers and public authorities about the usefulness of textbooks in such a context. It is the nature of changes that will retain our attention: in which ways, and how is the "system" of textbooks being challenged today? How do resource portals, as they have emerged in the contemporary editorial landscape, offer an alternative to textbooks?

This article focuses initially on the (macro) analysis of the «textbook system» as historically built. In a second time, we will show that teachers' practices question its centrality. Finally, we will address the case of a resource portal co-constructed by the French Ministry of Education and a network of industrial actors which seems to be emblematic of the changes under way. We will do this on the basis of a series of studies carried out over the past three years, based on two approaches: the analysis of the supply of resources (textbooks, resource portals) on the one hand, and several campaigns of interviews with teachers, school publishers and education managers on the other hand.

2. Textbooks system

2.1. Key role of textbooks in French educational landscape

Until recently, the supply of educational resources for school education was largely based on an emblematic editorial product: textbooks. Textbooks are central in all respects, which can be presented by distinguishing between three levels of analysis: micro level, concerning the teaching and learning practices of teachers, pupils and families; meso level, corresponding to the functioning of schools and local and regional authorities, which provide part of their funding; and macro level, corresponding to the socio-economic framework in which the chain of production and use of educational resources is embedded.

Textbooks at the heart of teaching practices

At the level of actors' practices, textbooks are a central tool for the preparation of courses, whether in the form of a textbook selected for the classroom, or a compilation of extracts from textbooks reorganized by teachers. Alain Choppin (2005, p. 39) emphasizes that «it constitutes the privileged medium for educational content, the repository of knowledge, techniques or know-how that a given social group considers necessary to transmit to the younger generations». In the very context of a wider range of resources, teachers seem to continue to rely primarily on textbooks (Fluckiger, Bachy and Daunay, 2014, p. 8). Outside the school setting, textbooks also appear to be an extension of the teacher's authority and «intervenes as a sign of the teacher's symbolic presence, despite its physical absence» (Deceuninck, 2012, p.106).

Textbooks in the school

The importance of textbooks in the school is not only measured within the classroom: it is also central to the documentary resources of the school, at least in budgetary terms. Buying textbooks (financed by the local authorities for secondary education, but endowed by the State for middle schools) corresponds to a budget line, the «pedagogical expenditure on specific credits» (Ministère de l'éducation nationale, 2011) separated from other teaching resources, and in particular from documentary acquisitions made as part of the documentary equipment of the institutions

(Documentation and Information Centre: CDI). According to a survey conducted by the State inspectorate of education, the budget allocated to textbooks is on average 2.4 times higher than that of the CDI (Durpaire, 2010). In addition, while the selection and acquisition of textbooks is not the responsibility of school librarians, it constitutes a considerable workload for the latter, from the distribution of specimen to teachers to the distribution of textbooks for every disciplines and their restoration at the end of the year.

Economic and Political Issues

Finally, at the macro level, school publishing represents an important challenge for both public authorities and actors in the book industry. In 2016, the turnover of the «school education» segment accounted for 14.9% (or 404,000,000 euros) of the total French publishing production (Syndicat national de l'édition (SNE), 2017), making it the second largest sector after literature. The segment's average profitability, despite high production costs, is also slightly higher than the industry average, excluding legal publishing (Table 1).

Table 1. Publishing segment profitability rate (Source: KPMG, cited by Moreau & Peltier, 2015, p. 39).

Segments	Profitability
Literature	4,60%
Fine books	-2,80%
Textbooks, science and dictionaries	6,90%
Tourism	1,80%
Practical books	7,20%
Youth	4,80%
Comics	13,80%
Legal	25,40%
Average (without Legal)	5,50%

For the French Ministry of Education, textbooks are an equally key issue. While textbooks publishing in France is free and not subject to prior checking of their content, historical relations with the publishing sector at least partly constrain the pace of curriculum renewal, with a recast leading to the production of new works likely to be acquired on a massive scale. The last few years (2016 and 2017) have been particularly prosperous, since the whole curriculum, from primary to cycle 4, have been renewed. The latest available data on sales of textbooks published by the SNE shows that even in a low year, i.e. without curriculum reform, sales of textbooks (from preschool to secondary school) amounted to 31,552,000 copies (Table 2).

Table 2. Chiffres clés de l'édition 2015, données 2014 (Source: Syndicat National de l'édition, 2015).

Segment	Turnover (k€)	% of global edition turnover	Sales (thousands)
Preschool and primary school	70,187	2,8%	15,541
Textbooks for middle and high school	93,831	3,7%	11,997
Textbooks for vocational and technical education (middle and high school)	46,783	1,9%	4,014
Textbooks for technical education (higher education)	9,359	0,4%	761

Segment	Turnover (k€)	% of global edition turnover	Sales (thousands)
Extracurricular publications	76,899	3,1%	24,838

The extent to which governments are involved in the operation of textbook publishing may be more accurately measured if their financial contribution to the purchase of textbooks is taken into account. The books made available to pupils are in fact acquired, for the secondary school level, by local and regional authorities with State funding, and in a large number of cases by the regional authorities for high schools. The situation is more volatile at the primary level, where educational credits allocated to schools are often too low to allow purchasing of individual textbooks. Thus, between 2016 and 2017, 300 million euros were earmarked for the purchase of new textbooks (even if the payments made were lower, by 270 million euros).

Finally, and unlike other segments of the publishing industry, the distribution arm of the school production chain is particularly favored and benefits from less uncertainty as to the volume of sales: orders are precisely quantified, which means that the publisher does not have to bear the cost of unsold returns. However, it is by focusing more specifically on the methods of producing textbooks that we will then gain a better understanding of the changes that can be observed.

2.2. Production and evaluation chain

The timetable for the production of a textbook corresponds to a one-year process (even a year and a half, when it is not constrained by the publication of new curricula, which is not the most common situation), schematized by the representatives of publishing (see <http://www.savoirlivre.com/edition-manuel/calendrier.php>), in which key stages emerge: the evaluation times of the intermediate documents, which, once assembled, will constitute the textbook object. These successive phases of evaluation bear witness to the fact that actors with specific functions are involved throughout the production process, based on highly structured exchange formats.

Indeed, from the preparation of the «publishing plan», which is the equivalent of a set of specifications for the forthcoming textbook, to the «final proof» issued by the editor in charge of the project, the process involves a series of tests and adjustments for each intermediate production. Three central moments punctuate it: firstly, after the authors' team has produced a summary and a double-page model (or a demo chapter in the case of the digital textbook), round tables between authors, publishers, teachers and sometimes parents of pupils are organized, leading to the project being amended as a whole. Secondly, the authors' work consists mainly of filling out «templates», i.e. standard formats that prefigure the content of a double page, which are subject to a fivefold validation: that of the other authors, that of the collection manager, the publisher, but also of the lay-outter, who may have to adjust the content according to the remaining space. Finally, the finished product is tested in class before final corrections, tests that the editors try to attend. This process is thus part of a network of relations between the Ministry, teachers and publishers, which has been gradually built up to the relatively stabilized situation we are experiencing today.

2.3. A historical construction based on a social liberal compromise

As it appears at the end of this necessarily schematic presentation, textbooks are the material translation of a compromise between divergent expectations of the

actors of the school framework: the Ministry, families and teachers, and allows to «maintain relations of trust between parents and the school institution». On symbolic level, textbooks are «a sign of the existence of the common rule and the principle of authority to which the teacher agrees to submit». It is a «common referent, regardless of the teacher's professional quality» (Deceuninck, 2012, p.107). For the teacher, textbooks guarantee a state of knowledge, while remaining selected by the teacher himself. For the institution, finally, it is «a sign of the absence of totalitarianism» (*ibid.*), while guaranteeing the dissemination of the curriculum.

Even more than this compromise between actors, it is the liberal compromise between the different options successively debated in the history of textbooks since 1793 that is remarkable, and that constitutes the anchor point for the following analyses on the situation of digital educational resources. The current situation is simply the result of a gradual construction of a liberal model. Periods in which school publishing fell under a «state monopoly», textbooks being selected on the basis of a competition (1793), periods in which teachers' choice was limited to a selection of works previously authorized (until 1875), and the current system, inherited from the Ferry Laws (1881), alternated (Choppin, 2005). Between the desire for a general control of education and the willingness to let teachers act as prescribers, it is therefore a form of compromise that has emerged within the «ideological» dimension of textbooks (Choppin, 2005, p.39).

3. Uses of alternative resources

The compromise mentioned above should not obscure the existence of controversies, sometimes lively, concerning several aspects of textbooks. Drawing on the work of Deceuninck (2012, p.86 sq.), several sets of «controversies» can thus be identified: the first concerns the modes of marketing specific to textbooks: sometimes the close links between the teaching world, the institution and the commercial sector is criticized; sometimes, conversely, the absence of a requirement or prior checking of the quality of textbooks gives rise to objections. The usefulness of textbooks is also questioned: a qualitative survey conducted in high schools shows that photocopying is the preferred medium for teachers, who also see it as a «personal creation», even though the original documents often come from textbooks (Khaneboubi *et al.*, 2017).

But it is, above all, the changes observed more recently concerning teachers' activity that tend to jeopardize the current balance. The practices of self-production of resources by teachers are indeed better known today, especially since the work carried out in the framework of the «ReVEA» project (which the authors of this article contribute to) and it seems that they call into question the central status of textbooks in the documentation and instrumentation of their activity. The main objective of this research program (anr-revea.fr) funded by the French National Research Fund (ANR) is to understand the daily management processes and the singular activities and tasks (research, selection, storage, arrangement, classification, use, modification, re-appropriation, creation, dissemination, pooling, etc.) of secondary school teachers around educational resources (middle school, high school). The disciplines studied are English, Mathematics, Physics and Chemistry, and Engineering studies.

3.1. Variable use of resources by discipline

Surveys (classroom observations, interviews with teachers) conducted by the project researchers showed similarities between disciplines: teachers use curricula as a

starting point for their sessions, as well as non-teaching resources (i.e., resources designed for non-teaching purposes), but also peer sites or student productions. Conversely, there are disparities related to disciplines: specific place of textbooks, different types of resources (ReVEA, 2015).

Thus, in English, teachers seem to be strongly influenced by institutional discourses that recommend the use of so-called «authentic» documents in order to teach students the linguistic and cultural elements of a language. The majority of them, particularly in high school, use non-teaching resources, particularly visual resources presented as memorization tools and triggers for a sequence. (ReVEA, 2015, p.8). Textbooks are more of a tool for course preparation than a «systematic support» for classroom activities (ReVEA, 2015, p.6).

In mathematics, «textbooks continue to occupy a key place», especially the classroom textbook, but it is mainly used to give exercises. Indeed, the latter are one of the criteria for the teacher's selection of textbooks: «these exercises must be sufficiently numerous and varied; there must be exercises for direct application of the course but also progressive, towards more open exercises; and these exercises must also be clearly presented (numbering, rubrics)» (ReVEA, 2015:27). If teachers can obtain a free pdf version of the book, it is displayed in the classroom; this possibility is one of the criteria for selecting a textbook, with instructions for using calculators and commonly used softwares. The resources of IREM (Research Institutes for the Teaching of Mathematics: univ-irem.fr) and APMEP (Association of Teachers of Mathematics in Public Education: apmep.fr), as well as the resources received in training are also mentioned by the teachers surveyed, in particular for the development of introductory activities. Finally, digital resources are very present in the work of mathematics teachers: use of spreadsheets, various softwares (Algobox, Scilab), or Mathenpoche (mathenpoche.sesamath.fr) exercises developed by Sésamath collective (ReVEA, 2015, p.9).

In physical sciences, textbooks are very present, especially when it comes to construct a sequence plan. But it is mainly «Practical works (PW) [that] constitute an important resource for classroom sessions... because some documents are reused after the PWs, and the construction of the sessions is guided by the progress of the PWs» (ReVEA, 2015, p.12). Teachers also use non-teaching resources, especially videos or images taken from the media and depicting, for example, a chemical disaster.

In Engineering studies, the situation is more difficult to identify because of the many specialties for which there is a wide variety of resources but not always textbooks. Instead, teachers use resources from the business world: manufacturer's textbooks, technical standards, samples of electronic components, reference documents, calls for tender, or specialized software or company platforms because these resources are references for students' work. The majority of resources are therefore digital and occupy a very important place. For certain specificities, these resources are even objects of teaching; this is the case for example with software such as *Scilab*, *MatLab*, *LabVIEW*, *MassWorks*, *DraftSight*, or *Cypcad*. It should be noted here that in general, and especially for cost reasons, teachers prefer to turn to free software, even if they are required to use commercial software (some teachers use «pirate» versions). Online resources come more from practice sharing sites, such as the *MyElec* forum (myelec.fr) or *MySTI2D* (mysti2d.net), than from institutional sites. Other resources are also mentioned by teachers: resources from higher education (especially PhD dissertations), professional journals, «resources from personal interests» and

student productions. Finally, the online training and collaborative work platform for Pairform@nce teachers (now M@gistère) was widely cited.

3.2. Legacy and trust: two modes of resource flow

The ReVEA surveys highlight four key processes in teacher activity around resources: the transmission of resources, often coming from peers and carried out during initial training or in the first years of teaching; the creation of a collection (material and digital) by the teacher throughout his or her career; the development of trustworthy networks of materials (sources considered relevant: books, sites, etc.) and peers; and the development of a network of teachers.

More specifically on legacy and trust, teachers request their peers first and foremost, especially close colleagues (often the same discipline and school) with whom they are used to working and with whom they can discuss the relevance of in situ resources, as resources have already been tested and therefore come with additional information. Resources are also received by heritage, particularly during training periods, and teachers are gradually building up directories (or collections); this is the case, for example, of mathematics teachers with IREM resources.

3.3. Production by collectives

Networks and teacher collectives allow teachers to pool and share resources. In France, collectives and associations are very active in the creation and exchange of resources. In her PhD dissertation on online teacher networks, Quentin (2012) counted about 80 collectives, the most famous of whom are Sésamath (mathematics), Weblettres (French), APSES (economic and social sciences) and Les Clionautes (history, geography and civic education). With regard to online resources for teaching, the sites of the associations are part of an abundant collection: personal sites, sites resulting from research work, and institutional sites (academic sites, disciplinary sites, etc.). In this proliferating landscape, collectives do not respond to the same rules. As Baron and Zablot (2017) show, while using the concept of commons in the field of teachers communities, sharing and appropriating resources doesn't have the same meaning for different collectives. In some of them, sharing only means using, or downloading, while in other collectives, contributing is considered as a duty. It should be useful, in their view, to examine precisely the way teachers regulate (more or less) collectives with «boundary rules».

The hive and the sandbox

Two organizational models emerge from Quentin (2012): the hive, which characterizes highly productive collectives underpinned by strong shared values, very restrictive and explicit rules that do not allow their production processes to be seen, and the sandbox, for exchange and mutualization collectives with flexible and implicit rules, publishing all their interactions and allowing dissemination and legitimization of teachers' practices. However, collaboration is not always easy: more than 70% of the members remain invisible against only a very few prolific speakers; the tasks carried out collectively are almost non-existent and discussions rarely lead to the creation of new knowledge shared by the group. Nevertheless, teacher networks enable their members to compare their practices with those of their peers: the most experienced teachers share their skills, and young teachers gain self-confidence.

Four user profiles are further distinguished: invisible and visible users, relay people that transfer information published by others, donors that share their own resources, and co-operators that collectively design resources. The question of profiles has also revealed sometimes ambiguous positions: users qualified as «consumers» or «looters», or in contrast to «hyperactive members who put themselves too much in the spotlight». Quentin (2012) shows, however, that professional networks facilitate the emergence and clarification of a professional identity through collective identity, thus creating a climate of trust that encourages learning and knowledge transfer.

3.4. Open educational resources

Other observations within the framework of ReVEA also point to activities and discourses around free educational resources (OER). One in the special education «vehicle maintenance» (professional high school) and Engineering studies and technology disciplines (college), and the other in physics and chemistry (high school). In physics-chemistry, teachers differentiate between paid and free resources, and are aware that some free content is not in fact free. In Engineering studies, the teachers surveyed mainly use software applications and documents used in industry, such as CAD (Computer Assisted Design) software for the representation and simulation of technical systems, programming software for embedded computing, or technical databases for automotive repair. Subscriptions and licenses—for use by students in computer equipped—are purchased by schools, at a reduced cost under an agreement signed in 2008 between AFNOR and the Ministry of education. There are, however, practices that circumvent the restrictions on access to and use of so-called «sensitive» documents or technical information considered necessary by some teachers: contacting the author of a doctoral thesis in engineering sciences about specific technical data not provided by the aircraft manufacturer, accessing a costly standard through a friend who is an engineer working in the industrial sector, or anonymizing documents so that one cannot access them. Finally, teacher networks exist where teachers exchange teaching materials free of charge, subject to registration or membership, such as the MySTI2D resource site mentioned above.

Thus, the place of textbooks, after examining teaching practices, no longer appears as central as it used to be. The compromise that led to its nodal position seems to have been in the process of deconstruction for some time now, as evidenced to some extent by the emergence of new resource access mechanisms that we are now interested in.

4. Towards a reconfiguration of resources supply?

4.1. Newcomers and destabilization of historical actors

Textbook publishing sector itself is undergoing major changes, which seem to call into question the balance between the various players involved. Newcomers have indeed emerged, whereas the dominant trend was more towards concentration of the sector between the three main school publishing groups (Hachette Éducation, Editis and Albin Michel).

In such an uncertain situation, the initiatives taken by newcomers to the school publishing market seem to have an effect on the strategies of historical players, as may be the case with productions by collective teachers (Abensour, 2013). One of the players causing the greatest concern for historical publishers, Lelivrescolaire.fr, has

quickly acquired an important place in the field. Co-founded in 2010 by a graduate of a business school and a history-geography teacher, the company, which publishes textbooks in eight disciplines (History-Geography, French, English, Spanish, SVT, Physics-Chemistry, Maths, Interdisciplinary Practical Lessons) and offers free access to their digital version, is the translation in the publishing sector of an initiative of a startup, Gutenberg Technology, also founded in 2010. The initial project is twofold: providing Gutenberg with a showcase for its publishing and production tools, and experimenting with collaborative production of Creative Commons licensed digital textbooks. In fact, the pool of authors, paid in royalties, is important: about 500 authors, with a waiting list system that allows for the anticipation of publications in new subjects or on other levels of study than the college.

The evaluators would be about 2,000, and are not remunerated (Interview: publisher). While the economic model of this new player has not yet been fully established, the pricing policy implemented, combining the sale of paper textbooks at a price equivalent to that of competitors, and free access to digital files, forced publishers to sharply reduce the selling price of digital licenses, whereas the prices charged until then could not compensate for the drop in paper sales. Lelivrescolaire.fr claims some 20% market share on digital textbooks, in the disciplines for which it offers its services, and 13% on paper (lelivrescolaire.fr, 2016), and also claims the 3rd place in French and history-geography. Sésamath's experience, which also markets paper textbooks (but in partnership with Generation 5, and after with Magnard editions), has previously inspired the company's strategic choices (as well as its ambitions in terms of cooperation and collaboration) (Interview: publisher).

In counterpoint, one of the strategies adopted by the publishers was to approach teacher collectives, whose name appeared likely to be as unifying as a brand name: Sésamath and Magnard Editions on the one hand, and Weblettres and Le Robert Editions (Editis) on the other hand, joined forces to produce a collection of printed textbooks. As part of the alliances forged by publishers, the case of the resource portals recently created under the Ministry's auspices is an interesting entry point for the analysis of ongoing change and strategies.

4.2. A particular form of alliance between actors: the case of BRNEs

The French Digital Education Plan

The creation of BRNEs takes place in a particular context, that of the «Digital Plan for Education» initiated in May 2015, and still in force today, following a national consultation on digital education. The stakes of BRNEs can only be understood by situating them in relation to the other implementations of this plan, so we give an overview below. The plan is part of a twofold ambition (Interview: Ministry): to renew teaching practices and encourage the emergence of «European champions» in the field of digital education, by developing four axes: training, teaching resources, equipment and innovation. These four «pillars» have resulted in complex technical achievements, involving players from different backgrounds.

On the resource axis under discussion here, three tools have been announced: the Myriae.fr portal, intended to provide access to all resources published by private or public actors, with the objective of promoting referral practices among teachers; a content access manager (the «GAR»), a secure identification service enabling users to

use a single access point for resources requiring identification. It is to this last tool that we are more precisely interested in the following lines.

BRNEs (Banks of educational digital resources)

BRNEs are portals accessible to teachers, National education staff, their students and families under certain conditions, offering access to «resources» or «content» (media, activities and sequences) and «associated services» (resource editing, scriptwriting and student monitoring tools). The volume of resources per portal is between 1000 and more than 3000, knowing that these numbers add up elements of variable granularity: «sequences» or «paths» (depending on the terminology adopted by the publishers) are counted in the same way as elementary or intermediate level grains. These three categories correspond to the expectations of the call for tenders, and if, sometimes, the levels of granularity, from the micro (granular unit) to the macro (scripted path) via the meso (module or activity) do not perfectly overlap, the tripartition has been widely applied. The «associated services» that make up the interactive side of the portal, since it encourages teachers to rearrange, compose or modify resources according to their pedagogical choices, were prefigured according to «teacher needs», accounting for 70% of the practices common to all teachers and 30% of the practices specific to the disciplines (Interview: Ministry1).

One of the market's objectives (interview: Ministry 1) was to encourage publishers to adapt their productions to audiences with disabilities (particularly dys-disorders). The observations made (interview: Ministry 2), as well as the results of an audit conducted by a specialized firm show that the objective was not achieved, even if the approach could appear a posteriori as «an evaluation matrix and a progress matrix addressed to the industry», so that other ministries wanted to draw inspiration from it (Interview: Ministry 1). The case of accessibility is thus in line with the industrial impetus, which is already apparent from the announcement (in 2012) of the objective of «bringing schools into the digital age». Between the requirement of command and evaluation procedures, there are also two sides to this policy: impetus and evaluation, the process having been an «opportunity to measure the maturity of French industry» (Ministry1).

Competition or partnership: what relationship between public authorities and industry?

Even if public authorities and publishers need each other, both appear to maintain a sometimes stormy relationship. For example, when official curricula are not renewed fast enough, school publishers lobby («Les Éditeurs d'éducation») claim new ones. Otherwise, a «competition» between public publishers —mainly Canopé (which is the public operator of the Ministry for publishing, producing and disseminating educational and administrative resources for teachers) and the CNED (Centre national de l'enseignement à distance)— and private publishers has led the Syndicat national de l'édition to demand commitment to drop out.

However, the publishers interviewed do not make it a lively question, even if some friction points appear, particularly in relation to «Prep' Exam» and «English for Schools», two free resources published by the CNED. In the case of BRNEs, relations between public and private actors are more often presented in terms of complementarity and «partnership».

In the recent context of digital resource production, the type of relationship between the department and publishers differs from the usual way in which a program is established by the department, and the supply is then freely declined. The simplified tendering procedure «with negotiation» is significant here. It is in fact a mechanism where the sponsor (the Ministry) draws up specifications, but where the provider can make new proposals, and where negotiation time takes place afterwards. In the eyes of the actors involved in the process, it has therefore emerged as a form of «co-construction».

4.3. Two opposite logics?

At this stage, it is not possible to make a radical distinction between the production process in traditional school publishing and the one that would have prevailed in the case of BRNEs. Perceptions differ according to the actors involved, and clearly the organization modes are not identical from one consortium to another. Nevertheless, the discourse of the actors interviewed reveals two distinct logics: the first one relying on a tried-and-tested industrial organization mode (textbooks publishing) and the other experimenting with organizational modes less dependent on editorial control. Obviously, we do not intend to evaluate these two ways of doing things qualitatively, but to identify the main lines of force that manifest themselves in each other's speeches.

With all the precautions that must be taken at this stage of the analysis, it seems useful to us to situate the trends described below from the perspective of the theory of cultural and educational industries, one of the «components of information and communication sciences» (Miège, 2012). Indeed, this is a heuristic framework that has given rise to work in the field of educational industries (see for example Mœglin, 2007 and Bréda *et al.*, 2012) after having been tested for cultural industries, although these two sectors remain quite distinct.

Designed to reflect fluctuating situations, in environments where the value of products and services seems to be uncertain, this theoretical framework seem to us to be able to shed light on a situation where divergent forms of organization are played out, but federated by a shared objective. Model analysis is based primarily on the examination of four distinctive features:

- the method of payment for the goods produced, which can range from individual purchases, to the monetization of user-generated data with third parties;
- identification of the actor able to occupy the central position, i.e. to determine the rate and methods of remuneration of the different actors in the production chain;
- identification of the actor occupying the function of interface between upstream (design) and downstream (use —or consumption— of goods);
- the specificities of the property: is it an acquired copy of an original, a right of access to a catalogue offer, the possibility of accessing a live stream built from a programming grid?

In this perspective, the most striking fact for BRNEs is the reduction of the four criteria to two. In the initial analysis at least, the specifications defining the main characteristics of BRNEs model are:

- the payment of all the goods and services accessible by BRNEs being provided by the State, users do not contribute in any way, and the players are not obliged to seek a viable remuneration model.
- the specificities of the supply have been determined upstream: it consists of an extended access right, allowing data to be extracted from its initial environment.

Otherwise, even if the selection of responses to the tender is also the responsibility of the Ministry, it is the pilot structures of each consortium that determine the way they are organized and remunerated. Two trends are emerging.

On the one side, actors who present the portals' production process in the perspective of a fairly traditional publishing process, to which additional steps have been added, with the ambition of «rationalizing» the digitization process (Interview: publisher). In this way, the portal's production is based on the exploitation of existing resources, i.e. resources included in several of the company's textbook collections, the acquisitions of a platform called «LMS» (Learning Management System), and in order to enrich an interactive exercise repertoire, the recruitment of new authors. Editorial control remains the responsibility of the publisher, and the provision of functionalities that are foreign to previous productions leads to the occasional use of service providers.

On the other side, a project manager presents his approach from the point of view of «techno-pedagogical engineering», i.e. a process that leaves teachers recruited as authors with full control over formats and content, based on their knowledge of the actual conditions of teaching practices in the classroom (Interview: publisher).

Another project manager presents the operation of the consortium from the point of view of «agile methods», put on the same footing as «R&D» and «startup mode». While agile methods essentially consist of favoring the integration of end users in the development process, and segmenting it into close delivery stages, they are mainly opposed in principle to the linear development of a project based on an initial specification and a recipe. However, it is this latter approach that governs the whole BRNEs project, even if an «agile» approach may have been a source of inspiration here and there.

4.4. Who benefits from BRNEs? Recipient ambiguities

In particular, the place of users in the design and production phases seems to us to be decisive, because it points to a persistent ambiguity in the editorial projects specific to the school world (including textbooks). If we consider that the end user — the recipient of the published product — is the teacher, then he is at the heart of the project; if we consider, on the other hand, as some publishers seem to think, that the end user is the pupil, or even his family, it is different. As an author, the teacher is well mobilized in a manner similar to what can be observed in the design and production phase of textbooks. However, his intervention as an evaluator outside the production process is shifted downstream, at the time of the evaluation carried out by the teachers designated in the four academies selected by the Ministry. The mechanism of the «round table» implemented by textbook publishers seems to be lacking here, probably because of the strong constraints of the production schedule: everything else being equal, the production schedule of BRNEs was around eight months shorter than the

one of textbooks. Even more important is the absence of testing in a learning situation, within a classroom. The evaluation period by the experimental teachers took place shortly before the summer holidays of 2016, so that the tests actually carried out in situ by some teachers (Interview: teacher) were carried out in the absence of the pupils.

As for pupils themselves, because they are not considered as buyers or prescribers, they are not consulted, unless we consider the test phase of textbooks in class as an indirect consultation of their preferences. In fact, the student figure is projected in a way that is more or less based on the experience that authors and publishers may have of students' practices or preferences. On this specific point, there are few differences between textbooks and portals.

5. Conclusion

All the points discussed above may leave the impression that we are witnessing the emergence of scattered trends: teaching practices varying according to subject matters, a more or less peaceful coexistence of two logics of production and access to resources, public policies that support both of these logics, and digital tools that sometimes combine them. However, separating three levels of analysis (the actor, the instrument, the system) as Baron, Bruillard & Lévy (2000) do, for example, could help to perceive interactions between each of these three strata, which were not always perceptible until now.

On the system side (meaning here the macro level), the ambitions of public policies to develop tools are no longer translated (only) into campaigns to acquire materials, but into the production of resources co-constructed with actors who are attached to other economic models. From an instrumental perspective, the resource portal model seems to compete with textbooks model, even if it is not intended to replace it: the two coexist, and each contains traces of the other. Moreover, resource portals themselves have a vision of what the teacher's activity should be, from the point of view of the school institution: conductor and harmonizer of a score composed of documents with clear legal status and considered as «grains» of quality. Without anticipating uses that remain at this stage potentialities and not observable practices, it seems to us that these emerging trends are remarkable enough to be followed in the long term. For example, are BRNEs —because their conception (in the context of the contract with adapted procedure) and their evaluation by teachers on duty identified by their superiors— the sign of a new form of control on the production of resources, of which Bruillard (2005) already distinguished from the warning signs? A fairly large number of questions result from this, concerning for example the positions of the various actors placed under the Ministry's supervision (it is likely that not all of them are on the same axis), or the way in which the resources and associated services can «prefigure» teacher activity, in the sense that Jeanneret (2014, p.14) gives to the word: «the latitude available to certain actors to organize the conditions of communication» and, in this case, teaching practices.

6. Corpus

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