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# Innovation in Socio-Historical Context

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## 1.1. Meaning and significance of the word “innovation”

### 1.1.1. *The origins of innovation*

Innovation is part of today’s habitual way of speaking which consists of projection into the future, that is, transformation of the present time to invite individuals to become “project animals”: teaching people to do projects is our contemporary redemption. Thus, “innovative” projects abound, furnished with the best assets in their supposedly beneficial aspirations. Their establishment and inevitable decay, up to disappearance, resulting from their confrontation with complex social reality, are filled with contradictions.

However, innovation has not always been synonymous with development regarded as positive, linear and rational. From the Middle Ages up until the 16th Century, innovation was seen as disruptive, transgressive, disturbing, even Satanic. It was urgent to maintain institutions in their current state, and to struggle against attacks linked to any desire for transformation. Respect for institutions such as the Church was fundamental. Whoever wanted to introduce something new was condemned as a heretic. We must understand that there were two kinds of innovation: those carried out for the material benefit of people, regarding which religions had contrasting positions, even internally; and those which innovated in religious practices themselves, for example, saying the Catholic mass in the vernacular language instead of Latin. It is thus impossible to state that religions have always been firmly

opposed to innovation; they have often subtly played with it in order to reinforce their identity and their contemporaneity.

Michel de Montaigne hated innovation: “Nothing oppresses a state,” he wrote, “except innovation; change only brings about injustice and tyranny.” In his *Essays*, innovation is synonymous with “novelty”, a word which the author used in a pejorative sense.

*The Quarrel of the Ancients and the Moderns* came from the need for solid and stable models, as society was perceived as intrinsically fragile and the fear of returning to primeval chaos was strong. Diderot himself wrote: “all innovation is to be feared in government.” The meaning of the term innovation was, in that era, apocalyptic, in strong contrast with the modern flavor of the term. This *Quarrel* illustrates the tension between these two extremes.

The rise in power of science and technology has led us to a positive connotation of the term, linked to examples of inventions as brilliant as they are useful. “From the start of the 19th Century, innovation became the god that we still worship today.”<sup>1</sup>

As the taste for innovation became stronger, the definition of the word became radicalized to the point of excluding tradition and imitation. Innovation thus took over in all domains, including that of painting, where modern art appeared, or in literature, surrealism. A kind of “terrorism” of innovation seems to have gradually appeared, emerging from a blank slate. Girard would go as far as to speak of “self-deception”. He raised the question of the very important role of imitation, which seemed relegated to the background or even to disappear, in the process of learning<sup>2</sup>. He added:

“When the humility inherent to the master-disciple relationship is seen as humiliation, the transmission of the past becomes difficult, or even impossible.”

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1 GIRARD R., *La voix méconnue du réel. Une théorie des mythes archaïques et modernes*, Grasset, Paris, 2002.

2 WINIKAMEN F., *Apprendre en imitant ?*, PUF, Paris, 2015 (republication).

In other words: innovation, imitation and tradition are components of the same process of social evolution.

### **1.1.2. Innovation as the inverse of tradition**

There is no innovation without tradition, that is to say, without the roots which fertilize innovation, invite it to build on the old to create the new, to give it meaning. Was it not Paul Ricoeur who said:

“Tradition in the singular means transmission of things said, of beliefs professed, of norms assumed. It is thus first of all to cross a temporal or cultural distance. Now, this crossing is only possible if tradition remains half of the couple which it forms with innovation. In my previous work, I referred several times to this tradition-innovation couple, tradition representing the side of the debt owed to the past and the reminder that nothing comes from nothing.”<sup>3</sup>

We must add here that tradition is endlessly revisited by those who consider it, including for pedagogical innovation, through pedagogues of the past such as Pestalozzi, Montessori, Steiner or Freinet. It is doubtless through contemporary reading, often unconsciously, of the great pedagogues of the past that innovation, the other side of the coin, appears. Moreover, as Ricoeur specifies in the same work, this is not so much in what might have happened than in the unfulfilled promises of the past. In addition, this past is part of a future for those who lived in it, in what Koselleck<sup>4</sup> calls the “past future”.

In fact, innovation frequently emerges from dissatisfaction felt at the present, thus becoming a possible response to overcome this dissatisfaction. Now, the latter does not arise from nothing, but is part of the momentum of a reality which must be surpassed. This momentum is the product of a knowledge of the past and its possible futures which were not able to come to pass. In this sense, pedagogical innovations are strictly linked with the past experiences, sometimes in an unconscious manner, of their initiators, if

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3 RICŒUR P., “Identité narrative et communauté historique”, *Cahier de Politique Autrement*, October 1994.

4 KOSSELÉCK R., *Le futur passé. Contribution à la sémantique des temps historiques*, EHESS, Paris, 1990.

we consider that a society's relationship to its past experiences and to its hopes conditions its possibilities of action. Koselleck adds:

“Throughout modern times, the difference between experience and expectation never ceases to grow or, more exactly, modern times only experience themselves as new times from the moment when expectations, in their impatience, become more and more remote from all previous experience.” (p. 324)

All this is linked to the fact that innovation cannot dispense with time, particularly with what Bachelard<sup>5</sup> describes as psychic time: “duration is only a number whose unit is the moment.” It is “a dust of moments, more, a group of points which are grouped together more or less closely by a phenomenon of perspective”. It is doubtless because time is seen as the present moment that the past is mishandled, when it is consubstantial with creation and innovation!

### **1.1.3. Innovation versus invention and creation**

Nietzsche wrote that “only that which has no history can be defined”. Now, although innovation is indeed a concept which, since the 13th Century, has been used extensively in many societies, it is our current era that uses and abuses it to designate exponentially a collection of activities considered to be economically as well as socially beneficial.

First of all, three words are often confused with innovation and have a common point of involving the new: invention, creation and innovation.

Invention has marked our history: throughout time, human beings have sought to increase their power to act on their environment and thus to acquire ever more powerful intellectual and material means<sup>6</sup>. It consists of an act often seen as the fruit of a single person to whom we give the name of “inventor”, even if, when we look from further away, this invention is closely linked to its context. Another word is very close to it: discovery and, for example, discussions around the discovery of the printing press by Gutenberg bear witness to this. In fact, although the inventor and the

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5 BACHELARD G., *L'Intuition de l'instant*, Stock, Paris, 1932.

6 LEROI-GOURHAN A., *L'homme et la machine. Evolution et techniques*, Albin Michel, Paris, 1943.

discoverer are clearly designated and often glorified, they did not spring out of thin air, but in a social context which allowed their emergence. Simply put, until recently, context has not been taken into account in the forms of thinking about society.

We find this in historical perspectives, which were once stories about great men and the great events which marked them out, while now history is centrally focused on the daily lives of people<sup>7</sup>. Now, concerning Gutenberg, it is said that other individuals of the same era were on the cusp of inventing the printing press! Galileo in 1623 evokes the inventor of the telescope, making him out to be an opportunist in a situation where its components were at hand and a possible new usage was conceived:

“We are certain that the inventor of the telescope was a simple optician who, manipulating by chance various shapes of glass, also happened by chance to look through two of them, one convex, the other concave, held at different distances from his eyes. He realized with astonishment the effect they produced, and from there, discovered the instrument.”

The inventor is often convinced that his idea, formulated as a dream or a utopia, will be called upon to become a founding practice.

Schumpeter himself distinguished invention (*art of insight*) and innovation (*the carrying out of combinations*). The first is exogenous with respect to the field, whereas the second, innovation, is an endogenous factor, a process that arises from the field and only has meaning in its socialization: “Invention is an exogenous factor from the endogenous character of innovation.”

Innovation is thus an invention which has succeeded, in the sense that it becomes integrated into people’s social practice towards a goal which subsequently becomes institutionalized, that is, becomes part of the habits of people and is thus considered more as innovation. In innovation (which some call *rupture* to signify that it renews certain ideas), *it is the modes and habits of consumption and of life which change*. For example, the electric toothbrush was invented around the 1940s, but it was only 20 years

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<sup>7</sup> On this theme, see the works of Michelle Perrot on women and those of Arlette Farge on archives.

afterwards that it became an innovation, through the process of progressive trivialization of its use.

The path would be that shown in Figure 1.1.



**Figure 1.1.** *Process of development of innovation*

As for creation, it arises from a very strong personal component, motivated very little by the production of a technological object aimed at improving practical life. D. Anzieu<sup>8</sup> distinguishes two components of creation: one linked to the psychic work of creation, the relationship of the author to the work, which he calls poietic: the other, named aesthetic, which concerns the fate of the work, the relationship between the work and the public, including its social recognition.

The poietic is envisaged as a creative process obeying general laws which the author attempts to release through experiences and works already completed, and he marks out “five stages of the path of creation” (these stages are not linear; they can be zigzag, spiral or irregular):

- inspiration consisting of an interior apprehension, in the same way that we may be seized by cold;
- return to consciousness in a sort of regression;
- the central core around which the work will materialize and be constructed;
- the accomplishment in detail of this invention, that is, composition in its proper sense;
- the creator makes the difficult, arbitrary decision that their work is finished and ready for public view.

<sup>8</sup> ANZIEU D., *Le corps de l'œuvre*, NRF, Paris, 1981.

Freud<sup>9</sup> discusses the multiplicity of parameters (sexual, social, familial, psychic, etc.), which are involved in all creative processes. The creator is seized, it is not him or her who seizes, by a profound force that mocks reason and consciousness. Let us not forget that the Greek word for creation is *demiurgia*! Freud adds, concerning Leonardo da Vinci:

“[there is] a special disposition – though about its determinants (which are probably organic) scarcely anything is yet known. [...] We consider it probable that an instinct like this of excessive strength was already active in the subject’s earliest childhood. Amongst other things it involves sublimation, that is, the state of changing its immediate goal for others, not sexual, possibly placed higher on the scale of values.”

However, Anzieu explains that the process of creation can also be collective. But, from his point of view, this collective creation is rather made up of individual creations (and he gives the example of the surrealist painters whose mutual influences are undeniable, while each is still credited with their own creation). Consequently, innovation is not a creation.

#### **1.1.4. Innovation and creativity: a brief incursion into school**

The creative process is rare and not to be confused with creativity, with which all individuals are blessed, if not everyone expresses it. The difference between them comes from the “launch”, this interior apprehension.

Moreover, Anzieu certainly distinguishes creativity and creation when he writes:

“So-called minor arts such as decoration, gastronomy, weaving, pottery, etc., demand creativity[...] this is an area in which there is not considered to be creation. So, we speak of innovation instead of creation.”

Does using the word innovation instead of creation (especially in the arts) indicate enlarging the field and the number of individuals who may be designated creators? Does the word innovation therefore become a higher

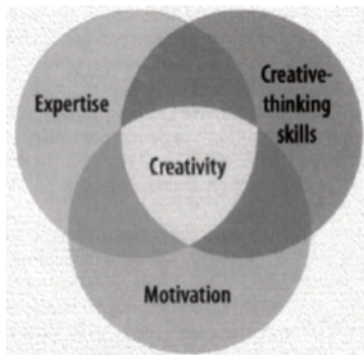
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9 FREUD S., *Leonardo da Vinci and A Memory of His Childhood*, Gallimard, Paris, 1987.

category, encompassing all the words whose meaning is related to novelty? This leads Anzieu to say that, currently, nothing becomes worn-out more quickly than the new!

Creativity is thus a capacity that each of us possesses; it consists of the personal dispositions and opportunities which induce creative behaviors. There exist many training tests and exercises which allow us to develop this capacity. These range from brainstorming to schemes for developing ideas, along the lines of: “I’m going to a desert island and I can only bring five things: what, and why?” Similarly, Bono’s six-hat exercise which teaches us to sequence thought in six distinct domains, each represented by a different-colored hat, is another example (white for neutrality in the quest for facts, red for the emotional part, green for creativity, black for pessimism, yellow for optimism and blue for the organization of ideas).

Creativity is equally the result of three indispensable criteria: expertise (you must be familiar with and possess knowledge in the domain where this creativity will develop); being motivated to change things, and have divergent thinking which often creates relationships between thoughts or things which are usually perceived separately, with no relationship (what might be called the competences or capacities of reorganization), as shown in Figure 1.2.

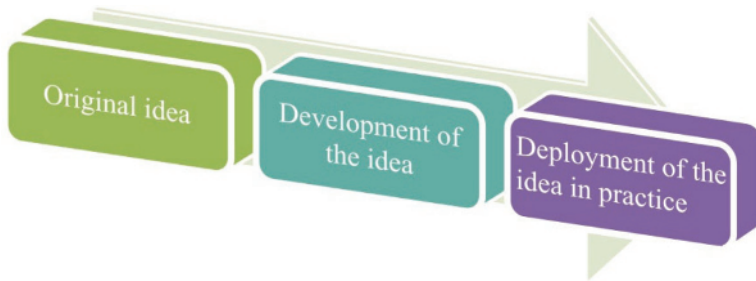


**Figure 1.2.** *Determinants of creativity (source: Innovation, Education and Training in the EU Member States, 2009<sup>10</sup>)*



This capacity, to produce content which is both new and adapted to the constraints of the situation or the task to be performed, is enacted in three phases:

- the emergence of an idea (of the order of insight);
- the development of this idea, since we all have original ideas, but they remain unused or censored;
- the deployment of the idea, which may furthermore be taken up and deepened by what we may call a change agent who is none other than the person who had the idea.



**Figure 1.3.** *The three phases of implementation of creativity*

Creativity becomes the starting point of innovation, revealing itself to others who may adopt it or draw inspiration from it. In firms, there are people known as “change agents”, on the lookout for these original ideas for which they have the foresight to see the possibilities. An innovator launching an innovation all on their own is rare at present, even in schools where work is increasingly carried out in teams. However, the role of change agent does not officially exist in middle schools or high schools. This is a person who will spontaneously support an idea as it is put into action (which may be done by the head of a school or by a leader of the teaching staff). According to Frascati’s manual, “innovation is an idea transformed into something that can be sold”; doubtless, this is the stage at which a change agent may intervene.

In the field of schooling, creativity thus becomes a competence which the students must also acquire. Many new reforms of the educational system insist on the acquisition of this competence as a fundamental step. To integrate with contemporary society, the teacher is thus required to provide

activities for students to develop their own creativity. They are led to develop what Puozzo calls “a pedagogy of creativity”<sup>11</sup>.

Researchers have studied the ways in which schools might encourage the development of the competence of creativity among students, in particular in music courses.

Thus, Giglio<sup>12</sup> identified five dimensions, which indicate ways in which teachers may take charge of developing this competence among students and, on that basis, create possible modules of professional training. These five dimensions are:

- the explicit formalization of a requirement to develop creativity among students in programs for educational reform (institutional support);

- the ability of teachers to envision creative activities, or representations of this creativity by teachers (knowledge of expectations);

- creative activity itself in its role as a source of creativity, supported at the same time by consciousness of creating, in a practice of creativity linked with research and development;

- necessary social interaction as a facilitator of development for this competence (creativity is based on collaborative and emulative activity at school);

- forms of contribution in setting up creative activities in the content of teaching and the use of new tools, such as digital devices. Training teachers to attain the goal of developing the competence of creativity among students cannot be done without considering these five dimensions.

As said previously, every individual possesses the potential for creativity. They can seek it out and develop it, or leave it lying fallow. The reasons for such an attitude are multiple; however, current society increasingly encourages every individual to be creative, if only to cope with rapid social and technical change. Each person is encouraged to be creative in their working lives.

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11 PUOZZO I. “Pédagogie de la créativité: de l’émotion à l’apprentissage”, *Éducation et socialisation*, 33 | 2013, published online 1 September 2013, accessed 1 June 2017. See <http://edso.revues.org/174> (DOI: 10.4000/edso.174).

12 GIGLIO M., “5 dimensions pour étudier le changement de l’éducation du maître pour améliorer l’apprentissage créatif”, *Journal for Educators, Teachers and Trainers*, vol. 5, no. 1, pp. 80–89, 2013.

It is also in this sense that creativity becomes a priority in the development of the competences of students in education, to face the uncertainties of the 21st Century society<sup>13</sup>. There are tests which provide us with indications of a person's potential to develop their creativity and to innovate. The two main examples are those of Torrance<sup>14</sup> and those of Guilford<sup>15</sup>, based on convergent thought and divergent thought, the latter being conducive to creative activity.

There are, however, ways to increase this capacity for creativity, which is based on dispositions such as openness to new experiences, cognitive and affective variables such as perseverance, self-esteem or a tendency to active participation in social networks. It is clear that if we want to develop this competence in schools, the role of teachers will have to change to allow for free expression by students, while at the same time showing them paths to perfection.

Certain pedagogic practices are based on inviting artists into classrooms, who can encourage more open and original behaviors without substituting themselves for the teacher.



**Figure 1.4.** *The five components of creativity*

13 MILLER R., LOONEY J., SIEMENS G., *Assessment competency: knowing what you know and learning analytics; it's time for a breakthrough*, *Promethean Thinking Deep*, Research Paper no. 3, Promethean Education Strategy Group, Blackburn, United Kingdom, 2011.

14 TORRANCE E.P., *Torrance Tests of Creative Thinking: technical-norms manual*, Research Edition, Princeton Press, Lexington, Massachusetts, 1966.

15 GUILFORD J.P., *Characteristics of Creativity*, *State Office of the Superintendent of Public Instruction*, Gifted Children Section, Springfield, Illinois, 1973.

Figure 1.4 sums up the five possible components of creativity.

Creativity has been widely studied in the United States, and two authors have carried out research in this area: Robert J. Stenberg and Tod Lubart. They define creativity as follows: “the capacity to produce work which is at once new (that is, original and unexpected) and appropriate (that is, useful in relation to the constraints of real work)”<sup>16</sup>.

Creativity is doubtless the central quality of all innovation<sup>17</sup>; without it, it is impossible to escape from habitual patterns of thinking, which Watzlawick describes as type 2<sup>18</sup> change (*thinking outside the box*). However, every person can be creative without necessarily being innovative, meaning that even though innovation needs creativity, the latter will not necessarily become innovation. The latter demands a more complex process of social change, composed of negotiation and creation of networks – that is, of strong social capacities.

## 1.2. Innovation in the world of beliefs and values

If there is a whole hidden area at present on the subject of innovation, it is that of religion. This becomes an important question in the current context of the exponential development of currents based on old or new religions. The etymology of religion, based on the meaning of “relinking” people to each other in a “communion” of shared “beliefs”, of faith, leads to a link with innovation as the aspiration for a better future world (a sort of Parousia).

The parallel between innovation and religion, in a kind of abandonment of physical time for eschatological time, seems hidden among current positivist reflections on innovation. A hot topic if there ever was one!

Yet, the famous study performed by Max Weber on the sociology of religions marked the beginning of reflection on this link between religion and innovation. This study tried to show a possible link between religious doctrines and the innovation-producing structure of the Western economy. Weber thus designed a plan of comparative study of religions and economies

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16 STERNBERG R., LUBART T, *Handbook of Creativity*, Cambridge University, 1999.

17 On this topic: “Vers une éducation plus innovante et créative”, *Dossier d'actualité, veille et analyse*, no. 70, Institut français de l'éducation, Lyon, 2012.

18 WTAZLAWICK P., WEAKLAND J., FISH R., *Changements: paradoxes et psychothérapie*, Le Seuil, Paris, 1975.

and their mutual influence. The constitution of an “ideal type” allowed him to focus on the multiple and contradictory components of liberal capitalism as it existed in that era – that is, an economic system in search of profit, of ever-greater profitability, enslaved to the order of the market, based on a rationalization of speculation which summarized for him “the spirit of capitalism”. American civilization was his reference point, notably the writings of Benjamin Franklin which reflected this particular ethic. In other words, Weber offered a comparison between Protestantism and Catholicism, stressing that the first, by the very fact of its principles, allows innovation, in contrast to the second.

In fact, Protestantism is based on the redemption of sins (indulgences). Thus, each person may take charge of their own life’s project, leading towards an individualism which is little seen in Catholicism, where the community takes precedence. Moreover, Protestantism invites each of the faithful to read the Bible for themselves, to make their own interpretations of it and to discuss them with others (which implies everyone knowing how to read). On the other hand, the Catholic Church is based on the interpretive filter of priests who tell the faithful what to think, in a sort of collective submission.

Furthermore, Protestantism does not have the same relationship to money, which can be used in market transactions, while the Roman church imposes a vow of poverty and of everything pertaining to finances, which seems to link it to other religions such as Islam. The condemnation by the church of usury is based on biblical texts such as the famous Deuteronomy 23:20-1, where usury is declared lawful for the enemies of the faith. Of all merchants, the usurer is the most accursed, because he sells something given by God and thus sells something which does not belong to him. Time is given to man, and he may not construct it and claim to dominate it<sup>19</sup>.

This somewhat brief comparison allowed Weber to conclude that the troubling proximity of the outbreak of innovations in Germany, for example, was linked to the relationship with the world dictated by the dominant religion, while in France, the Church hindered the development of innovation and commercial exchange. However, at the same time, we might observe commercial and innovative development during the Renaissance in

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19 “You shall not lend at interest to your brother, whether it be a loan of money or of food, or of anything for which interest is demanded. To the foreigner may you lend at interest.”, *Deuteronomy*, *École biblique de Jérusalem*, 23, Éditions du Cerf, Paris, pp. 20–21, 1956.

Florentine society. This latter was of course Catholic, which somewhat contradicts Weber's intuitions. However, he can be credited with posing the question of links between innovation and religion.

As a result of his illustrious work, many debates have taken place and still continue. J.M. Berthelot<sup>20</sup> analyzed Weber's explanatory structure to take account of the relationship between Protestantism and capitalism:

“This relationship contains not two but three levels – that of homologies between Protestant ethics and the spirit of capitalism, that of the transformation of religious asceticism into the Puritan way of life, and finally that of the structural effect of a change in behavior of certain actors within a given tradition. Protestantism is an ethic and the matrix of a new ethos whose secularized reflection we find in the spirit of capitalism.”

However, Weber strikes a tone closely linked to the conception of innovation as situated in a liberal capitalist market. He writes<sup>21</sup>:

“The first innovator encounters mistrust... How can we not see that only his uncommon strength of character enables the new-style entrepreneur to keep his composure? [...] It is only by virtue of ethical qualities which are well-determined and strongly developed that he also finds the ability to inspire his clients and workers with absolute confidence in his innovations.” (p. 71)

He reserves a place for Judaism which, due to its history, is based upon insecurity. Due to this, for him, “Judaism stands on the side of venture capitalism and speculation; in a word, its ethos is that of a capitalism of pariahs” (p. 201). We can easily see here the image of the hero of capitalism found in the work of the founder of innovation within capitalism, namely Joseph Schumpeter.

However, Max Weber's thesis was strongly debated at the time and found some opponents. For example, H. Karl Fisher considered Weber's book to be an overdetermined text, showing confusion between the spirit of capitalism and German investment, in the sense of this openness to

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20 BERTHELOT J.M., *L'intelligence du social*, PUF, Paris, p. 33, 1990.

21 WEBER M., *The Protestant Ethic and the Spirit of Capitalism*, Gallimard, Paris, 2004.

innovation. In fact, it pertains to the German population's idea of having a profession, one based on the feeling of duty fulfilled in its very exercise. The latter is thus "the chief content of a person's moral action", and money is a means of exchange par excellence. Thus, we better understand that the transfer of feelings operates precisely on the field of value added to money. Issues of religion do not come into it. And this author adds that the Renaissance capitalists, in Genoa, Florence or Venice, demonstrate that, in the medieval era, the capitalist spirit was also able to exist within Catholicism – even if we remember the strong presence of Savonarola and his school. There is thus a parallelism to be drawn between the spirit of capitalism and religion, but not causality; the latter must be found elsewhere.

Such statements, though, only bind their author. For others, they are not solidly founded and only reinforce Weber's thesis on the idea of a particular capitalist ethos. M. Gauchet<sup>22</sup> also expresses reservations as to the unilateral and obvious link between the "spirit of capitalism" and "ascetic Protestantism", and considers that it is "the leading edge and the emergent breakthrough of an immense subterranean movement which, little by little, imposed the active optimization of the terrestrial realm in place of the old restrictive submission to the intangible".

The arrival of Lutheran and Calvinist principles enabled behaviors more consistent with the options of capitalism, in particular allowing financial usury, "making money work", something unthinkable in some religions where the vow of poverty and rejection of financial interests are basic principles. Conversely, the Catholic Church was a brake on overt innovations, eager to exploit financial resources as a motor of innovation.

The resistance of the Catholic Church envisaged by Weber allows him to use this explanation. It is true that the image of the Catholic Church of that era was synonymous with the maintenance of tradition and the structural inability of its ecclesiastical society to renew itself, ignorant of industrial society and its effects, and organized around the mainly rural world, as existed before 1870. Did not Denis Diderot say that "when the priest favors innovation, it is bad; when he opposes it, it is good"?

The papal encyclical *Rerum Novarum*, concerning the condition of the working class, 1871, rejected any liberal doctrine while still being mindful of

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22 GAUCHET M., *Le désenchantement du monde*, Gallimard, Paris, p. 100, 1965.

the conditions of workers. Funnily enough, this text emphasizes that social equality is not a good thing to the extent that inequality is beneficial to the body politic, allowing it to fulfill the set of functions necessary for civil society. Such an approach runs up against the innovator invoked by Weber whose very basis is equality, to the extent that every single person can innovate in an open market society. For the Catholic Church, everyone has their place in society, even – and maybe especially – when it is unequal, this inequality not being felt as an injustice, but as what must be. This inevitable and necessary inequality is reinforced by the condition of man after the original sin.

This link between innovation and religion is above all seen as something demiurgic, leading us to view innovation at the same time with fascination, attraction, fear and revulsion. Does Greek mythology not speak of Prometheus being punished for having stolen fire from God for men<sup>23</sup>?

In *Prometheus Bound* by Aeschylus, Prometheus responds to the coryphaeus that it is based on fire that men will learn many arts from him. There is in innovation a kind of messianism that sees progress<sup>24</sup> as the completion of creation. These two elements – technical modernity and arrangement into capitalist societies – proceed from the simplifications of Max Weber. Moreover, it is sufficient to note the extent to which the Catholic religion, even if some religious groups still refuse modernity, especially in the conduct of the liturgies, has been affected by it through, for example, the electrification of churches. A religion can remain doctrinally correct while still benefiting from technical advances, that is, from innovations.

However, this idea of a link between innovation and religion is not exhausted, and some of our contemporaries try to find explanations for it not in religion itself, but in the differentiated practices which are manifested within it. Researchers on this question are convinced of a link between religious practices and the economic and technical development of a society. We are no longer truly dealing with religion, but with religiosity.

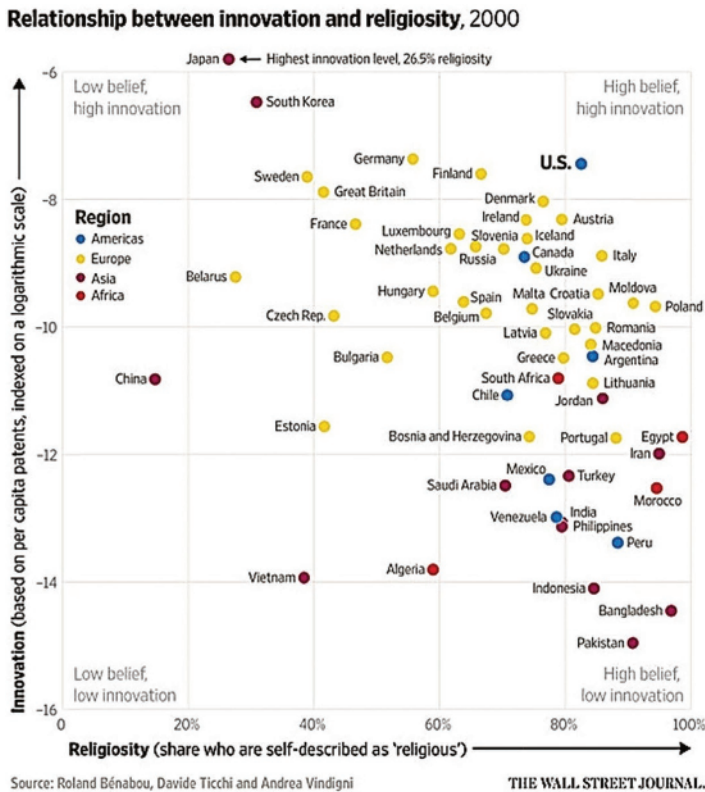
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23 LAGREE M., *La bénédiction de Prométhée: religion et technologie*, Fayard, Paris, 1999.

24 We will deal separately with the question of innovation and progress. See section 1.4.



A preliminary survey was carried out<sup>25</sup> in several countries to compare them to each other in 2000. Religiosity was defined as an individual position with regard to 11 parameters measuring attitudes towards openness or refusal of innovation and five parameters identifying the degree of religiosity (belief in God, importance of religion, importance of God in their life, perceived expectations of the Church). Figure 1.5. plots the macroresults against each other according to country, as a function of two opposed parameters (strong or weak belief in religion, strong or weak attitude towards the development of innovation).



**Figure 1.5.** Relationship between innovation and religiosity in several countries. For a color version of the figure, see [www.iste.co.uk/cros/innovation.zip](http://www.iste.co.uk/cros/innovation.zip)

25 This survey was carried out by three American researchers: BÉNABOU R., TICCHI D., VINDIGNI A., “Religion and innovation“, NBER, *Working papers*, no. 21052, March 2015a.

Figure 1.5 shows, for example, that the United States shows high religiosity and belief, while being open to innovation. There is therefore a paradox if we cling to the hypothesis that religiosity (rather than belonging to a religion) is an obstacle to the development of innovation. The study carried out by these three American researchers in their own country is based on this aporia<sup>26</sup>.

First of all, they divide the set of countries into three types of society: secular societies, including Western Europe; theocracy, defined as a very religious society, refusing knowledge which does not come from the Church; and a society between the two previous types, such as the American system which combines the two with strong inequality between individuals, creating a “right to religion” and requiring rich and poor to coexist faced with discoveries and ideas, in a sort of indifference.

What interested these researchers was to go into more detail about understanding the concrete practices implicating the individual in their religion. However, it was difficult for them to identify the actual practices; they therefore constructed a broad sample of Americans using the country’s demographic studies and taking individual statements with respect to 11 measures of (declared) attitudes to what they considered to be openness and five measures of religiosity. From the multitude of data, they distinguished three global attitudes:

- an attitude towards science and technology;
- an attitude towards new ideas, change and risk-taking;
- qualities envisaged for the education of the young in order to encourage (or not) children to develop their imagination, their independence, their determination and their perseverance.

The results of this study showed that the links are complicated and that, for example, in Florida, the mixture of attitudes displayed made an extension of innovation possible; similarly, the social level of individuals is a strong determinant linked to religious practices and thus does not allow us to say if religiosity or social class determines openness to innovation.

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26 BÉNABOU R., TICCHI D., VINDIGNI A., “Forbidden fruits: The political economy of science, religion, and growth”, NBER, *Working papers*, no. 21105, April 2015b.

Let us include the religion of Islam, whose sometimes strict doctrines recall a saying of the Prophet<sup>27</sup>: “Take care of invented things, because all these things are an innovation, every innovation is a bewilderment and every bewilderment leads to hell.” Innovation is contrary to the Sunna, that is the Islamic law of prophetic tradition. Moreover, the word “innovation” does not exist as such in the Arabic language; the word *bid’ah* is often used, which means both a new idea and a heresy.

In other words, if we can say that certain doctrinaire religious sects are an obstacle to any innovation, for the others, the results are uncertain. However, let us not forget that there is no innovation, particularly social and in education, without a background of values and a vision of the future which guides its direction. It is because the innovator has an image of what the world of the future will be after the enactment of the innovation, that they work on it with an enthusiasm which sometimes borders on militancy. Note, however, that education’s status as the quintessential place where values or belief in a better or redemptive society are invested often results in a close link between innovation in education and religious belief.

### 1.3. Innovation in schools: what is its definition?

For more than 20 years, we have studied innovation and, more precisely, a type of innovation which is not often celebrated because it is difficult to identify: innovation in education, innovation in schools or pedagogic innovation<sup>28</sup>.

Yet, there is no shortage of definitions of innovation: we have collected over 600 of them and all of them are relevant, to the extent that the word is mentioned relating to new activities<sup>29</sup>, activities which increasingly define our contemporary societies.

What differs is not so much the definition itself of the word, as the social use made of it and, in this case, the meaning arising from this contextualized

<sup>27</sup> See the site [www.islammessages.com](http://www.islammessages.com), accessed May 2017.

<sup>28</sup> We will examine the difference between these innovations further on.

<sup>29</sup> As an example, we provide here the definition posted on the Pollen site of the Ministry of Agricultural Education: “Innovation in education is a deliberate process of transformation of practice by the introduction of pedagogic and organizational novelty which is the subject of dissemination and which aims at the sustainable improvement of the educational success of pupils or students”, March 2017.

usage. For example, to speak of innovation in political discourse signifies that the user wishes to mark their intention to change things in a way that they consider to be positive, or again, to speak of innovation for a prison shows a desire to improve the performance of the institution and to avoid accidents, without necessarily making its inmates the beneficiaries of such a transformation.

All these usages blur the meaning of the word. Moreover, it is interesting to note that, in public interventions, we have given a precise definition of the notion of “innovation at school” and yet, at the end of every presentation, people have come to see us and noted that we had not given a clear definition of school innovation; and this has systematically reoccurred!

What explains such a refusal to listen? Are there words which are undefinable because of their social significance and their implicit issues? Is it not the case that, through a contamination effect, the word innovation, because of its lability and continuous interrogation, suffers from being caged in a definition which is stabilized once and for all?

In any case, this attitude is not based on a lack of definition, but on the deep desire that there should not be one in particular. Why? Two explanations are possible. The first is based on the fact that an innovation is defined by the results of the innovative activity, and not by a semantically stable concept, thus allowing openings in active interpretation. The second is the refusal of a framework: innovation is envisaged as the freedom to do what is intuitively better, refusing *a priori* analysis and explanation. The act is thus considered to be impossible to formulate, only visible and comprehensible in the breadth of professional activities. The innovator is not accountable to some censor or legislator for the nature of this new practice<sup>30</sup>. As Nietzsche said, a definable word is a word without a history, meaning that words belong to the eras and situations in which they are used.

Yet, when we study the plethora of innovations, certain stable and common ingredients emerge, invariant features which, taken together, account for innovation in education. There are five of them, in no particular order, which we will explain and analyze in their relevance.

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30 For more on this idea, see the following work: JOAS H., *La créativité de l'agir*, Éditions du Cerf, Paris, 1999.

First of all, innovation, following from its etymology, indicates something new. This latter is introduced into a precise and situated context. However, what qualifies as new? What indicates that something is new? In the case of a technological object, the question is scarcely relevant, as it is enough to look at it to understand that previously there was nothing like it, and therefore it is new. Yet, we must not forget that every innovation, even of a product, is only innovation when it is the result of social appropriation, that is, of new social behaviors being adopted.

However, in the context of education, what can we say is new? Is it setting up multi-age classrooms? Was that not already done in the 19th Century in the “mutual instruction” system? Peer learning has been used for a long time. Getting an advanced student to help another in difficulty has surely always existed. And yet tutoring is ancient! And we can draw up a long list of all the innovations, or things described as such, related to pedagogic situations, to show that, in matters of learning situations, almost everything has been done: individual tutors, group work, varied levels, needs-based groups, level-based groups, educational projects, written summaries, etc. In other words, the new is not intrinsically new, but what gives it the quality of being new is its situation in the context where it appears. For example, a school which has never before gotten its students to work in small groups announces that it is innovating, when this pedagogic technique is very old! We can take this innovation into consideration, although the practice is not, in light of the history of pedagogy, a novelty in itself!

We sometimes assign for reading a text on new education, describing an active pedagogy such as currently advocated, whose fundamentals are based on the ideas of Rabelais or Montaigne, or even Confucius, stipulating that “the child is not a vessel to be filled, but a fire to be lit” ...

We hide the name of the authors and ask our students at what date such a text could be written. The answer is immediately agreed: the text is thought to be contemporary, which shows how, before innovating in pedagogy or at school, it would be useful to re-read the pedagogic classics, but that would go against the innovation which first of all invites us to reject the past<sup>31</sup>! The “new” of innovation in schools is thus always relative to the present and immediate context.

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31 See section 1.1.2 “Link between innovation and tradition”.

Thus, if a teacher has never had their students work on projects, they might declare themselves an innovator, even if there have been many precursors. This is the limit to which we can say that anything is new in schools, particularly when it comes to learning situations. It would even be possible to imagine a teacher declaring themselves to be innovative when nothing visible differentiates their pedagogy before and after, solely because they have changed their conception of their students. Defining the new is thus a tricky matter, and it is for that reason that no rules exist in the area such as we might find in organizational or structural innovations. We might even push the reasoning further and consider as an innovation a contemporary teacher giving corporal punishment to students, to the extent that this is a new practice and does not exist in the context surrounding such practices! And if we stretch the reasoning, the teacher might justify this innovation by the fact that the students seem to have learned their lessons better (evaluation). As to which deontologies and ethical purposes are at work: this will be the penultimate component of the definition of innovation, that of values, as we will see later.

Similarly, in the context of professional training of teachers, the last 20 years have been marked by the injunction to identify as a “reflexive practitioner”, which consists of asking the teacher to reflexively examine their actual practices, to analyze them verbally in an adequate support process and to be able to identify the gaps to remedy them in a conscious and reasoned manner, even to innovate. Now, if we read the Spiritual Exercises of Ignatius Loyola from the 16th Century, we encounter this same type of practice which he calls “examination of conscience”, to prepare oneself for an exercise of collective or individual discernment. Where is the newness, if not in the context and faced with more advanced knowledge in the field of psychology or psychoanalysis? For Husserl, value becomes the act of constitution of the object in a process of differentiation: this creates value and meaning. It is always value in relation to implied others.

1) So, you say to me, there is still something tangible that is new in schools, a new product or object, particularly information technologies, that which we call the introduction of the digital. These have been mentioned for at least the last 30 years as a means of revolutionizing teaching practices and learning. They are relatively recent and may qualify as “new”, having in no way existed up until now in schools. Yes, but it is not the object in itself which makes something new, but rather the situation in which this object is used pedagogically. It is completely possible to use a computer or a tablet as

you would an image from a school textbook. These tools must therefore be on one hand “didacticized”, and on the other, put “into pedagogical space”. These demands relate to the competences of the teachers themselves. Innovation is thus found to be at the heart of the teacher–student relationship, in a pedagogical space conceived and designed by the teacher. Greater sophistication of digital tools will hardly replace a teacher’s educational intuition.

2) The importance of goals must always be remembered in educational matters. The central question is to know what we wish for in a citizen of the future, with regard to those being educated. The current catchphrase is to “create society” or to “live together”. However, what do these terms entail, to what pedagogical and educational conceptions do they correspond? Innovation in education most often arises from a feeling of dissatisfaction on the part of an educator or a team of teachers. This is increased by objectives or goals which are often ideals. We would say that, if the base of education is creativity, its essential motor, which sustains the energy of the innovator, is values. There is no innovation, especially in the field of education, without values which are sometimes intensified. This may correspond to wanting the best for another despite themselves, and this danger may befall some militants blinded by their good faith and the belief in their own rightness. Innovators often speak of improvement, of making things better; still, it is necessary to know what they mean by “better”! The road to hell is sometimes paved with good intentions, and it is without doubt that the values of innovation are embedded there, in this improvement. For example, to say: “I want to improve the wellbeing of my pupils” is so vague that good intentions are not enough; the aspiration for a better world sometimes leads to extremes worse than inaction!

3) Education is full of values and innovation and, when performed, is translated into concrete enactments of values rarely displayed by the institution. For example, desiring equity between students may indicate a perspective of giving more to those who have less, as has been done in France in the priority education areas (although this is a criterion linked to a residential area exhibiting social problems) or a perspective of dealing with differences among a heterogeneous group of students through external interventions, as also practiced in France by RASED<sup>32</sup>. All innovation in

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<sup>32</sup> The specialized teachers and national educational psychologists of RASED (French acronym for “Networks of specialized assistance for students in difficulty”) provide specialized assistance to pupils in kindergartens and elementary schools in serious difficulty.

education pursues objectives and is underpinned by values. The problem is to analyze how these values are embodied in the innovative activities in question<sup>33</sup>, and it is doubtless from here that most disagreements arise concerning school.

4) The fourth component relates to change. In reality, all innovation provokes change, but life itself is made up of change: we grow older, our hair turns gray, children grow up. In short, change is consubstantial with the passing of time and with life. Therefore, to say that innovation is change is a banality. On the other hand, we can say that innovation, if it is incontestably a change, is a particular change which might not have taken place without the desire of those who initiated it. In other words, innovation is voluntary, intentional and deliberate change. Now, some innovations come from outside: let us say that they are provoked by external constraints such as official educational reforms, but their innovative character comes from the way in which the teacher integrates or exploits them through their creativity and their will to change.

Innovation, based on creativity and on values, is based on a momentum towards the unknown, on an attempt to put into place an unscheduled activity, which appears to go in the direction of the desire of its initiators, to respond to a lack or a perception of deficiency. Innovation is not the only way to respond to a deficiency. Two others are a project, and problem-solving. Moreover, these two approaches are often assimilated to innovation, as they satisfy institutional demands for visibility of what the innovator wants to do, so as to help them financially or with support. These approaches are also forms of change, just like experimentation.

In fact, a project<sup>34</sup> is defined as a mental activity resulting in action governed by a certain number of realistic, often linear steps, with goals clearly marked out, a program, a timetable and a means of evaluation.

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This assistance may be educational or rehabilitative. Their specific work, complementary to that of classroom teachers, allows a team to create a better response to difficulties in learning and in adaptation to the requirements of schooling experienced by certain pupils (source: [education.gouv.fr](http://education.gouv.fr), 17 March 2017).

<sup>33</sup> We will see in the chapter on the evaluation of innovations in education that these goals are seldom achieved, and that other objectives that were not present at the beginning of the innovation appear and are achieved.

<sup>34</sup> See the work of BOUTINET J.P., *L'anthropologie du projet*, PUF, Paris, 1990.



The approach of problem-solving is, for some, equivalent to that of innovation. Problem-solving consists of the identification of a perceived problem and searching for solutions to trial and evaluate their ability to resolve the problem. Innovation is of a different nature: it can exist without its author encountering any problem, simply because they wish to update their pedagogy, to try other methods of learning without yet perceiving any particular professional problem to be resolved.

One other approach can be added to these: that of experimentation, which is based on an experimental protocol revolving around variables to be monitored and evaluated through a controlled experiment. This wish to name innovation as something other than itself is a way to discipline it and to bring it into more identifiable frameworks of rational linearity.

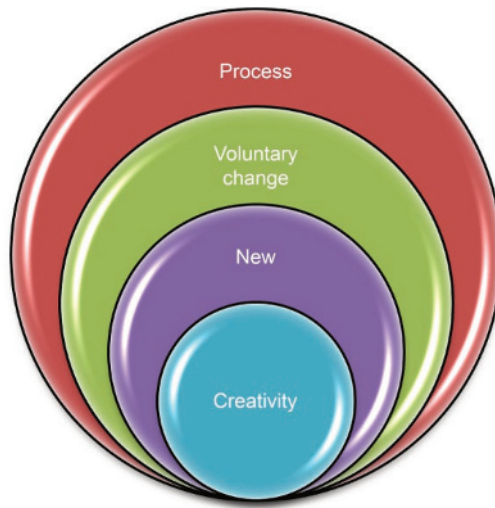
5) Now, innovation is risk-taking, an adventure whose outcome we do not know in advance, and which surprises even the people involved. It is not reassuring for institutional officials, as they are obliged to accept this kind of maximum uncertainty. In other words, innovation is a process which is discovered as it progresses to completion. As the poet Antonio Machado said: “*el camino se hace caminando*”<sup>35</sup>. It is thus far from being a project, and using the expression “innovative project” somewhat distorts this adventurous aspect.

The advantage of innovation is that it allows the emergence of pedagogical activities unprecedented in their context (even if the new is somewhat diminished) and, in this case, context is the base of innovation. In fact, as mentioned previously, innovation is neither invention nor discovery, but the socialization of a new activity, that is, an appropriation by actors of this innovative activity (parents, students, teachers at the school, etc.). Innovation cannot institutionally develop except in a climate of autonomy, openness or even sometimes disorder; but we will examine this more closely in the chapter on educational policies and how they deal with school innovation.

In other words, a school innovation is an activity that includes something new in relation to its context, based on change which is voluntary, deliberate and intentional. It is a process steeped in uncertainty, based on creativity.

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35 The path is made by walking it.



**Figure 1.6.** *Invariant features of the definition of innovation in schools*

However, a question still remains: where does innovation begin and end in the social activities and, in particular, the professional work of the teacher? No action is ever the repetition of another action; in every activity there are variations. We never exactly repeat the same thing, and the ingenuity of the teacher is quite often at work trying to deal with the unexpected behavior of students.

We remember one initial professional training for teachers which involved creating a teaching plan for 8th grade students. Each teacher–trainee thus had to carry out this project in the tiniest detail by specifying on a timetable what would be accomplished by the teacher and predicting the behavior of the students. Then, the enactment of this course project took place in conformity with what was planned, up until a student stood up impulsively and told the teacher that she was “pissing her off” with all these phrases!

This event had been in no way foreseen in the course project. What should the trainee have done? And it is here that the reactive capacity of the teacher intervenes, at the moment where nothing is planned and where

urgent action is required to mobilize their inventive capacities, while still anticipating future consequences. And yet, it cannot be a matter of innovation, but of professional development to the extent to which the professional competences of the teacher are put into action in response to the field in which they work on a daily basis. These types of responses fall within the framework of competences of mastery. Thus, an expert teacher will know how to respond in the most appropriate way to these unexpected situations; the novice will develop these competences to the extent to which they practice their profession. The line between expert competence and the implementation of innovation is often quite fine.

Innovation begins with the voluntary, intentional and deliberate change, which we have discussed. Yet we must be careful, as one might consider any action that has not previously been performed, which is sufficiently isolated and recognized as new, to qualify as innovation.

And that might take place in the most mundane daily situations:

“We innovate every time that we try something new, when we smoke our first cigarette, when we give a course for the first time without having bothered to prepare or when we discover that we can cheat on the test and not be found out. Of course, ordinarily, when we use an expression like innovation in teaching, we have the feeling of talking about something which is both new and beneficial. And we may even tend to want to claim that something is good because it is new or different from what we have done before.”<sup>36</sup>

This understanding of innovation in relation to teaching can muddy the waters and give the impression that every novelty is an innovation. Now, the invariant features discussed above allow us to limit our frame of reference, even when all the invariants are not obviously present. For example, we are not persuaded that the process is an emergence, as the socialization of the practice of the action of smoking is strong and habitual.

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36 HAVELOCK R.G., “Innovations in Education, strategies and tactics”, Working papers, *British Journal of Educational Technology*, Ann Arbor, Michigan, 1971.

Other words surround innovation such as renovation, reform, adaptation, revolution, or refoundation. Let us take these concepts one after the other:

– a renovation is an activity consisting of restoring what exists (*re-novare*: to renew its attractiveness), in the sense of renovating a house. The latter remains the same, but it has a better appearance corresponding to its original appearance. It reinforces the character of the house without changing its meaning or usage. It is the same in education. A renovation is a change in organization and/or in pedagogical practice so that the goals, while being intangible, may be better achieved or improved in quality;

– a reform is a change carried out within the existing institutional framework (for example, agrarian or constitutional reform). Reform in training systems comes from laws and decrees, doubtless inspired by concrete observations, but the decisions are central, governmental (“top down”) and aimed at allowing everyone to be reinscribed in a legal framework. The French educational system has seen an avalanche of reforms, quite often not allowing teachers to adapt to them, as another reform arrives to replace the previous. This is without doubt one of the causes of the inertia of French schools; too many reforms kill reform;

– an adaptation<sup>37</sup> is a response to a perceived change in the context. For example, students are not the same as those of 20 years ago, and teachers see themselves obliged to respond to the new defining characteristics of current students. They thus develop a professional practice in response to new conditions of existence as they perceive them; they adjust their activity to the circumstances which they encounter. The systemic approach is based on phenomena of regulation close to adaptation. Let us add that a reform may take the form of an adaptation;

– a revolution, etymologically, is an orbital movement around a central axis which brings the object in question periodically to the same point. Here, a revolution is seen instead as a radical upheaval, important and abrupt. It might even entail a violent transformation. Innovation is the opposite: it is the action of introducing something new in the intention of socially embedding it over the long term;

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<sup>37</sup> We are not talking here of adaptation as defined by Piaget, a phenotypic adaptation, which is “a process by which an organism transforms itself under the pressure of changes in the environment, or the result of this process, without this transformation being predetermined at the level of the organism's genetic system”.

– a refoundation is a term more recently used in education to affirm the fundamental principles to be defended within education. It means to declare new foundations based on the original intention of certain policy directions. The word allows us to affirm a certain number of values attributed to education as priorities – namely, equality and solidarity. The affirmation of these principles leads to sets of actions based on four pillars, in relation to the law of 8 July 2013, published by the Socialist government of François Hollande, namely:

- educational success for all;
- a just and effective education system;
- students at the heart of the refoundation;
- trained and recognized staff.

From here also arise orders and decrees of application, which lead to the process of reform discussed above.

The abundance of vocabulary produced by the world of education shows, if it were needed to be shown, that the situation is complex and that moving the “mammoth” – as the former Minister of Education Claude Allègre puts it – is among the most complex and delicate of actions. The use of new words will not change anything while the educational system depends on wider political decisions linked to what the nation wants to be done with its schools.

#### **1.4. Innovation as progress**

In March 2017, a meeting took place moderated by Pierre Haski of the weekly *L'Observateur* with the suggestive interrogative title: “Is progress still progressive?”<sup>38</sup> The term “progress” is no longer as widely used as in the time of the Enlightenment and the last two centuries of history. It seems to have disappeared from the discourse of innovators as well of that of politicians.

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38 See bibliography.

Peter Wagner, a German sociologist, was invited to this meeting after the publication of his book<sup>39</sup>. He declared:

“We lived for two centuries with a certain conception of progress which no longer exists. We must rethink, reinvent progress, we still need it, but we can no longer return to the previous conception.”<sup>40</sup>

This current pessimistic vision of progress is shown in the speech given by Albert Camus at the reception of his Nobel Prize, in 1957, when he said:

“Every generation doubtless believes itself destined to remake the world. Mine, however, knows that it will not do so. But its task is perhaps greater. It consists of preventing the world from unmaking itself.”

Now innovation, wedded to the search for something better as a horizon, is based on the idea that students, after having experienced innovation, will progress in their behavior and their learning. And reflecting on this, the word “progress” is singularly absent from current official discourse, while being frequently used by teachers; a student who progresses is a student who has better results. This idea of the linearity of progress remains; the student can only make progress when they are firmly in the grasp of the intentionality of the innovator.

If scientific and technological progress is seen positively through the material benefits brought to individuals (such as, we live longer, we can travel further and more safely, etc.), it is often thought of as engendering social progress which, however, leaves many left behind and produces more and greater inequalities. Social progress does not therefore seem to be on the agenda, and is linked to two parameters: domination and liberty.

It is interesting to note that the arrival of digital technology in schools has produced more hope than all the pedagogical practices mentioned in the preceding pages. This is due to the fact that all technology arrives with a

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39 WAGNER P., *Sauver le progrès. Comment rendre l'avenir à nouveau désirable ?*, La Découverte, Paris, 2016.

40 “Le progrès est-il d'actualité ?”, *L'Obs*, no. 2731, p. 79, 9 March 2017.

strong promise of progress, even if disillusionment sometimes lies ahead. This is without doubt linked to the meaning given to its project, and to the need to believe that something is changing for the better.

Innovation is thus one of the ways of expressing this meaning to avoid having to accept the present era as it is, and to see it rather as “a reservoir of possibilities”. The discourse of disintegration of the school seems to be nothing but refusing to create a new concept of progress. Innovation would thus be the expression of this collective intentionality (taken up by a collective or even by the whole establishment and beyond at its emergence), what Wagner calls “a collective democratic act”.

### **1.5. Techno-economic innovation and innovation in schools: Tocqueville and Schumpeter**

Innovation in schools is a concept which emerged well after innovation in technology and the economy. In fact, social evolution is primarily based on consumption and the accumulation of material goods. This is a major characteristic of capitalist societies, and it is possible to say that the cradle of development of innovation is the economic and industrial development of our societies. Profit is its essential motor.

Two authors, through their teaching, particularly marked this trend: Tocqueville with his conception of democracy as the future horizon of society, in particular America's, and Schumpeter, the precursor of the unveiling of an economic theory based on innovation.

Before becoming a positive doctrine, the demand for economic freedom was expressed as early as the mid-18th Century. This was the translation of a social aspiration: the desire for abolition of all the professional privileges which regulated access to the trades. This aspiration was in turn a response to the pressure of technical innovation and progress. In fact, economists such as Turgot or Mirabeau have shown that the corporative framework was a considerable brake on progress, as every appearance of a new product got a hostile reception from those professions whose reserved domain was threatened by it. For the citizen, this double corporatism of the monopoly of

production constituted one of the factors in the cost of living: the abolition of privileges and the freedom of industry were the same thing in their eyes.

The individual thus acquired social power in a specific relationship with the law. It was no longer God, Nature or some other transcendence which determined the laws, but subjects relying on their will and their reason.

Tocqueville is one of the authors who speaks with the most clarity on this inexorable democratic movement, defined by “the decomposition of the aristocratic hierarchy of the past and the progressive equalization of the conditions of individuals”<sup>41</sup>. He bases his arguments on the American society of his time (the first half of the 19th Century), which he rates as the best democratic model based on the very fact that there is no hereditary aristocracy. Moreover, it is in turn, he says, because individuals have become equal before the law that their main activity has become economic: this is the reflection of the primacy of the economy that will remain the case all through the development of innovation. The latter becomes necessary as a source of adaptation for a capitalist society firmly anchored to the principles of individualism and the free market.

Building upon this later is Schumpeter who, after the crisis of 1929, offered his theory to the United States, finding in that country (a light-weight State and a high level of decentralization) the material for developing purely capitalist ideas. Thus, Schumpeter bases his theory on three interrelated organic poles: economic growth, innovation and technological progress. Innovation is central for him, as it constitutes the motor of growth and provides profits to firms to invest and produce still more and better. We are in the entrepreneurial world of technological innovations, generators of new products or new lines of production which are more efficient and more attractive to the consumer. The individual is seen as a consumer. When a product arrives at maturity, growth slows down. The latter is driven by a cascade of innovations which keep diverse businesses in the same market competitively fit. Each firm owes its survival and expansion to the development of innovation<sup>42</sup>. It lives from innovation to innovation, on the

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41 ARON R., *Dix-huit leçons sur la société industrielle*, Gallimard, Paris, 1962.

42 This is shown in GARREL G. and MOCK E., *La fabrique de l'innovation* (2012), where the survival of the Swiss watchmaking industry depended on an innovation adopted just in time to avoid the layoffs of many workers, through the emergence of the Swatch watch whose process of innovation is narrated from its creation to its commercialization.



path marked out by technological progress, which itself is considered as the road to economic and social progress:

“In fact, the fundamental impulse which puts the capitalist machine in motion and keeps it going is given by new consumer objects, new methods of production and transport, new markets, new types of material organization, all the elements created by capitalist initiative.”<sup>43</sup>

And Schumpeter insists on this idea, finding all sorts of virtues in these innovations.

In the end, innovations are like exogenous variables which arrive in “clusters”. Each innovation represents a cyclical process of installation with phases of expansion, recession and depression. The appearance of innovation ensures economic expansion and a temporary monopoly for the dynamic firm.

Schumpeter distinguishes five types of innovation:

- 1) the creation of a new good;
- 2) the introduction of a new method of production;
- 3) opening up a new market;
- 4) the conquest of a new source of raw material or of semi-finished products;
- 5) the realization of a new form of organization such as the creation of a monopoly situation.

It is out of the question, in his reasoning, for innovation to arise outside the economic and commercial domain; it is the very heart of his definition. Moreover, in the continuity of his ideas, he attributes a glorious role to the entrepreneur, this hero of modern times to whom he ascribes a wholly laudatory psychological profile:

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43 SCHUMPETER J., *Capitalism, Socialism and Democracy*, Payot, Paris, p. 121, 1965.

“For success, everything depends on the glance, the capacity of seeing things in a manner which experience subsequently confirms [...] finally the faculty of acting on others, which we may call by the name of authority, or weight. He creates without respite, because he can do nothing else [...], he possesses first of all the dream and the will to create a private kingdom, most often, but not always, a dynasty as well [...]. Then comes the will of the conqueror, finally the joy of creating a new economic form.”

A short time ago, we still heard this discourse about business leaders and today to justify the massive sums paid in remuneration to CEOs of major public companies!

It is possible to identify five characteristics of Schumpeterian innovation:

1) it is endogenous to the economy in an exogenous process, and therefore it takes place as a phenomenon of economic and social development;

2) it arises independently of social relations which are only discussed as they relate to the innovation (opponents, for example);

3) it needs people who know how to promote its emergence and development (entrepreneurs);

4) it needs an institutional framework (justice, administration, etc.), which promotes the desire for innovation and science for economic purposes;

5) finally, it is beneficial for the economy and thus for society.

Knowing that capitalism is inseparable from private property, it is not certain whether, even for innovation in schools, such a paradigm is not currently being followed by some politicians, through the idea that schools could take part in the process of a competitive market, leading to a multiplication of innovations whose goal would be to improve the “student-product”. The parents taken hostage thus become consumers and make a market choice between schools.

In fact, if education is the responsibility of the public service, it is not a sovereign function of the State like the police, justice, the army or printing money, because it does not relate to the security of goods or persons. In

other words, as a public service, education could be provided by a private firm (conceived in the same way as that of Schumpeter) which would work, naturally, in the general interest under the control of the State, which would ensure respect for continuity of service, equality of treatment of users and other fundamental principles of public service. This would allow some room for liberty, even for abuses...

Such an idea poses the question of guaranteeing these principles and of how it would be verified. If the tendency of a country is towards privatization or deregulation of this public service, it is conceivable that we would witness the emergence of many so-called private, competing schools, following the spiral of innovations which, under the positive image of the development of young people, in fact only have one goal: that of profitability. Education, and in particular, the school system, is complex and vulnerable, so how can we envisage a deployment of innovations which does not follow this paradigm?

Doubtless here we can affirm that innovation in schools cannot be reduced to techno-economic innovation.

There did not yet exist in Schumpeter's time the vast and formidable field of advertising, which often creates artificial needs among consumers.

## 1.6. Innovation and its process of socialization

Let us recall that innovation follows invention; we might say that innovation is an invention that succeeds, for not every invention results in an innovation. It may happen that an invention remains on the shelf, or that it emerges because the social context is ready to accept it. This is, for example, the case for the electric toothbrush, invented in 1939 and only commercialized (as the Broxodont) in the 1960s. We might also mention what Akrich<sup>44</sup> discusses, that is the appearance of frozen food in 1912, whose use was not socialized until around 1952, in other words 40 years later!

In fact, the central feature of innovation is found in this process of socialization, that is, in its adoption by society. The field must be able to

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44 AKRICH M., CALLON M., LATOUR B., "A quoi tient le succès des innovations ? 1) L'art de l'intéressement 2) Le choix des porte-paroles", *Gérer et comprendre*, Les Annales des Mines, pp. 14–29, 1988.

accept the use of the new product which will then spread. The social process is eminently important; it may be based on the tides of fashion (for example, in schools, non-directive pedagogy based on certain libertarian tendencies and on a misunderstood Rousseauism, fashions which might subsequently be violently rejected and accused of all manner of social crimes such as the loss of authority of teaching staff, absence of discipline in classrooms, etc.).

This process of socialization is uncertain and may flare up like a gunpowder trail, disappearing with as much rejection as it was adopted with excitement. This is doubtless one of the defining elements of innovation in schools: what was cherished several years previously is often reviled.

Moreover, social practices and the use of new objects are part of a social imaginary, that is, a dynamic system of facts and images, of social representations and grand narratives. This system works by its own, always ambivalent logic. It fulfills the function of linking concept and percept, and enriching reflection and perception. This imaginary, or techno-imaginary when it comes to new objects, particularly digital objects, is formidable and uncertain, because it does not follow market logic.

It is therefore very difficult sometimes to tell the story of the birth and deployment of an innovation, without falling into Schumpeter's imaginary of the brilliant and heroic entrepreneur or the strategy of a foresighted politician or the great creativity of an engineer or a group of people. It is all of this at the same time, in disorder and contingency.

For example, Fordism or Taylorism are organizational innovations and, to be established, they had to defend their point of view against unions, against workers and against bosses. However, what often tips the scales towards the implantation of innovation is society in general, unconsciously searching for a solution which satisfies its expectations and agrees with its imaginary. Similarly, there have been many commercial innovations over the past 20 years such as hypermarkets, bulk-purchase stores and drive-through shopping. How to explain their success, of which we are now sensing the decline?

Two theories allow us to understand how they come about. The first is the mechanistic theory of Fisher,<sup>45</sup> which sees innovation as an exogenous

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45 FILSER M., "Méthodologie d'élaboration d'une typologie de clientèle en marketing direct", *Revue Française du Marketing*, vol. 126, no. 1, pp. 57–66 1990.

process, showing that innovation is a response to an environmental demand, no matter the structure of the proposal, from the moment that this innovation comes to the point of implantation, in a process of adoption. Society is an important actor in the deployment of innovation, so much so that, in innovations linked to the commercial domain, this process is called organizational socialization of the client (OSC)<sup>46</sup>, something close to a process of learning. We can also mention another theory, that of the forms of implication of social actors in this socialization of innovation, that is that the logics of actors are of primary importance in the development of innovation.

These two tendencies are different. We consider innovation through its intrinsic qualities (that is, indisputable performance) and the other, more sociological, considers innovation through its implantation, as the result of a compromise between its characteristics and the demands of users. Within the latter tendency, social influence and the role that might be played by minorities<sup>47</sup> discussed by S. Moscovici (more in the order of social psychology) and the contributions of Callon (more from a sociological approach) deal centrally with the movements of social groups and power relations.

In fact, the work of Akrich and his team<sup>48</sup> indicate that the future of innovation depends on the interest that the latter evokes among “a whole series of social groups who will decide on its future” (p. 20). The authors add:

“The model of engagement underlines [...] the existence of a whole bundle of links which unite the object with all those who manipulate it. The model of diffusion locates the technical object within a society which constitutes a more or less receptive environment. The model of engagement introduces all the actors who welcome the object or turn away from it, and it emphasizes the points of intersection between the object and the more or less organized interests whose attention it attracts.” (pp. 21–22)

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46 GOUDARZI K., *La socialisation organisationnelle du client dans les entreprises de services*, PhD thesis, University of Aix-Marseille III, 2005.

47 MOSCOVICI S., *Psychologie des minorités actives*, PUF, Paris, 1991 (2nd edition).

48 AKRICH M., CALLON M., LATOUR B., “A quoi tient le succès des innovations ? 1) L’art de l’intéressement, 2) Le choix des porte-paroles. Gérer et comprendre”, *Les Annales des Mines*, pp. 4–17 and 14–29, 1988.

In other words, the success of an innovation depends on a sort of aggregation of interests “and on the participation of all those who decide to promote it”. This is what Callon and Latour call the entry into the “spaces of engagement” of individuals.

The socialization of innovation is thus linked to the will and ability of actors to adapt the innovation in their place of social activity: this is a strong mobilization, often through collective work. Akrich adds: “Adopting an innovation means adapting it” (p. 1).

It will thus be necessary first to identify the bearers of an innovation, the leader-clients, in other words: “the users who are best placed to transform the innovation and to bring it towards what users will demand” (p. 3). The latter will thus be responsible for creating a favorable context for the diffusion and acceptance of the innovation. It is up to the organization to adapt its innovation and/or convince these users. And the authors stress the need to bring about a co-evolution of the object and society, that is, the technology and its public, in a “work of mutual adaptation which determines adoption” (p. 6).

The joint work of this engaged collectivity and the organization will imply adaptation of the innovation through “all-out experimentation through successive iterations” (p. 6), which is to say, a process of back-and-forth between the actors who negotiate the characteristics that the innovation must possess. Thus, “the innovation is transformed at every iteration, redefining its properties and its public” (p. 8), so as to take account of its publics’ expectations, but also of the evolutions of the potential market. However, this assumes that the original public of the innovation, those who are involved in these negotiations, are good communicators, that they are relevant and legitimate. Even then, it involves a crucial decision whose relevance will not be perceived until the end of the process. Now, this choice will lead to other choices such as “strategic directions, but this also involves choosing what we will innovate on and the problems that will need to be solved” (p. 15).

Now for Akrich *et al.* (1988) through this process, it is a question of “getting into a position to formulate relevant questions, that is to translate an economic strategy into research actions [... but also] to find explanations and discover rules for action” (pp. 17–18).

Rogers' (1995) theory of diffusion of innovations is somewhat different: the author seeks to identify how an innovation spreads. Through the example of a failure (the diffusion of the habit of boiling water in a Peruvian village<sup>49</sup>), Rogers stresses that the diffusion of an innovation is favored by the compatibility of the innovation with the values, the beliefs and the lived experiences of the individuals who compose the social system in which the innovation must become established. In fact, the author underlines "the importance of interpersonal networks for the adoption and rejection of an innovation [to the extent that] diffusion of innovation is a social process, as well as a technical issue" (p. 4). Now, this process affects the way in which potential adopters will perceive the bearer of this change. Consequently, this process also affects the willingness of potential adopters of new ideas. Based on this example, the author defines diffusion as "the process by which an innovation is communicated through certain channels over time between members of a social system" (p. 5) and communication as "a process through which participants create and share information with each other in the goal of arriving at mutual understanding" (p. 5).

From this he deduces that diffusion is a matter of communication, in the sense that innovation is contained in the message. Now the particularity of this message resides, according to him, in the uncertainty of its diffusion among the population in question. Consequently, the diffusion of innovation can be understood as "a sort of social change, defined as the process by which an alteration occurs in the structure and function of a social system" (p. 6). This diffusion may be spontaneous as well as planned. Relying on this idea and these definitions, Rogers (1995) offers a definition of each of the characteristics of the diffusion of an innovation: the innovation itself, communication through certain communication channels including advertising alongside virtual social networks, time and the social system.

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49 The failure referred to took place in the Peruvian village of Los Molinos in the coastal region. Illnesses due to water pollution were increasing, from which arose the idea of implanting an innovation: that of boiling drinking water. However, at the end of a two-year intensive campaign, only 11 homes out of 200 were boiling their drinking water. Two factors explain this failure: on the one hand, the level of knowledge of the population, who did not know what germs were and who saw water as clean and if there were small creatures in it, they would be like ants, not dangerous to humans; on the other hand, the relationship with boiled water was determined by dietary regimes where local beliefs attributed a particular temperature to foodstuffs, independent of their actual temperature.

Rogers (1995) defines an innovation as an idea, a practice or an object, perceived as new by an individual or a group of individuals who might adopt it. According to him, it is the perception of the novelty of an idea from an individual's point of view which determines their reaction to it – that is, its adoption or rejection. Consequently, if an idea is perceived as new by an individual, that is, if it lends itself to understanding, persuasion or a decision to adopt, this will be considered as an innovation.

Moreover, according to Rogers, the process of decision-making with regard to an innovation essentially resembles a process of research and information processing, through which the individual is motivated by the reduction of uncertainty as to the advantages and disadvantages inherent to the innovation to be adopted. Thus, based on the information available concerning the following characteristics of the innovation, it will be more or less rapidly adopted:

- Relative advantage: to what extent is the innovation perceived as better than the idea which it aims to replace?

- Compatibility: to what extent is the innovation perceived as compatible with the existing values, past experiences and needs of the individuals affected by the adoption of the innovation?

- Complexity: to what extent is the innovation perceived as being difficult to understand and use?

- Is it possible to trial an innovation: to what extent is it possible to experiment with the innovation on a limited basis?

- Are the results of the innovation observable: to what extent will the innovation be visible to others?

Furthermore, independently of these characteristics, the author indicates that an innovation may evolve over the process of its diffusion, thus echoing the argument of Akrich *et al.* (1988) in the sense that innovation will in some way adapt itself to its public in order to promote its adoption.

Rogers (1995) indicates that communication is doubtless one of the most important factors in the process of diffusion of an innovation. According to him, the very essence of the diffusion process lies in the exchange of information, through which individuals transmit a new idea to one or more people. Now, depending on the nature of the exchange, its impact will not be the same. Thus, media allows an important audience to be reached, while



interpersonal exchanges are more effective for persuasion regarding the quality of an idea. The effectiveness of interpersonal exchanges will be all the stronger if the exchange takes place between individuals of similar economic status and education.

Relying on studies of the diffusion of innovation, Rogers (1995) stresses that early adopters are sensitive to objective evaluations of the innovation, while later adopters are mainly influenced by subjective assessments transmitted by their peers who have already adopted the innovation. This finding suggests that the process of diffusion resembles the imitation of early adopters by later adopters. Consequently, diffusion of an innovation depends on the experiences of the first adopters.

Rogers (1995) stresses that one of the essential problems of diffusion of an innovation is that communication of messages about an innovation generally takes place between heterogeneous groups of people, which means that this communication is inefficient. He considers time to be an important element in the diffusion of an innovation. According to him, the process of an individual deciding on the adoption or rejection of an innovation can be conceptualized through five successive stages.

First, the group of individuals must become aware of the existence of the innovation, to understand its functions. At this stage, mass media may transmit this type of information. Next, the group will take a positive or a negative attitude towards the innovation. The resulting attitude will consequently imply the adoption or rejection of the innovation. This attitude is based on the evaluation of the innovation through interpersonal networks. Depending on the preceding stage, the individual will put the innovation in question into use, or not.

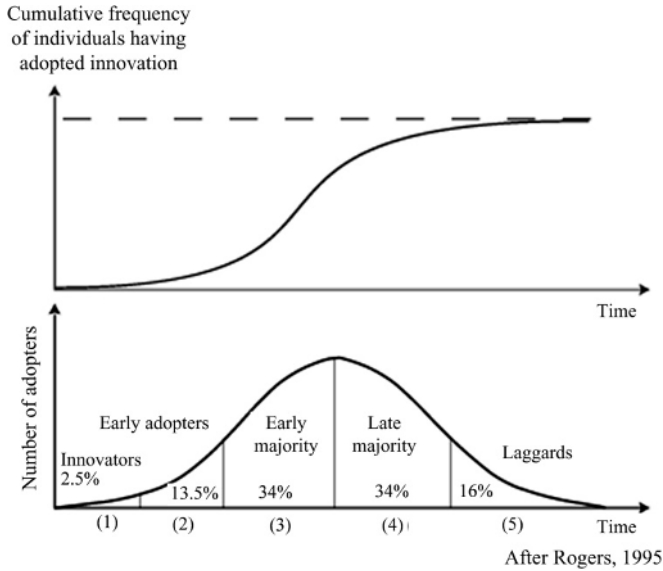
Thus, following the decision on adoption and testing the innovation, the individual will either confirm their decision or not – that is, the test will lead either to reinforcement or reversal of the decision taken previously. They may also decide to adopt the innovation and then to reject it (*discontinuance*<sup>50</sup>), whether because they were not satisfied by it, or because it has been replaced by a better idea. They may also adopt it at a later stage.

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50 We deliberately employ this term which gives a more precise meaning of suspension of a continuity.

Rogers classifies the different categories of adopters of an innovation on the basis of the time required for this adoption into five types: innovators, early adopters, the early majority, the later majority and the laggards, or recalcitrants.

The curves of Figure 1.7, as presented by Rogers, illustrate this process of development of innovation.



**Figure 1.7.** *Curves of the process of development of innovation according to Rogers*

Innovators are active researchers of information relating to new ideas. They have a high degree of access to media and their interpersonal networks are very extensive. In addition, they are capable of facing a higher level of uncertainty than the other categories with regard to an innovation. They are even more important in that they are the first to adopt an innovation: they cannot therefore rely on the subjective assessments of their peers. More widely, innovators and early adopters (generally young and educated, but not always!) tend to influence members of the other groups. In this sense, they may be considered as opinion leaders for certain categories of products (here we can see the “spokespersons” mentioned by Akrich, Callon and Latour (1988)).

Finally, the members of the other groups – that is, the later majority and the laggards – tend to be more cautious in buying new products and tend to wait longer to adopt the latest innovations. Rogers argues that most innovations follow an S-curve. In fact, if we place the cumulative number of individuals adopting a new idea on the Y-axis and time on the X-axis, the resulting distribution forms an S-curve, as in Figure 1.7.

In other words, in the first period, only innovators will quickly adopt an innovation. Then, the curve begins to rise: this corresponds to the adoption of the innovation by more and more individuals. After a certain stage, the trajectory will stabilize, because fewer and fewer individuals will remain who have not yet adopted the innovation. Finally, the S-curve reaches its asymptote, the process of diffusion ends, and we have reached the institutionalization and the banalization of the innovation, that is, its disappearance.

Rogers shows that the diffusion of an innovation is affected by the social system, in the sense that the latter may pose a barrier. It is therefore necessary to consider the effects of the innovation on existing norms, the role of opinion leaders and the consequences of the innovation. In fact, the structure of the social system may favor or prevent the diffusion of an innovation.

Thus, each person's propensity to adopt innovation is affected on the one hand by their individual characteristics and, on the other hand, by the nature of the social system surrounding the individual. The adoption of an innovation is also affected by the norms in force. The latter may be found at the level of a nation, of a religious community, of an organization or of a local system such as a village.

Consequently, the diffusion of an innovation will rely on opinion leaders. They illustrate and express the structure of the social system within which they exercise informal influence. This is explained by the fact that their opinion-leadership is gained and maintained by their technical competence, their social accessibility and their conformity to the norms of the social system in which they develop.

In some cases, the diffusion of innovation will be carried out by what Rogers (1962, 1995) calls a "change agent". This means a professional whose goal is to obtain the adoption of a new idea. This latter is generally an

individual who will have to rely on opinion leaders. He will also rely on the latter to reinvent the innovation, that is, to carry out changes or modifications to the innovation through its process of adoption and implementation. In one sense, the opinion leader will partly perform the role of a translator of the innovation among their peers, in the meaning of Akrich *et al.* (1988). They can promote adoption by their peers by promoting its adaptation and by explaining it to them.

What stands out in our review of the literature is that innovation as it is commonly discussed – that is, in firms – owes its success to the entrepreneur and his creativity (Schumpeter, 1939). In addition, to succeed, the organization must translate and adapt this innovation to its intended public (Akrich *et al.*, 1988). In this context, Rogers (1995) stresses the importance of peers and of time for diffusion of information about the innovation as well as the steps of adoption. Finally, the author sorts information channels according to the public to whom they are addressed (innovators, early adopters, early majority, later majority and the laggards). These channels are even more important in that according to Rogers (1962, 1995), the process of decision-making concerning an innovation essentially resembles a research and information-gathering process.

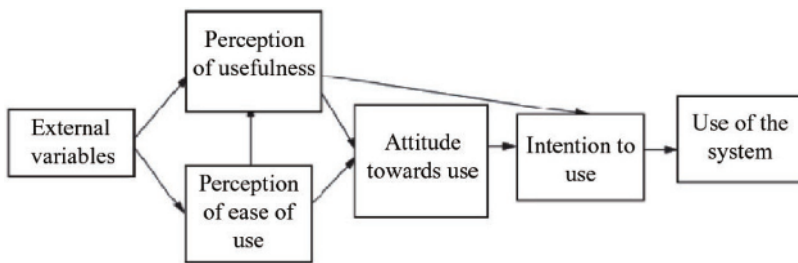
We will now proceed to identify the factors which may favor the success of an innovation among consumers. This question leads us to focus on the *Technology Acceptance Model* (TAM), which identifies perceived usefulness and ease of use (Davis *et al.*, 1989; Davis, 1989) as constructs favoring the adoption of a new technology.

The perspectives of the authors discussed, if not diametrically opposed, seem to have different orientations and varied conceptions of society. For some, society is an entity that shapes itself based on the intervention of personalities, whether heroic (Schumpeter), or “change agents” well-placed at the intersection of the technical qualities of innovation and the composition of society (Rogers), or a very diverse society with groups of individuals who become involved in controversies and sit in judgment, and who must be involved by taking account of their space of engagement according to a complex strategy (Callon).

These three great conceptions are no doubt themselves in step with the evolution of society, and Schumpeter’s concept of democracy, largely

inspired by that of Tocqueville, is very different from our current democracy as shown in the works of Akrich *et al.*

Other, lesser authors have also discussed a conception of diffusion of innovation, such as Davis *et al.* (1989)<sup>51</sup> or Childers (2001)<sup>52</sup>. The former author speaks more about organizational innovations; he focuses on the receptive public and on the perceptions they may have of an innovation's degree of usefulness and its accessibility without too much effort. He names this process the TAM (*Technology Acceptance Model*) and summarizes it as in Figure 1.8.



**Figure 1.8.** *Model of acceptance of technological innovation*

In other words, it seems that the literature devoted to the adoption of innovations concentrates on the transaction (Davis *et al.*, 1989; Davis, 1989; Childers *et al.*, 2002; Venkatesh *et al.*, 2003) and on the relationship, including the context in which the innovation<sup>53</sup> appears (Akrich *et al.*, 1998; Rogers, 1995) and then on concepts such as subjective norms which seem to play an important role (Ajzen and Fishbein, 1980)<sup>54</sup>.

To these latter authors we can add researchers for whom the primary component of innovation appears to be subjectivity: fundamentally, it is human behavior, in the adoption of a new activity or a new technology,

51 DAVIS F.D., "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, doi:10.2307/249008, 1989.

52 CHILDERS T.L., CARR C.L., PECK J., CARSON S. "Hedonic and utilitarian motivations for online retail shopping behavior", *Journal of Retailing*, vol. 77, no. 4, pp. 511–535, 2001.

53 In fact, can we imagine the diffusion of the use of the spade in a society where individuals did not have shoes?

54 AJZEN I., FISHBEIN M., *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, New Jersey, 1980.

which subjectively invests it with novelty, and the elements upon which this is based may be of the order of confidence (Gefen *et al.*, 2003)<sup>55</sup>, of motivation or of emotion (Venkatesh, 2000)<sup>56</sup>.

Opening the way for more experimental research, Benbasat and Barki (2007)<sup>57</sup> concern themselves with the patterns of use, reinvention and learning behaviors which users develop. The idea is that the TAM approach remains superficial and does not consider the possible diversion of an innovation by its users, and even the transformation of the initial goals of the innovation. In this same vein, it would be interesting to see in what we call “diversion of an innovation” perhaps a form of learning and of production of new knowledge given a new object. As Bernoux recalls<sup>58</sup>:

- in 1960, we worked for the product;
- in 1980, we worked for the client;
- in 2000, we worked with the client.

We can sum up these different approaches in Table 1.1.

Curiously, no theory of diffusion of innovation in schools has been produced, to the extent that we might raise the question of whether innovation in schools can be treated in its conceptualization as a technical innovation, a social innovation, an information systems innovation, or whether it is quite simply not applicable within an institution whose goal is the production among young people of social norms capable of maintaining a viable and cohesive society.

Would it be an oxymoron to talk of innovation for education, in the sense that education does not in any way resemble a firm with respect to its goals or function, nor a service-providing institution such as retirement homes, non-profit organizations or social assistance?

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55 GEFEN D., KARAHANNA E., STRAUB DETMAR W., “Trust and TAM in Online Shopping: An Integrated Model”, *MIS Quarterly*, vol. 27, no. 1, 2003.

56 VENKATECH *et al.*, “Age Differences in Technology Adoption decisions: Implications for a Changing Workforce”, *Personnel Psychology*, vol. 53, pp. 375–403, 2000.

57 BENBASAT I., BARKI H., “Quo vadis TAM”, *Journal de l’Association pour les systèmes d’information*, vol. 8, no. 4, pp. 211–218, 2007.

58 BERNOUX P., *Sociologie du changement*, Le Seuil, Paris, 2009 (new edition).

<b>Author</b>	<b>Origin of the innovation</b>	<b>Diffusion and deployment of the innovation</b>
<b>Schumpeter</b>	Heroic entrepreneur	Entrepreneur's capacity to convince
<b>Rogers</b>	Innovator (individual or industrial group)	Epidemiology, contagion. Role of a change agent allowing its passage from pioneers to laggards
<b>Akrich, Callon and Latour</b>	A team of innovators which gather future users through the process	Continuous engagement including at the moment of origin of the innovation. Adaptation to the public
<b>Davis, Childers, Venkatesh</b>	From the outset of the innovation, the user is envisaged in the virtual process of use as a transaction (TAM model)	The innovation includes in its presentation the usefulness and ease of access that it may have for users
<b>Ajzen, Gefen, Venkatesh</b>	Producers of innovation	Appropriation is linked to the affective investment (confidence, motivation) that can be made in the innovation
<b>Bensabat and Barki</b>		Reinvention of an innovation by reappropriation, going as far as possible, diversion of the initial goals of the innovation

**Table 1.1.** *Different approaches to innovation*

We are always at risk of saying that innovation in schools follows a process close (but not identical) to that of other social organizations such as health or social assistance. It doubtless develops through various spaces of engagement, motivation and perceptions of use, which allow us to understand its adoption.

Now, the reasons that educators might be motivated to innovate, to see it as useful in education, may be very numerous. The problem is that they are often based on contradictory, even opposing ideologies, about which the least that can be said is that trying to overcome them is like squaring the circle!

And the heterogeneous composition of the representativeness of the personnel engaged in teaching, through the different categories of actors involved in the education system, will not make this cohesive construction any easier, since their interests are often divergent.

The originality of the theory of engagement, in understanding the development of innovation such as it might occur in schools, comes from the fact that it is not an aggregation of various kinds of people (which corresponds to the composition of staff in education), which allows the socialization of an innovation, but the internal organization of their understanding in such a way that all of them find an interest in it.

The theory of Habermas in terms of communicative action might be useful in finding a way out of this cacophony<sup>59</sup>. Habermas, a researcher of the Frankfurt School, aims to get out of the dilemma of social cacophony which is most often resolved by injunction or social influence (which he calls strategic action). He proposes that the collective action of engaged people for a common result (here, the success of the students) should be based on communicative action, oriented towards a common understanding. He highlights reason as the source of mutual understanding, reason rooted in language and discourse. Thus, in the case of disagreement in the “lived world” (for him, the concrete professional environment of the individual), individuals must interact verbally, calmly, through a discourse which claims three things: a claim to precision, a claim to justice with regard to the social context and its norms, and a claim to sincerity. In other words, it is a matter of coordinating social interactions in advance and not only their effects. He calls this negotiation.

The role of the State is thus only to extend the innovation in such a way as to materially facilitate its general implantation. In fact, a State or a

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59 HABERMAS J., *Théorie de l'agir communicationnel*, volume 1: *Rationalité de l'agir et rationalisation de la société*, J.-M. FERRY (trad.), Fayard, Paris, 1981; volume 2, *Critique de la raison fonctionnaliste*, J.-L. SCHEGEL (trad.), Fayard, Paris, 1987.



department cannot innovate, because that would imply taking ownership of this innovation and thus perverting it. It can only take ownership of the decisions that it makes. We will see this more clearly in the chapter on the links between educational policies and innovations at school.

## 1.7. Innovation and its future

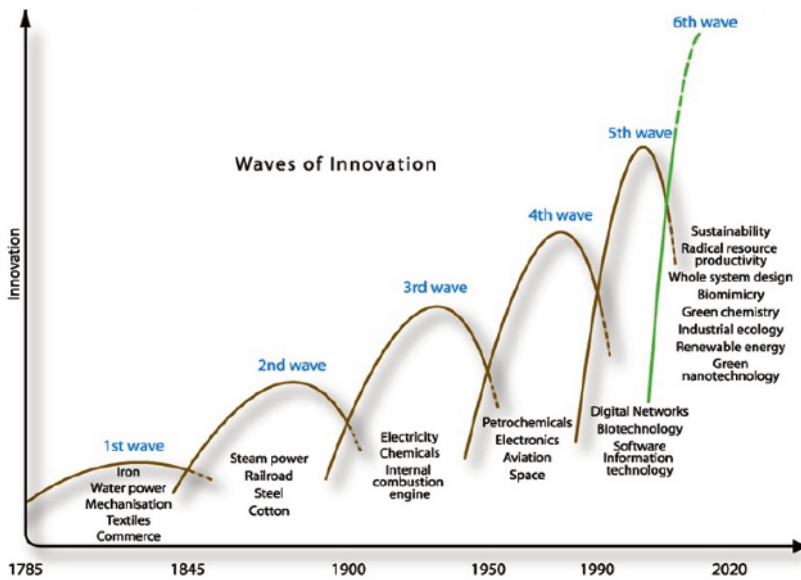
The question raised here is to ask whether an innovation adopted after a certain length of time remains an innovation. What does an innovation become in the longer term?

Schumpeter talks of “creative destruction”, that is, simultaneously with the emergence of innovation comes the disappearance due to obsolescence of sectors of economic activity jointly with the creation of new activities, all these based on two fundamental ideas: the idea of capitalism as the base of understanding, and that of technological progress.

In other words, an innovation is called upon to disappear in favor of another which allows technical and social progress. If innovation destroys, it is to produce better, more efficiently. This destruction may be violent, but this violence is softened by the arrival of a supposed improvement, that is through the new innovation. The question raised is that of how to judge what is better, of which we have already spoken in the definition of innovation: who judges “better” and who benefits from it, even if it proves to be unavoidable?

Several decades ago we witnessed an exponential explosion in the number of innovations, as shown in Figure 1.9.

The banalization of innovation, particularly in the social realm and doubtless in schools, leads us to think that this multiplication of innovations of different sizes leads to actors developing competences in innovation. In other words, innovation produces competences in the form of learning, producing in turn more innovations, in an ascending spiral. In any case, the competences acquired during this innovation would remain.



**Figure 1.9.** Change in the number of material innovations from 1785 to 2020 (source: *The Natural Edge Project* (2004))

Innovation may also disappear due to pure disinterest or be considered obsolete, or even dangerous. In schools, innovation may have three fates, namely:

1) It dies a quiet death due to lack of investors (for example, if the bearer of innovation is silenced or retires, or when the collective of innovators enters a phase of conflict). Some traces may remain to be taken up later by another innovator.

2) It becomes ossified, especially in the case of social innovations which tend to remain in a corner without anyone either being offended or taking up the torch of the innovation. We have thus known in schools some innovators who have been innovating for more than 20 years.

3) It becomes institutionalized, that is, it is taken up by the institutions who extend its boundaries, even making it compulsory. We will see later what kind of links form between innovation and institution for the generalization of an innovation. For example, the configuration of classes in schools, that is, the grouping together of young people of the same age for teaching at the same level, was originally an innovation which the

department seized upon and made the general structure and basis of the French educational system.

This last outcome is the most positive for the innovation if it wants both to become established and integrated into the social fabric.

The issue remains that an innovation is always adapted as it is adopted, that is that it loses its original “purity”, often leading to the innovators refusing the paternity of the new innovation. Opposition to the development of the innovation may even arise among the original originators, who then struggle against its establishment and generalization, which might have seemed to be the goal!

## **1.8. From technical innovation to social innovation**

### **1.8.1. *Different innovations: characteristics and implications***

The word “innovation” is often accompanied by an adjective which determines its boundaries, such as socioeconomic innovation, organizational innovation, pedagogical innovation, school innovation, technical innovation, technological innovation, social innovation and educational innovation. These adjectives define the field on which the innovation develops, that is, the field of socio-economy or of the organization, or of pedagogy, or more widely in the world of schooling, or in the domain of technical production, or that of technology which might be information and communication, or the field of social activity.

In addition, innovation might be a rupture, a process, incremental, ample, frugal, etc. It is a matter of designating the very quality of innovation. Incremental innovation signifies an innovation that involves a small degree of change and thus represents a slight disturbance in relation to what is usually done. For example, in a school, a teacher, who does not think they can teach an English accent to their students without voice work, invites his colleague who teaches music to intervene to help develop the students’ voices. The objectives of the school are unchanged, it is only the way of implementing them, yet without disturbing the school establishment.

By contrast, an innovation which is a rupture is more radical; it changes the habits of life. For example, the introduction of professional-style multidisciplinary projects into vocational high schools leads several teachers to work together and to change roles, to become companions rather than providers of knowledge. This is both a change in role on the part of the teacher and a change in the very content of the disciplines. This innovation is very disturbing in its implementation.

As for frugal innovation which we will return to later, it invites us to change to do more with less. It is linked to a desire to combat waste (for example, recycling wastewater) or reduce energy consumption (turning off streetlights in a city after midnight). In schools, this frugal innovation has never really been considered. Is it, however, relevant to schools?

### **1.8.2. Technical innovation and social innovation**

All over the world, mentioning innovation leads inevitably to the work of Schumpeter who doubtless shaped the destiny of innovation as a cumulative process taking place in a competitive economic space.

Moreover, the very evolution of the meaning of innovation has above all developed from the viewpoint of producing new consumer items. Research works discussing innovation often base their analysis on the production of a new product<sup>60</sup>. The idea of leaders or frontrunners of innovation is very current, even if these people do not always qualify as entrepreneurs in Schumpeter's terms. Start-ups are the most visible example today.

This production of a new object destined for consumers is a technical innovation in that the very basis of its existence is a new object which will be introduced onto the competitive market, derived from manufacturing production. The object comes first, and its social adaptations are relegated to the background, even if, as we have seen in section 1.6 on diffusion of innovation, the public is always present.

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<sup>60</sup> Even the works of sociologists, more focused on studying the innovative process and its impacts on the social conditions of individuals, mostly envisage innovation as production of a new object. This is the case in the research of the sociologist G. GAGLIO, particularly *Sociologie de l'innovation*, no. 3921, Que sais-je? PUF, Paris, 2014.

On this subject, we make a distinction between techno-economic innovation and social innovation. These two forms of innovation allow us to identify the priorities of innovation. In the first case, the focus is on the consumable object; in the second, on the provision of new services. Even if the economy is not excluded from the latter, it is not crucial to its beginning.

Techno-economic innovation transforms over time and the fact that two decisive dimensions are involved in production of the object – that is, the economic costs of operation (and forecast profits) and the discovery of consumer needs – moves the manufacturing aspect towards greater consideration of social factors.

The passage of time reveals complementarities between these two types of innovation. In fact, all technical or economic innovation requires the social aspect of implantation, and this is increasingly the case given the growing responsibility of civil society in economic and political decisions.

Although little valued over the years, social innovation is older than sociotechnical innovation. In fact, looking at the history of innovation, the concept has had a more political connotation (the direction of society) and the Greeks were the first to use the concept (*kainotomia*) to designate the introduction of change into an established order. However, this social innovation was regarded as disturbing and subject to manipulation, thus negative. The aspect of social governance has always been a complex issue, suspect in the eyes of citizens, and therefore delicate both to understand and to guide.

For example, we find in the *Encyclopedia Britannica* of 1888 (p. 211) that “communism is the name given to manipulation performed through social innovation whose central goal is to seriously threaten private property”.

At present, social innovation is seen as a way “to develop new answers to social needs which are badly or not at all satisfied in the current conditions of the market and social policies”<sup>61</sup>. This author adds that “the voluntary sector is the historical laboratory of social innovation, it is its DNA”.

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61 P. GORGET, manager of the AVISE program.

Dandurand<sup>62</sup> identifies three phases of the evolution of the concept of social innovation:

1) limitation, which is the assimilation of social innovation to the concept involved by Schumpeter's approach, that is, a technical trend;

2) generalization, towards the end of the 1990s when we really witnessed a strong emergence of social innovation and its indissociability from technical innovation (seen as its corollary to the extent that traditions or behaviors would change with the introduction of use of a new object, where it would be necessary to combine existing habits with new disruptions);

3) the current phase of fragmentation of the concept of social innovation depending on the nature of its application. Moreover, it is here that the author situates pedagogical innovations as particular forms of social innovation.

Social innovation is not directly based on production of a new, competitive object, but it attempts to respond to social needs that are new or not currently being met by the market or by social policies, implying the participation and cooperation of all the people concerned. Social innovation leads to a new mode of governance of institutions, which poses a problem for the very structure of the French national education system.

The social power of social innovation is focused on the representations of actors and on their relations: in other words, building a more just society, more concerned with the development of the subject. Innovation in schools resembles this conception, as it defines itself at the heart of learning and in a particular social relationship, the pedagogical relationship.

In France, social innovations have most often taken the form of voluntary associations formed under the law of 1901, where several people combine to respond to a new, unsatisfied demand, strongly involving their target audience in their new proposals and ideas. These associations have, moreover, often been criticized for allowing public policies to continue to ignore these new needs, since these associations are taking responsibility for them. This is a wide debate on which we will not go into more detail. The judicial aspect of this law of 1901 allows these associations to operate democratically; the crucial problem is their funding, which is often

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62 DANDURAND L., "Autour du concept d'innovation sociale, approche historique et comparative", *Revue française d'Administration publique*, vol. 3, no. 115, 2005.

indicative of their political and philosophical orientations. Some politicians<sup>63</sup> have even envisaged that social innovation should become the regulator of society, responding to its rapid evolution, even considering creating a fund to help their development. These associations are not funded by profits, requiring funds to be raised from members, from patrons and/or from State services.

Social innovation rules in those sectors where the State is not able to fully carry out its role, for different reasons. These sectors may be: youth unemployment, energy, housing, the environment, providing food or questions of over-indebtedness of households.

Education is also an area for this social innovation when it involves, for example, giving a “helping hand”<sup>64</sup> to children from disadvantaged backgrounds with their homework. In all these social innovations, the users themselves are the origin of innovation; they do not become the consumer of an innovation produced elsewhere, but the creator of innovation through dealing with the shortfalls they encounter.

In France, the social and charitable economy sector has long experience in this field. It saw the blossoming of several associations which have formed a national movement<sup>65</sup>.

However, what really raises the question of innovation is *jugaad*<sup>66</sup> or frugal innovation which, in spirit, is doubtless not as new as some might suggest, but leads us to rethink innovation in both its form and its objectives.

### **1.8.3. Innovation of withdrawal and frugal innovation**

Generally, innovation is seen as the arrival of a new element in an existing context. This conception is based on the idea that innovation

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63 It is enough to recall the intervention of François Holland on 30 April 2013, where he declared that the State should financially support certain associations developing social innovations.

64 “Coup de pouce” (Helping Hand) is an association under the law of 1901, a partner in academic success. Most of its activity helps children struggling with schoolwork and problems outside of school.

65 MOUVES, Movement of Social Entrepreneurs. Let us note that the term “entrepreneurs” cannot help but recall Schumpeter and thus the world of the heroic entrepreneur.

66 *Jugaad* is the Hindi word given to innovations that do not involve any additional expenditure of energy. This type of innovation originates in developing countries.

is an addition, an additive. This is based on an environment of growing abundance.

However, over the last few years, a form of innovation has developed, which defines itself by the removal of an object or a social behavior. One might give examples of car-less towns, pesticide-free agriculture, supermarkets without plastic bags, food without artificial coloring and short trade routes. These innovations lead to a de-institutionalization of the commercial apparatus for a new recomposition.

This new form of innovation, called innovation of withdrawal, implies ruptures, dissociations of existing links, and the loss of habits. We understand, for example, the progressive disappearance of textbooks from schools.

Two authors<sup>67</sup> have studied this mode of innovation, in particular in the agricultural world, on *no-till cultivation* which asks farmers not to plow certain areas of their plots to avoid the depletion of soils and to take environmental issues into account. Certainly, the principle is still based on the search for profitability, but by withdrawal of the item.

This withdrawal will subsequently structure human agricultural activities and social relations. In other words, if the theory of translation in the appropriation of innovation is still relevant, social interactions will focus more on decreasing intervention in certain aspects. It thus becomes essential to develop persuasive arguments for abandoning certain practices. It is not a matter of creative destruction in the manner of Schumpeter, because here it is the withdrawal which is the innovation and not its previous condition of existence.

Of more recent appearance is something called frugal innovation. Some see this as an epiphenomenon, arguing that it does not fundamentally challenge the nature of innovation.

Now, as with innovation of withdrawal, it seems that frugal innovation might, on the contrary, reveal something about our social transformations and will doubtless have an indirect effect on certain pedagogical options at school.

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67 GOULET F., VINCK D., "Innovation of withdrawal", *Revue française de sociologie*, vol. 53, no. 2, pp. 195–224, 2012.



First of all, what is frugal innovation<sup>68</sup>? The authors define:

“frugal innovation as the ability to do more with less, that is, to create at the same time more social and commercial value while economizing on precious resources such as energy, capital and time” (p. 31).

Frugal innovation came from a developing country: India, where the current lack of resources invites its inhabitants to innovate with the materials available. The example given by the first authors on frugal innovation illustrates this option: an Indian man goes to work every day by bicycle. The roads being very bad and covered with potholes and big gaps, his bicycle bears the brunt of these holes and he must pedal harder by jolting. He then has the idea to exploit the energy of these jolts by the installation of a dynamo which captures this energy and allows him to have a small motor, facilitating his travel with less effort. This innovation is called “frugal” as it consumes less materials and produces energy. However, such an innovation is a double-edged sword, as it may lead politicians to tighten the purse strings and resources, in the hope of exploiting the imagination and creativity of actors to the maximum if the latter wish to live in better comfort.

This frugal innovation, in resonance with current trends of economic crisis and the search for energy economy, rests on six principles:

- engage and iterate, that is, instead of waiting for inventions to come from research laboratories, here we begin with the clients, the recipients of innovation, carefully observing their behavior, even associating with them;
- boosting agility which responds to the trend of customizing objects, which the authors call “mass customization”;
- imagining plural solutions through continual recycling of the materials used in producing new objects;
- shaping customer behavior, for example, by giving a bonus to drivers who use new, non-polluting cars;
- co-creating value with “consum-actors” who conceive, develop and share the products and services that they want;
- collaborating with innovative partners, that is, creating networks in the chain of production of the new object.

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68 RADJOUR N., PRABHU J., *L'innovation frugale*, Diateino, Paris, 2015.

Without going too deeply into each of the principles, we can already raise certain questions as to the possible transfer of such innovation into schools.

The first principle runs counter to some assertions which stress that research is essential if we wish to develop effective pedagogy and teaching; the results of research will support certain practices.

The idea of consensus conferences, hosted by teacher-training organizations and universities, seems to sketch out a concept whereby researchers and actors control the production of innovation, and not just the researchers in their laboratory. In other words, applied research would no longer be relevant.

Researchers inform practitioners verbally of some of the results of their research work and hold discussions with education staff to find out what is understood, what might be integrated into their daily practice, on the condition of rethinking everything by the standards of professional practice.

To our knowledge, there has never been an assessment and a follow-up to these conferences. Now, frugal innovation questions the role of research and invites researchers to work right from the beginning with practitioners (the consumers). The definition of the research function thus changes. We will see this again in the chapter concerning the link between innovation and research-development.

The second principle is close to the idea of personalization of education, that is, not to abandon mass interventions while still ensuring that everyone should have the feeling of being taken care of with their particularities and their own representations. School currently poses the question of the individualization of teaching, which is not the same as individual instruction. The difficulty rests in the balance between considering every student in their individuality, as well as the students as a whole.

The third principle, already mentioned in the discussion on innovations in schools, rests on the idea that, to innovate, there is no need to spend more, either money, time or personal investment. This requires imagination from teachers who, for example, using available resources, find new uses for materials which are already present in the schools. It is a way of saying to teachers that everyone can innovate without needing to wait for more resources. We will see that it is not as simple as that, and that any new

activity requires from the person carrying it out a greater investment in time, or even in stress.

The fourth principle mentions the idea that innovation always takes place in a two-way relationship where the innovator influences the behavior of the recipient and vice-versa. The new idea is that this is done in a very conscious manner, in the goal of changing and influencing the behavior of the recipients of the innovation. This is not a case of adaptation of the innovation to consumer demand, but of co-production where the innovator is transformed as much as the consumer. For example, an innovative teacher who up until now has asked her students to study individually puts in place a series of innovations centered on group work and frequent exchanges between students, both in and out of class. This innovation will unquestionably change the role of the teacher and the behavior of the students to develop competences in collective work. The tools of evaluating student works will include criteria on these new competences.

The fifth principle, that of forms of association of the recipients of innovation, is very interesting for the teacher, in that it takes into serious consideration the role of students or parents faced with innovation and with the innovator. Now it is rare to encounter an innovation that originates with the students and is developed by the students, even if it is taken up by the teacher. This question of the role of recipients in the initiative, in its possible evolution, has never been addressed regarding innovation in schools. However, students and parents doubtless have new proposals to make which might be translated into innovations within the school.

The sixth principle relates to actions already carried out as well, at the level of the Department of Education with its innovation databases, innovations available on the national server and at the academy level. On the contrary, it is rarer to see associations being systematically formed between innovators working on similar themes or in geographic proximity, in the form of networks which are solidly established and maintained. To our knowledge, this is done, but not in a systematic way and, as usual, with no evaluation!

We have tried to make a parallel between this frugal innovation and what it could contribute at the level of innovation in schools. See Table 1.2.

<b>Entrepreneurial frugal innovation</b>	<b>Frugal innovation in schools and its specificities</b>
How to do better with less?	The question of what is “better” remains open in an acute manner in education. To define it, must we rely on international tests (PISA, TIMMS, etc.), which are incomplete and homogenizing? “Less” is envisaged in a material sense: what will not cost more in energy. But if this latter is understood as the teacher’s energy, it remains to be shown as teaching is a very demanding profession.
It does not mean a “low cost” approach but a local one.	Schools which are locally managed (primary and secondary) and exploit their proximity to local resources.
A change in paradigm. The 4 Ds: deregulation, decentralization, digitization and deceleration.	Local management: local recruitment of actors, local determination of programs (linked to the common base), reduction in central directives with adaptable programs and durations of teaching, to adapt to the profile of students and their parents.
Mass customization, increasing scarcity of resources and growing demographic diversity.	Construction of its own content and tools/pedagogic supports based on local resources. Exploitation of the particular contributions of students and their families.
Shaping the behavior of the client	Parents and children by highlighting the behavioral implications raised by the innovation.
Co-creating value with consum-actors, shaping client behavior (encouragement, influencing without giving the impression of manipulation), co-creating value (proposing ideas for innovative products with a platform of co-creation). Innovation invents a problem for which it becomes the solution.	Collecting the ideas of teachers (deprofessionalization and reprofessionalization). Collecting the ideas of students and parents. Analyzing their feasibility for implementation. This demands a continuous dialog between students, parents and education staff. Innovation reshapes the ways of thinking about school and anticipates possible negative effects in the future.
5 indicators: costs, resources, reliability, responsiveness and agility (adaptability).	These 5 indicators correspond to competences defining the profile of recruitment for school staff. Responsiveness is valued more highly than reflection which comes second in terms of time as

	<p>well as importance. In other words, the reflexive practitioner much touted over the last 20 years moves into the background in relation to the one who acts and reacts first, which does not prevent subsequent reflection on this action. Action is valued over words, just as in the learning process which is currently recommended to students.</p>
<p>Collaboration with innovative partners.</p>	<p>Opening the school to its environment, intensification of social networks via the Internet.</p>
<p>Developing a culture of frugal innovation.</p>	<p>Initial and continuous training of teachers centers on their capacities for innovation in a universe of limited resources, particularly on the fundamental development of creativity.</p>
<p>Growth involving rupture (minimalist design), a new spirit of authority.</p>	<p>The inverted classroom is an example of this, where students receive video “capsules” to prepare at home for exchanges in the classroom. The role of teachers and students produces a new spirit of authority.</p>
<p>Recycling all along the value chain (green products reused and recycled several times). Ecodesign and circular economy.</p>	<p>No more textbooks updated for each new program, but “video capsules” updated and enriched according to a spirit of gamification.</p>
<p>Growing large-scale personalization of profitable products.</p>	<p>Taking ownership of the tools available: sharing between teachers and students (using equipment belonging to the local council and associations)</p>
<p>Sharing rather than buying.</p>	<p>Bricolage, ingenuity and trading forums for items such as books or pedagogical and digital material.</p>
<p>Faster, better and cheaper.</p>	<p>Shorter circuits of trade, recruitment and mutual assistance allow more speedy acquisition and carrying out of activities.</p>
<p>Not creating new needs, but responding to a well-defined existing need (real problems of the clients), starting from client needs: “the customer is always king”.</p>	<p>It is hard for a school to create new needs; it responds to new needs corresponding to social demands and to behavior in contemporary society (creativity, the ludic aspect of learning, initiative, etc.). This recalls Schumpeter who created new needs, but without the co-participation of customers in this new need, which is far from being the case in schools.</p>

R&D: prioritizing quantity of innovations over quality.	<p>Collecting all the ideas of actors and working on them to develop new practices: a marketplace of ideas in the school establishments would be interesting, on the condition that they would be exploited in common and followed by new activities relating to these proposals.</p> <p>It is better to try an innovation and then abandon it than to do nothing for fear of failing. Multiplying the number of innovations allows us to banalize these approaches and leads to the development of professional innovative competences.</p>
Using crowdsourcing and social networks.	Solicit loans from generous donors and financial partnerships which are concrete in time and equipment.
Being steered by the market (Just In Time).	Establishing periodic evaluations over a short cycle, which are immediately exploitable.
Governance group for innovations (portfolio of products).	Have a sorting committee for innovations/ideas at different levels of the educational system.
There are no revolutionary technologies, and there are only cutting-edge commercial applications.	The inverted classroom is an example of the use of ICT and must be considered based on certain conditions of use. Commercial operations are absent in schools, but an extension of the inverted classroom may, for example, produce a cutting-edge school.
Take inspiration from start-ups: make it simple, work quickly, find solutions, do not fear uncertainty.	At school, the creation of mobile open work teams on multiple innovations, ready to abandon or modify them.
Giving power to employees, using the power of the group.	Power is shared with students and parents. The role of teachers and administrative and maintenance personnel is reshaped according to a clear definition of competences and attributes for each function. Each person is identified in a group or category of staff.

**Table 1.2.** *Conditions for establishing frugal innovation in a school*

In other words, we have tried to answer the following two questions:

- What would frugal innovation mean in education?
- What would a frugally innovative teacher look like?

If we return to the definition based on the authors of this frugal innovation born in India, we might say that it would mean the capacity to innovate rapidly, at the lowest cost and with very diminished resources, according to a sense of resourcefulness and “bricolage”.

Some examples from education might illustrate, at least in part, what we might consider to be frugal innovation:

- free courses in the form of YouTube mini-videos (storytelling and games), which is now common practice in some schools;

- MOOCs (Massive Online Open Courses), that is, platforms of resources for educational purposes available to the public, based on different conditions of assessment and monitoring;

- the reduction of bureaucracy and levels of hierarchy through more transparent decentralization (see Chapter 3, section 3.5, on the educational policies for development of innovation in schools);

- giving power to employees (*Maker Faire*)<sup>69</sup>, that is to teachers, to students and to parents, according to a well-recognized codification and explicit sharing of responsibilities;

- intelligent recruitment of teachers, emphasizing their competences in creativity and openness and their previous experience outside school;

- gamification, that is introducing activities for students which are essentially fun and motivating;

- platforms such as CoLearnr, free of charge, for collaborative learning online;

- sharing discussions (FutureLearn) between students (according to their level) and teachers whose vision for teaching work is to include a process of life-long professional learning;

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<sup>69</sup> Originating in the USA in 2006, *Maker Faire* is at the same time a science fair, a public festival and a reference event for innovation. It arose from DIY (do it yourself) culture and brings together innovators wishing to improve their work. These events take place in several capitals. A *Maker Faire* was held in Paris in 2017, at the City of Science.

– creating a (soft!) ranking according to the level of participation in exchanges (reputation, appreciation by peers of the quality of comments);

– micro-schools funded by crowdfunding, which does not yet result in subservience to a media outlet, a business or a multinational. We might also think of crowdsourcing for teachers and students, that is, the externalization of certain activities such as drawing on networks of knowledge, of creating sites which are not restricted to the school world, etc. However, this demands meticulous work on the ethical modes in effect.