DESCARTES ON EDUCATION: THE CARTESIAN REFORMATION OF THE SEVENTEENTH-CENTURY INSTITUTIONALIZED KNOWLEDGE

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Abstract. It is well-known that the Cartesian scientific and philosophical project was directed towards instrumental purposes which guided Descartes' theoretical research, as it is evidenced in the *Discourse on the method*. The transformation of the educative curriculum can also be considered one kind of intervention directed to the same purpose. The question of introducing his project into the schools has been a recurrent topic in order to analyze the *Principles of Philosophy*. Nevertheless, it can be affirmed that the Cartesian interest for institutionalizing his project – both science and philosophy – is present in more of Descartes' works. This paper aims to analyze the different rhetorical and discursive strategies performed by Descartes so as to introduce his project in the educational system.

Keywords: Descartes, education, institutionalization of knowledge, instrumentalism, rhetoric

Introduction

The *crise pyrrhonienne* of the XVII century represented a double-edge weapon; it contributed in promoting a deep crisis at the universities, but also posed a number of problems that the *novatores* ought to tackle, such as the useless character of Aristotelian science or the lack of a justified knowledge capable of avoiding sceptic's arguments. In this context, Descartes proposed a novel view in both philosophy and science, embodying new answers to contextual challenges which Scholasticism could not solve. Nonetheless, Cartesian philosophy did not represent a mere alternative interpretation of the phenomena. Descartes was committed with the *transformation of the world* which universities did not executed, being that "the best way of proving the falsity of Aristotle's principles is to point out that they have not enabled *any progress* to be made in all the many centuries in which they have been followed"[1]. He denounced the lack of material progress which Scholastic philosophy and science involved "for no one has ever succeeded in deriving any practical benefit from 'prime matter', 'substantial forms', 'occult qualities', and the like"[2], proposing a new philosophical and scientific approach whose main aim was to become ourselves in "the lords and masters of nature. [...] [which] is desirable not only for the invention of innumerable devices which could facilitate our enjoyment"[3]. His system appealed to the fruits –

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moral, mechanics and medicine[4] – that could be obtained through his new philosophy and science, then, achieving practical consequences supposed for Descartes one of the guarantees that distinguished his project from Aristotelianism.

The Cartesian intervention in the world did not suppose only the attempt to reform Scholastic science or philosophy but also educational institutions like universities or schools. Descartes was aware that the success of his project required the proposal of "a practical philosophy which [could] replace the speculative philosophy taught in the schools"[5], in other words, the institutionalization of his philosophical and scientific project so as to transform the world. This paper aims to analyze how Descartes tried to institutionalize his own philosophical and scientific projects through different strategies, understanding that human progress was linked to the reform of the institutional knowledge. For this purpose, the different rhetorical and philosophical tactics performed by Descartes in order to introduce his project in the institutions will be examined.

I. Crisis in the seventeenth-century universities: the struggle between Ancients and Moderns

Universities have been recognized among centuries as the educative spaces which produce, develop and spread out the institutionalized form of knowledge. Nonetheless, this conception of the university's task has not ever been unitary and progressive, at many historical moments the university has been questioned because of its lack of adaptation to its present circumstances. Seventeenth-century universities embodied one of those moments. Modernity starts with the Scientific Revolution, which brings a new conception of the world and a novel science totally different of those practised by the Aristotelians at the university. Furthermore, the new science is a product of original philosophies appeared in the XVI-XVII centuries like Mechanism which were different than institutionalized Scholasticism and whose principles were in conflict with Peripatetic philosophy. It was a science that rejected the qualitative physics made in the universities and appealed to a quantitative and mathematized account of the nature.

The triumph of New Science is based not only on its better – more simple and comprehensive – explanations about the phenomena of nature, but in the *useful practical consequences* that this science can provide. Modern science is guided by the Baconian claim of making ourselves masters and possessors of nature; consequently, the idea of intervening in nature through science, understanding knowledge as power, becomes a core notion of the new science[6]. Knowledge must offer practical results which proof their truth, justify them. The problem of epistemic justification in Modern Age can no longer be solved appealing to classical authorities who determine what knowledge is[7]. The sceptical crisis of the XVII century was responsible of this transformation in the academia. Scepticism involved a deep critique of the inherited knowledge through authors like Montaigne, Charron[8] or Sánchez[9], questioning the institutionalized theology, science and philosophy and, consequently, weakening Aristotelianism. It was necessarily that Pyrrhonism enveloped "all the human sciences and philosophy in a complete sceptical crisis, out of which modern philosophy and

the scientific outlook finally emerged"[10]. Scepticism engaged a necessarily criticism of institutionalized knowledge, easing the birth both a new science and philosophy.

The crisis of medieval universities is linked both to their incapacity for providing a correct explanation of this new science in Aristotelian terms[11] and to their inability of solving the sceptical challenge. Consequently, Scholastic philosophy and science started to be considered *useless* by the new scientists and philosophers[12]. To the inability of providing a correct solution for these problems, we found another important element which hinders the adaptation of universities to their context: their conservatism against any novelty. Aristotelian scholasticism embodied in the XVII century the institutional philosophy which was recognized as knowledge, and, despite the critiques to Peripatetic thought made since the XVI century, these institutions were very careful in the introduction of new contents in their curriculum. The conservatism of universities can be explained upon their religious mission. Medieval universities were institutions dependent of the Church, hence the main task of them was to protect and promote Christian theology. After the deep criticism that Scepticism made of Christian theology[13] – which supposed a great help for the Reformation – universities distrusted any kind of novelty because of his dangerous implications, which could purport new heresies. Moreover, after the Reformation, Aquinas' theology was institutionalized as the correct one that had to be taught at universities, whereas Aristotelianism embodied the right philosophy of the School in virtue of his fitting with Christian theology[14]. For that reason, the *Ratio Studiorum* of 1599 indicated that teachers "shall not depart from Aristotle in matters of importance […] [and] shall be very careful in what [they] rea[d] or quot[e] in class from commentators of Aristotle […] always speak[ing] favourably of St. Thomas"[15]. The narrow relation between both authors implied that any kind of criticism to Scholasticism was understood by authorities as an attack to Christianity, so the critics of Aristotle posed a threat to Aquinas:

> Aristotelian philosophy owed its prestige, and its place in the universities, to its service in supporting the higher disciplines, especially Christian theology. [...] The Dominicans (who chose Thomas as the official doctor of their order) and the Franciscans (who followed John Duns Scotus) wished to use Aristotelian concepts and arguments in developing the doctrines of scripture and the Church Fathers into a systematic theology. Thus, Thomas asserts in the Summa contra gentiles that natural human reason, as interpreted by Aristotelian philosophy, can demonstrate some Christian doctrines, including the existence of God and the immortality of the soul.[16]

This connection made the contextual adequacy of university difficult, precluding the adoption of a different philosophical perspective and, consequently, preserving an institutional philosophy and science which could not rise to the challenge of its era. In other words, the religious commitment possessed by medieval universities implied the conservation of Aristotelianism for theological reasons, rejecting any kind of new philosophy.

Some authors have pointed out an economic factor which must be considered in order to obtain a correct explanation of the limited role of universities in the Scientific Revolution. Universities were "primarily teaching institutions. Professors were not expected to advance knowledge but package it in a convenient form for mass"[17], they "were expected to teach boys, not to be research institutes"[18]. Consequently, their funds were insufficient for providing an adequate research material for the scientific inquiry. Research in the seventeenth-century required a huge investment of capital – which scholastic centres did not have – for providing of media research such as laboratories, botanical gardens or observatories. Hence, the conservatism of the institution together with its economic obstacles facilitated the consolidation of alternative institutions like Academies or Scientific Societies whose capital was higher and only dedicated to a research purpose[19]. Thus, universities "bastions of Aristotelianism – declined as the institutional loci of scientific novelty in the seventeenth century"[20]. They "became increasingly obsolete and their social impact less conspicuous compared with [...] other institutions which were better adapted to meet the new challenges"[21], being substituted by new institutions which had better financing for research tasks and whose higher independence of the religious power boosted the development of a novel science and philosophy. These problems of the scholastic institutions could lead to the traditional understanding[22] of the universities' role in the Scientific Revolution where they are seen as "the principal centres of opposition to the new conception of nature which modern science constructed"[23]. Nevertheless, Porter or Gilson have evidenced that universities have not to be considered as mere ballast for the Scientific Revolution in so far as they played a key role in them. These institutions provided the intellectual framework of the new scientists and philosophers. The "overwhelming majority of those who by any criteria made a contribution to that revolution had attended university"[24], thus "Peripateticism, in whatever propaedeutic form, was the earliest contact they had as individuals with serious philosophical and scientific concerns"[25].

Despite the formative role which universities could have played in Modernity, their function is not to be overestimated. The university was not an open-minded place where any kind of philosophy and science was possible to explain and discuss, sowing the seeds of the Scientific Revolution. It must be reminded the theological task that it performed, which was in many points incompatible with the rise of a new thought. This religious commitment was the most responsible of both the persecution and the disqualifications of the *novatores* made by the academics during seventeenth-century, and the preservation of "Aristotelian scholastic philosophy [...], and an attack on this philosophy might be taken as an attack on the foundations of theology"[26]. Regardless of this crossroad, "medieval university maintained an institutional basis for science and natural philosophy in the seventeenth and eighteenth centuries"[27], embodying for a long time the institutionalized knowledge[28] – those sets of beliefs sanctioned by the authorities as the correct ones. Hence, reformers were not satisfied only proposing new scientific and philosophical approaches; they wanted to institutionalize their own projects introducing them both in Academies and Scientific societies but also reforming study plans and educational institutions. Indeed, the question of pedagogical reform was central for humanist circles insofar as it was

perceived as a form of "inculcating the knowledge and skills to achieve material improvements in society"[29]. Campanella's *City of the Sun*, Andreae's *Christianopolis* or Francis Bacon's *Solomon's House* represent utopian models directed to a transformation of society whose axis is centred in an educational reform. In those utopian proposals lie a connexion between knowledge and education which carries to a better society. For example, *Solomon's House* program was focused in the practical dimension of knowledge, ignoring scholastic philosophy in the curricula because of its useless character. Under the motto "*Scientia potentia est*", Bacon's purpose "was to seek new knowledge by means of deliberate experiment […] [since] the aim was to find knowledge in every domain that affects people"[30]. Certainly, Verulamio saw the transformative potential of education and, for that reason, he placed "the educational institute at the centre of the ideal society"[31]. According to him, "the progress of knowledge depends, on the one side, on the ordering of the institutions, and on the other, on the communication of knowledge among them"[32]. Both objectives were the target of his educational reform. Hence, *Solomon's House* was centred in the development of an educated workforce of researchers so as to produce knowledge for conquering social progress. In a nutshell, the potential of education was perceived by pedagogic reformers as the central tool in order to perform a transformation of society[33].

II. A new philosophy and science at schools: Descartes' internal strategies for institutionalizing his system

The institutionalization of Aristotelianism as the official philosophy in the medieval universities was based on its political contribution for ensuring the prevalence of Christian theology. Nevertheless, the preservation of the religious order was also linked with the educational task developed by universities; institutions dedicated to the transmission of the "official knowledge" to the subsequent generations in order to perpetuate its validity. For this task, the delimitation of the appropriate educational materials which had to be used at class was important so as to guarantee the preservation of the theological commitment. The curriculum paid close attention to the educational texts which allowed students to achieve the correct knowledge. In seventeenth-century, the books introduced in the universities' curriculum where divided into treatises and textbooks. The former embodied the original works of authors recognized by educational authorities as corrects. This pedagogical strategy "was based upon a direct reading of Aristotle's works in Latin translation"[34], where the medieval style of commentaries provided the guide of the correct interpretation. Indeed, study plans of schools gave importance to the reading of texts like Aristotle's *Organon*, *Physics* or *Ethics*. For example, in the Jesuit schools, the *Ratio Studiorum* explicitly advocated for the direct reading of Aristotle's works as an essential part of the philosophical education[35]. Textbooks, on the other hand, represented an educative practice that in the seventeenth-century "really began to dominate the teaching of the subject in most formal courses in institutions of higher learning"[36] through the manuals of authors like Clemens Timpler, John of St. Thomas, Francisco Toletus or Eustache a St. Paulo. These textbooks were known as *cursus philosophicus* and represented a "summary of scholastic teaching in philosophy […]

[whose function] was to provide the basic philosophical knowledge"[37]. They arose from the Medieval Commentary tradition which was still present during the XVI-XVII centuries in the Conimbricenses[38]. The commentaries on Aristotle were, at certain point, "so prolix that many professors thought it incumbent on them to write briefer treatises summarizing the essential content of their teaching"[39]. Therefore, textbooks constituted a synthesis where the contents were relatively malleable. The progressive reduction in the length of careers made along the XVI-XVII centuries[40] increased the importance of textbooks over treatises[41], carrying to the requirement of summarizing the contents, understanding textbooks as the most useful tool for this task. They "often incorporated the characteristics of summary and expansion at the same time, by giving either more or less attention to a given topic than was available in the extant works of Aristotle"[42], allowing a higher control of the most controversial topics. The introduction of Aristotelianism as the official philosophy meant the adaptation of the Peripatetic thought to the Christian theology. There, textbooks embodied an easy way of promoting the adequate contents, deleting the most controversial ones[43], and building a Scholastic system more consistent and coherent. It should be noted that in the XVII century Catholic and Protestant universities consolidated the use of different manuals and textbooks according to their theological approach – Protestants avoided the connexion with Aristotelianism whereas Catholic preserved his importance[44].

On this context, Descartes' attempts to institutionalize its philosophy at the schools embodied both forms. Regarding treatises, we found his *Meteorology* as the most representative one, whereas concerning textbooks his most important endeavour was the *Principles of Philosophy*. Previously, it must be noted that these works do not embrace the totality of Descartes' attempts of institutionalization. The fact is that he also manifested his interest for introducing the *Meditations on First Philosophy* into schools, appealing to strategies directed to its acceptance by teachers:

> I am confident that Father Mesland's testimony will no less effectively lend authority to my Meditations, particularly since he has taken the trouble to adapt them to the style which is commonly used for teaching, and I am deeply obliged to him for doing this. I hope that experience will show there is nothing in my views which should cause teachers to be apprehensive about them and to reject them; on the contrary, I hope they will be found very useful and acceptable.[45]

However, he was aware of the mistrust that religious authorities will manifest against his philosophy because of the theological matters involved, representing an important obstacle in order to introduce it in the schools. The solution of Descartes was centred in the acceptance of the *Meditations* by the authorities through two stratagems. The first was to write the *Meditations* in Latin, for proving his connexion with Scholastic philosophy – remember that "Latin is the more scholarly language"[46]. Certainly, Descartes was aware of the importance of Latin in the educational institutions insofar as it constituted the language of the preceptors[47]. For example, concerning the *Objections* sent by the Jesuits of La Flèche, Descartes knew that "they will prefer to

write them in Latin rather than in French"[48]. Thus, the introduction of his philosophy in the schools was only possible in Latin. For that reason, most part of the books which were conceived with the purpose of being institutionalized were firstly published in Latin, as it happened in the cases of the *Meditations* and the *Principles*. On the contrary, the *Discourse* was written in French because it was not directed to scholars, but to common people[49]. The second strategy searched the protection of his philosophy "with the authority of others, as far as I can, since truth by itself is so little esteemed"[50]. For this purpose, Descartes dedicated his *Meditations* to the masters of the Sorbonne[51], who had a great theological prestige in the XVII century, thus he thought that it "may be very useful for [his] purposes" [52] –that is to say, to institutionalize his philosophy. Under the theological shield of the Sorbonne, Descartes believed that nobody could refuse the *Meditations* by a religious matter, easing its introduction on the school. To obtain this protection, Descartes manifested repeatedly the agreement between his philosophy and the theology[53] – with poor results.

Nonetheless, the *Meteorology* and the *Principles* embodied his most representative and serious attempt for institutionalizing his philosophy and science in schools. For this purpose, Descartes performed in both books different rhetorical and discursive strategies, presenting the Cartesian philosophy to the authorities with an apparently harmless and conservative appearance which ultimately implied a surreptitious refusal of Scholasticism. This paper will not explore the success or failure in the institutionalization of Cartesianism, nor the diachronic development of Descartes' attempts for introducing his project in the education system, but the stratagems accomplished by him for doing it. The reason is, firstly, that there are many scholars who have examined those perspectives[54]. Besides, I am trying to prove the connexion between the Cartesian transformation of the world and his educational reform. For this task, it is not necessary to analyse how much fruitful were its outcomes, but the strategies accomplished by him.

Regarding the *Principles*, Descartes conceived them as the instrument to "submit to the public the sum total of [his] few reflections on philosophy, and to fight for the widest possible acceptance of [his] views"[55]. two stratagems performed so as to institutionalize them an be underlined. On the one hand, the form adopted for writing the textbook, whose intention was to "use a style more suited to the current practice in the Schools. That is [...] [to] deal with each topic in turn, in short articles, and shall present the topics in such an order that the proof of what comes later depends solely on what has come earlier, so that everything is connected together in a single structure"[56]. Despite the book was initially conceived with a comparative structure between his philosophy and the Scholasticism, Descartes finally wrote a brief exposition of his system in textbook form, whose wording was inspired in the *Summa Philosophiæ Quadripartita* of Eustache a St. Paulo[57]. Consequently, the "plan for an explicit comparison is abandoned, but there can be no doubt that there is an implicit one"[58]. The *Principles* were presented as a manual which kept the same structure[59] exposed in the Scholastic ones. Moreover, the appearance of textbook eased its introduction in classrooms because it adopted the same style of the books used for giving lessons. The form of the *Principles* implied a strategy for adapting Cartesianism

to the style of the School for favouring its admittance. A formal strategy that even conducted Descartes to consider to title the book "*Summa Philosophiae*" – like St. Paulo's textbook– so as "to make it more welcome to the scholastics"[60].

On the other hand, it is important to underline the *Principles*' textbook character, which provided of a *comprehensible* and *summarized* version of the Cartesian philosophy[61]. Both traits represented for Descartes the pedagogic elements which made textbooks important in the educational development of infants. Although the refusal of child prejudices is a constant in his project[62], he was aware that this task cannot be performed until the subjects finished their instruction at learning institutions, since "it is very useful to have taken the complete course in philosophy as it is given in the Jesuit schools before attempting to raise one's mind above the level of mere book learning and become a genuinely knowledgeable person"[63]. According to Descartes, infants need a previous education based on the institutionalized knowledge before they perform the procedure showed in the *Meditations* (epistemic autonomy). His argument is constructed upon the child's *incapacity* of separate the mind from the body[64], that is to say, to refuse our most harmful prejudice so as to conduct our reason in the best possible way. This inability implies that "in the mind of an infant there have never been any pure acts of understanding, but only confused sensations"[65]. Consequently, infants cannot produce reflective thoughts, which are necessaries to abandon the prejudices and follow the autonomous procedure of the *Meditations* – a method based on the pure understanding. Only *adults* can perform this task, thus "in adult [...] the mind enjoys some liberty to think of other things than those presented by the senses, [and] we know there is not the same liberty in those who are sick or asleep or *very young*, and the younger they are, the less liberty they have"[66]. Hence, education must provide the ground which prepares infants for refusing the prejudices – a task where the *Principles of Philosophy* contributes.

In this formative role, textbooks represented a useful tool which offered the pedagogical basement needed before the assumption of an epistemic autonomy based on the refusal of our prejudices, making the difference between a good and a bad education. Moreover, both elements also comprised the task of introducing Cartesian philosophy in the schools in such an easy way that "even the least gifted teachers will be capable of teaching it from this book alone"[67]. An easily understandable and summarized version of Descartes' philosophy contributed to institutionalizing it in a form that "those who have not yet learnt scholastic philosophy will find it much easier to learn from this book than from their teachers"[68]. Finally, it is important to underline that the introduction of Cartesianism into education system satisfies a strategy directed to refute surreptitiously Scholasticism[69]. Formally, the *Principles* were composed "in such a way that it can be said to be not at all in conflict with the ordinary philosophy"[70], nevertheless, this was a tactic whose ultimate goal was to *substitute* Scholastic philosophy. All these stratagems tried to present Cartesianism as an innocuous philosophy for institutionalization and replacing Scholasticism:

> But please do not tell people, for that might make it harder for supporters of Aristotle to approve them. I hope that readers will gradually get used to my

> principles, and recognize their truth, before they notice that they destroy the principles of Aristotle.[71]

Regarding the treatises, they embodied the correct scientific explanations accepted by authorities for natural phenomena. The prevalence of Aristotelian science in the XVII century was manifested through its authority and predominance at universities, where treatises like Aristotle's *Meteorology* remained taught as the true scientific explanations. Again, the preservation of theology was the main argument for preserving the Aristotelian science, thus their scientific explanations – like the geocentric model – were those which fit better with Christianity, whereas "Novel cosmological speculations were classified [...] inconsistent with traditional interpretations of scripture"[72]. Substituting Scholasticism implied, in the scientific ground, the necessity of alternative explanations better than those provided by Aristotle, which also preserved theology. If the *Principles* represented Descartes' alternative philosophy, his treatises symbolized the scientific outcomes, result of his philosophy –as it is evidenced in the image of the tree of philosophy. Descartes wrote many treatises whose field of study was diverse – optics, geometry, physiology, etc –, but the fact is that his attempts to institutionalize a treatise were fundamentally directed to one: the *Meteorology*. Certainly, it is known that the *Meteorology* was send to many people "including teachers at La Flèche, Louvain, Lille and Paris"[73]. Likewise, there are many textual references which evidence the interest of Descartes in the reaction of universities and schools to his treatise so as to introduce it there. For example, he wrote to Father Noël professor at La Flèche, that "there is no one […] who has a greater interest in examining this book than the members of your Society. I see already that so many people are going to accept the contents of the book that (especially where the *Meteorology* is concerned) I do not know how they will be able to teach these subjects from now on as they are taught year by year in most of your Colleges"[74]. Some time after, Descartes stated to Father Dinet that he did "see no reason why the philosophers who give annual courses on meteorology in all [the Jesuit] colleges should not refer to [his] account"[75]. Indeed, he recognized his interest in "know[ing] how they [the Jesuits] deal with [his] *Meteorology* in their philosophy"[76]. Therefore, Descartes "did not appear to expect anything but widespread acceptance of the contents of *Les Météores* among those teaching in Jesuit colleges"[77]. This special concern about the introduction of his *Meteorology* in schools has not to be understood as a mere coincidence but a strategy performed so as to replace Aristotle's treatise by his *Meteorology*. Aristotle's *Meteorology* was, in the XVII century, a widely used and known treatise – through commentaries like the Conimbricenses–, present in all the study plans. Descartes tried to substitute Scholasticism both in philosophy and science. Consequently, his *Meteorology* was written as "a possible replacement for the teaching manuals on meteorology, especially those taught in the Jesuit schools"[78] for proving that his philosophy could provide better scientific explanations than institutionalized philosophy:

> Indeed, I think I have experienced the effects of this policy already in connection with the treatise on meteorology that I published. For since, if I

> am not mistaken, it provides a truer and more precise explanation of the area of philosophy' with which it deals than is to be found in anyone else's writings, I can see no reason why the philosophers who give annual courses on meteorology in all your colleges should not refer to my account, other than that they may have believed Father Bourdin's unjust verdict on me and thus never read the book.[79]

Hence, Descartes' attempts for institutionalize the *Meteorology* were both a refusal of the scientific explanations derived from Aristotelianism – which Descartes affirmed that were false[80] – and a form of proving that the Cartesian science provided of better and useful explanations than Scholasticism. Furthermore, the attempt to replace Aristotle's *Meteorology* was performed by Descartes through some rhetorical strategies of content and style that tried to show his treatise more similar to the Scholastic ones.

Concerning the style of the *Meteorology*, some scholars have underlined that, compared with other treatises, it presents a "conservative nature [...] despite its novel treatment of the rainbow and the enumeration of an explicitly corpuscularian position" [81] . As Gilson has evidenced, there are many resemblances between Descartes' and Conimbricenses' treatises on meteorology in the structure, topics and language[82] which make the Cartesian one more traditional than the rest. Indeed, the causal explanation of some phenomena based in "Aristotelian approaches […] are found throughout Descartes's treatise without being changed at all or with only minor changes"[83]. For that, in order to make *Meteorology* more welcome to Scholastics, Descartes did not deny the existence of substantial forms and real qualities in his treatise. He stated that "in order to preserve the peace with the philosophers, I do not want to deny anything of what they imagine in bodies […] such as their *substantial forms*, their *real qualities* and the like"[84]. Nevertheless, we know that Descartes, in his correspondence, clearly affirmed that "the ideas of real qualities and substantial forms […] should be altogether rejected"[85] because of their useless character. Therefore, the preservation of these notions constitutes a strategy so as to make the treatise more comfortable to Schoolmen. This conservative style has not to be obviated, thus it embodies a rhetorical strategy for easing the discussion and the introduction of the treatise at School. The *Meteorology* "was neither revolutionary, nor was it intended to be revolutionary"[86] since it was adapted to the Scholastic form and language so as to be perceived as harmless, allowing its introduction in the classrooms because did not represent a threat to the faith. Nonetheless, this was a rhetorical device for replacing ultimately Aristotelian science by Cartesian science, facing the teachers with a treatise whose explanations were better and incompatible with Aristotelianism.

Both the *Principles* and the *Meteorology* represent different *internal strategies* directed to institutionalize Cartesian philosophy. The first was an easily understandable and synthesized form of his philosophy whose purpose was to "rewrite his philosophy in Scholastic terms, and to present it as a total system in the way in which the Scholastic textbooks presented their system"[87] for favouring its institutionalization. The second evidenced the better scientific results which Cartesian philosophy offered in comparing with Scholastic science, whose principles "have never provided a good explanation of any of these observations"[88]. Likewise, the

Principles and the *Meteorology* share a common strategy based on a Scholastic look – by means of formal aspects like style, vocabulary or content – the danger which these books represented for the Aristotelian doctrine. The innocuous and conservative character which Descartes defences for introducing his project implied a deep critique of the institutionalized philosophy in order to *substitute* it, providing a new philosophy "which would replace the speculative philosophy taught in the schools"[89].

III. Descartes' external rhetorical and discursive strategies for institutionalizing his philosophy

As it has been explained, in the XVII century, philosophy – in its institutionalized form – was connected to a theological commitment where the first was responsible of providing scientific and epistemological explanations compatible with Christianity. This connexion between philosophy and religion caused mistrust in the School against those philosophers called the *novatores*. Novelty was perceived by authorities as a threat to Christian theology, thus those new philosophies did not guarantee the preservation of the theological commitment. Descartes had to face this challenge, being aware "that the main reason why [...] [the theologians] take great care to reject all sorts of innovations in philosophical matters is their fear that these innovations may bring about some change in theology as well"[90]. Consequently, he perceived the necessity of conserving – at least formally – that religious connexion characteristic of ancient philosophy in order to institutionalize his new philosophy at schools – since the education system was ruled by the Church.

Analyzing Descartes' correspondence and works, a contradiction can be observed in the issue of the novelty or antiquity of his philosophy. The fact is that Descartes sometimes clearly advances the newness of his project[91], whereas in other occasions he refuses the innovative character of his philosophy[92], asserting that it is "nothing new but is extremely old and very common"[93], that is to say, conservative and compatible with Scholasticism[94]. He even claims that his views are a continuation of Aristotelianism, thus he does "not use any principles which were not accepted by Aristotle and by all those who have ever concerned themselves with philosophy"[95]. Nevertheless, we will say that this contradiction is only apparent. It is obvious that Descartes did not believe that his philosophy and science supposed a continuity of Aristotelianism; hence he not only rejects the principles of Peripatetic philosophy explicitly, but he was aware that his own philosophy was in fact *incompatible* with Scholasticism because it destroyed their principles.

Ariew has asserted that Descartes proposes a solution to this contradiction based on considering "that all of Peripatetic philosophy, insofar as it is different from other philosophies, is new, and that his is ancient"[96]. That is to say, Descartes solves the inconsistency showing that Aristotelianism is a novel philosophy, whether his project is genuinely based on old principles[97]. Therefore, a philosophy which contradicts Scholasticism would not be a novelty, because only Aristotelianism would embody the true novel philosophy. Nevertheless, Ariew's solution presents two inconsistencies. First, his understanding of the controversy does not acknowledge that Descartes admitted *explicitly* many times the novelty of his philosophy[98]. The incongruity is not solved considering Aristotelianism as a novel philosophy and

Cartesianism as an old one, because the contradiction is manifested at a textual level. Second, Descartes asserted repeatedly that his philosophy was heiress of Aristotelianism – even in the *Principles* he affirmed that he has "not employed any principle which was not accepted by Aristotle and all other philosophers of every age"[99]. Hence, the solution cannot just refuse those connexions since there are many textual evidences where Descartes affirms the agreement between both philosophies. Then, a correct interpretation must explain why sometimes Descartes refuses his connexion with Peripateticism while sometimes accepts it.

For solving this contradiction, I propose that the conservative character which Descartes tried to attribute to his philosophy was only a *rhetorical strategy, not a real asseveration*. All the tactics previously analyzed embody, both in the *Principles* and the *Meteorology*, transformations in the internal structure – form, content, style – which were directed to mask the real aims of the Descartes' books. Likewise, Descartes' claims that his philosophy is not new but the oldest are an external strategy which shares the same goal referring to different elements: to mask the novel character of his philosophy in order to replace Scholasticism. For evidencing this thesis, the analysis will be centred at *who* receives the different asseverations.

Regarding the novelty of his philosophy, Descartes recognizes it to people like Father Mersenne, Princess Elizabeth, Father Noël or Father Charlet[100]. The common element that groups all these scholars was *their friendship* with Descartes[101]; all of them were part of his circle of trust to which he confessed many times the real aims of his project. Nevertheless, with respect to the ancient character of Cartesianism, Descartes asserts it to religious authorities such as Father Dinet or the members of the Theology Faculty of the Sorbonne[102]. Both authorities embodied positions of influence whose prerogative was a guarantee of the commitment of his philosophy with the theological orthodoxy: Father Dinet was the Jesuit provincial of France, and the members of the Sorbonne personified the highest theological authority in France. Descartes needed to present his philosophy as an old one – like Peripatetic – because "Well-trodden and familiar pathways are always safer than new and unknown ones, and this maxim is particularly relevant because of theology. For the experience of many years has taught us that the traditional and common philosophy is consistent with theology, but it is uncertain whether this will be true of the new philosophy"[103]. Consequently, he underlines the connexion between Cartesianism and Scholasticism so as to prove its antiquity. Furthermore, another place where Descartes affirmed the ancient nature of his philosophy must be underlined: in his public writings. Certainly, he disguised his novel proposal as an ancient one in order to protect himself from religious controversies. For that reason Descartes's statement that his "philosophy is nothing new but extremely old and very common"[104] is contained in the *Meditations*[105], in the *Epistola ad Dinet* – a letter which was attached with the *Meditations* – and in the *Principles*. On the contrary, in the *Discourse*, Descartes states the novelty of his philosophy, but it must be regarded that the *Discourse* was anonymously published[106], and that he later denied the novel character of his method in the *Meditations*[107].

Descartes adopts two arguments for proving the antiquity of his philosophy. As it has been explained, the first consists in underlining a connexion between Cartesianism and Scholasticism so as to prove its oldness. If his philosophy "do not

use any principles which were not accepted by Aristotle"[108], it cannot represent a threat for Christianity because it is an old philosophy – that is to say, compatible with theology. However, this must only be considered a rhetorical device, and so Descartes was aware of the real incompatibility between Peripateticism and Cartesianism, whose principles "destroy the principles of Aristotle"[109]. The second argument appeals to the correct fit between the Christian theology and his philosophy – which he rhetorically subordinates to theological tasks enjoined by Pope Leo X to Christian philosophers[110]. For Descartes, the claim that "opinions can in fact be deduced from my philosophy which 'are in conflict with orthodox theology' is vicious and false"[111], thus "there is nothing relating to religion which cannot be equally well or even better explained by means of my principles"[112]. Indeed, despite his refusal to opine on religious matters[113], he gives explanations to theological problems like the transubstantiation[114] according to his principles. Consequently, Descartes' philosophy is old because it agrees with Christian theology as good as Scholasticism. Nonetheless, the Cartesian concordance with Scholastic philosophy and theology will be only a simulated position. Descartes denies the agreement of Aristotelianism with Christian theology, considering that "it is impossible to give a satisfactory explanation of the doctrine by means of the traditional philosophy"[115]. Furthermore, he asserts that "the faith has never been so strongly supported by human arguments as it may be if my principles are adopted. Transubstantiation, in particular, which the Calvinists regard as impossible to explain by the ordinary philosophy, is very easily explained by mine"[116]. This second argument is directed to evidence that, as Cartesian philosophy is compatible with Christian theology, it is an ancient philosophy. Nevertheless, Descartes does not consider his philosophy as an old one since he asserts the disagreement between Scholastic philosophy and Christian theology and the concordance of Cartesianism with Christianity. Descartes' statement that his philosophy is old and compatible with Aristotelianism is a mere rhetorical device. He is aware that "it is almost impossible to expound another philosophy without its seeming to be directly contrary to the Faith"[117] and that too many "people [...] confound Aristotle with the Bible"[118]. Thereby, he needs to mask his philosophy as ancient in order to reduce the Scholastic mistrust to it and, ultimately, for replacing Aristotelianism surreptitiously.

In brief, Descartes statement that his philosophy is old is directed towards religious authorities whose influence is important for institutionalizing it and to the public in general for avoiding any form of religious polemic, whether he recognizes the novelty of his philosophy to friends and trustworthy people. Descartes wants to introduce his project in schools, being aware of the incompatibility between his philosophy and Scholasticism. Hence, it seems that the most probable explanation for his apology of antiquity is a strategy in order to refuse the theological mistrust against his philosophy. Descartes employs two arguments in order to justify the ancient character of his philosophy. On the one hand, Cartesianism is compatible with Scholastic principles and is, consequently, an old philosophy. On the other hand, Descartes' philosophy is agreeable with theology – as Aristotelianism –, thus it is an old one because only old philosophies are compatible with theology. Both arguments are simultaneously rejected by Descartes, evidencing the novel character of his philosophy. Descartes performs a rhetorical strategy to theological authorities whose

target is to costume his philosophy as an ancient one so as to introduce it at schools – a tactic that ultimately did not involve any success[119].

IV. An alternative form for institutionalizing the Cartesian project: the Craftsmen's School

The lack of adaptation of educational institutions to its scientific and philosophical context was the main thing responsible of the rise of alternative institutions like academies or scientific societies which were dedicated to philosophical and scientific tasks free of the universities' theological commitment. These institutions played a fundamental role for the new science; their better financing and freedom of thought was traduced in a better inquiry. Descartes was not alien to these circumstances. His refusal of the Scholastic philosophy was certainly based on its maladjustment to the intellectual context, namely, that "they have not enabled any progress to be made in all the many centuries in which they have been followed"[120]. Thus, Descartes' attempts to institutionalize Cartesianism must be understood as endeavours for reforming and adapting educational institutions to its intellectual context, whose last goal was to make us "lords and masters of nature"[121]. Despite the importance given by Descartes to the consolidation of Cartesianism in the education system, the attempts to introduce his system in the institutions were not reduced only to schools. He also designed an alternative strategy for implementing his scientific proposal in the practical sphere: a School of Craftsmen[122]. In order to analyse the role of craftsmen's school in the Cartesian institutionalization of knowledge, we must pay attention to: (1) the connexion between theory and practice that is present in this model of the school; (2) the question of financing insofar as it represents a key element for the scientific purposes.

Concerning the relation between theory and practice, it is important to mention what Rossi called the "craftsmanship's tradition", present in the Renaissance and the Medieval Ages. In those centuries, the manufacture of artefacts was not a product of scientific knowledge, but a mere "know-how" based in the accumulation of experience devoid of method and unity. Hence, "The medieval technical writings gave ample and detailed instructions on the way 'to work'. They offered themselves as a compilation of rules, recipes, and precepts. They were completely devoid of 'theory' understood as an attempt to derive the precepts from general principles and then to base them on a totality of verifiable facts"[123]. Descartes totally refused this conception of craftsmanship, which he perceived as the central problem for achieving perfect inventions[124]. According to him, it was necessary to establish a permanent connexion between science and technique, hence, paraphrasing Kant, technique without scientific knowledge is blind, scientific knowledge without practical application is empty. The Cartesian cooperation between theoretical and practical dimensions is in fact evidenced in the *Dioptrics*, a work which can be considered a manual of technical instruction addressed to the artisans[125]. This manual embodies the form in which the theoretical knowledge must be adapted to an easy-understandable level for the craftsmen, thus "since the construction of the things of which I shall speak must depend on the skills of the craftsmen, who usually have little formation, I shall try to make myself intelligible to everyone"[126]. The treatise contains some chapters bounded

to theoretical questions like the theory of refraction or the physiological explanation of the eye, which are important so as to build the instruments, procuring the theory necessary for a correct practice [127]. The "collaboration between scientists and technicians and th[e] copenetration of technology and science […] was at the root of the great scientific revolution of the seventeenth century"[128] since, for Descartes, the manufacture of artefacts had to be the outcome of theoretical knowledge. Craftsmen were "responsible for translating the idea of the machine into a physical machine, of compelling physical matter to behave exactly like mental matter" [129]. Therefore, artisans represented an indispensable element in the Cartesian transformation of the world. Any real intervention of the Descartes' science required the devices produced by the craftsmen as a form to undertake it.

This connexion between theory and practice is clearly present in the project of a Craftsmen's School, where Descartes mentions two kinds of figures: professors (*professeurs*) and craftsmen (*artisans*). The first must provide the theoretical background for building artefacts. For that reason, professors "must be skilled in mathematics and physics in order to be able to answer all the questions of craftsmen"[130]. The second were responsible of the practical translation of knowledge so as to improve our mastery of nature. This project arises as an institution directed to guarantee the transfer of theoretical knowledge – produced in universities – to the practical dimension. It is in this point where the financial question emerges.

Descartes never resorted to educational institutions for performing experiments or crafting machines. The reason was that these places lacked funds for scientific purposes, thus they were consecrated not to research tasks, but to educational purposes. Nonetheless, Descartes was aware of the expenses which any kind of scientific research requires [131]. Inquiry needs investments for recreating experiments and to hire "artisans or such persons as he could pay, who would be led by the hope of gain […] to do precisely what he ordered them to do"[132]. The problem, at this point, is that science implies high expenses that, in many cases, cannot be afforded by researchers individually:

> Moreover, I have now reached a point where I think I can see quite clearly what line we should follow in making most of the observations which serve this purpose; but I see also that they are of such a kind and so numerous that neither my dexterity nor my income (were it even a thousand times greater than it is) could suffice all of them.[133]

Hence, after seeing the shortcomings of individualized scientific work, Descartes had to seek alternative sources of funding. For that reason, he asked Mersenne in 1632 for "some people who were so dedicated to the advancement of science that they were willing to make every kind of experiment at their own expense"[134]. Here begins the Cartesian understanding of science as a *collective enterprise* –consolidated in the *Discourse* (1637) –, where some men are in charge of research while some others can "contribute towards the expenses of the observations that [artisans and scientists] would need"[135]. At the Part Six of the *Discourse*, Descartes performs an apology in favour of collaboration in scientific research, hence by "building upon the work of our

predecessors and combining the lives and labours of many, we might make much greater progress working together than anyone could make on his own"[136]. In that collaborative enterprise, we can distinguish between: Maecenas, scientists and craftsmen. Maecenas purveyed the school of the necessary materials so as to favour scientific research and the manufacture of artefacts. Scientists were dedicated to theoretical research tasks, whether the craftsmen represent those responsible of the practical materialization of the scientific knowledge, providing of new machines, instruments and "innumerable devices which would facilitate our enjoyment of the fruits of the earth and all the goods we find there"[137].

The School of artisans followed this cooperative structure. Its financing came from a donation provided by Mr. D'Alibert, a patron who was interested in the progress of science for philanthropic reasons. Besides, it was also present the division between professors (theoretical dimension) and craftsmen (practical dimension) concerning research tasks. This collective enterprise was raised as a form of overcoming the economic and practical deficiencies of educational institutions, providing a space where science and technique could be jointly developed. Therefore, the question of financing is solved in this alternative institution, enabling the development of a technique guided by scientific knowledge.

In brief, the introduction of Cartesian philosophy at schools was directed to replace Scholastic philosophy, but that substitution was circumscribed to the philosophical and scientific ambit, that is to say, to the *theoretical dimension*. Descartes' project of a craftsmen's school allowed a complete institutionalization of his project, thus that school aimed to materialize in the *practical sphere*[138] the results of the Cartesian method, which was understood as "a multifaceted instrument of authority created to act on the socio-cultural as well as on the natural philosophical fields of knowledge" [139] . Descartes "desired to reorganize [through his scientific and philosophical project] thinking and hands-on practices, and consequently to oversee how natural philosophers created ideas and artisans manipulated matter"[140], that is to say, to institutionalize a new theoretical and practical conception. The school of craftsman embodied the practical attempt, whose purpose was to guide the artisans in the Descartes' science for an intervention on the world through the institutionalization of a correct practice in the building of machines. The success of that intervention proved ultimately the truthfulness of the Cartesian science – against the lack of results provided by Scholasticism–, "discovering a *practical* philosophy which would replace the speculative philosophy taught in the schools"[141].

Conclusion

The crisis of the seventeenth-century in the educational institutions was a consequence of the maladjustment of universities and schools to its intellectual context. The New Science and the sceptical crisis evidenced the falsity of Scholasticism – especially due to the lack of practical consequences that it manifested. In response to this challenge, two different responses which were concerned about the reformation of educational institutions emerged. On the one hand, the new scientific academies wrestled with schools in their intellectual pre-eminence, allowing a wider freedom in the field of research. On the other hand, some reformers, such as

Francis Bacon or Comenius, arose in order to adapt educational institutions to their present circumstances through the introduction of new contents and pedagogical novel approaches.

Descartes was not alien to this context, sharing the necessity of a reformation in the intellectual institutions for the same reasons:

> The ordinary philosophy which is taught in the schools and universities is by contrast merely a collection of opinions that are for the most part doubtful, as is shown by the continual debates in which they are thrown back and forth. They are quite useless, moreover, as long experience has shown to us; for no one has ever succeeded in deriving any practical benefit from 'prime matter', 'substantial forms', 'occult qualities', and the like. So it is quite irrational for those who have learnt such opinions, which they themselves confess to be uncertain, to condemn others who are trying to discover more certain ones.[142]

Descartes' attempts for a reformation covered a broad spectrum of contents taught in schools: scientific treatises, textbooks and philosophical books. He was aware that the possession of a better philosophical and scientific system was not enough to guarantee its success, thus the educational institutions were not guided by the mere purpose of obtaining truth, but for a commitment to safeguard Christianity. Consequently, Descartes had to develop some rhetorical strategies, like the use of a conservative style-writing or the repeated denial of the novelty of his philosophy, so as to replace surreptitiously Scholasticism – trying to introduce the seeds which made the renovation of school possible.

Nevertheless, for understanding his interest in the reformation of those institutions, it must be reminded that the practical dimension is central for Descartes, thus the axis of his project is addressed to the *intervention in the world*. In the same way that his purpose with the *Dioptrics* was "to show that one could make sufficient progress in philosophy to enable one to achieve knowledge of the arts which are beneficial for life"[143], or that the Cartesian method was directed to make ourselves masters and possessors of nature, the reformation of educational institutions shared the same goal, since *transforming the institutions meant transforming the world*. Descartes' attempts for a renewal of education were not a mere intervention, but embodied the last step for institutionalizing a Cartesian intervention which guaranteed the transformation of the reality in a concrete way. Despite failing to replace Scholasticism in schools, the terse introduction of Cartesianism contributed to its dissemination and posterior influence.

References

[1] References to Descartes' texts are given as follows: "AT" = *Oeuvres de Descartes*, 12 vols., ed. Charles Adam and Paul Tannery (Paris: Vrin, 1964-71); "CSM" = *The Philosophical Writings of Descartes*, vols. I-II, trans. John Cottingham, Robert Stoothoff and Dugald Murdoch (Cambridge: Cambridge University Press, 1984-5); "CSMK" = *The Philosophical Writings of*

Descartes, vol. III, trans. John Cottingham, Robert Stoothoff, Dugald Murdoch and Anthony Kenny (Cambridge: Cambridge University Press, 1991). AT IX-B, 18 (CSM I, 189)
[2] AT VIII-B, 26 (CSMK, 221)
[3] AT VI, 62 (CSM I, 142-3)
[4] See AT IX-B, 14-5 (CSM I, 186)
[5] AT VI, 61-2 (CSM I, 142)
[6] Menn, S., "The Intellectual Setting", in *The Cambridge History of Seventeenth Century Philosophy (Vol. I)*, eds. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), 71.
[7] Popkin, R., *The History of Scepticism from Erasmus to Descartes* (Grierson Press, 2011), 13.
[8] Larmore, C., "Scepticism", in *The Cambridge History of the Seventeenth-century Philosophy (Vol. II)*, eds. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), 1154.
[9] For an account of the Sanchez's criticism of Aristotelianism see: Popkin, R. "Theories of knowledge", in *The Cambridge History of Renaissance Philosophy*, eds. Charles B. Schmitt, Quentin Skinner & Eckard Kessler (Cambridge: Cambridge University Press, 2007), 682.
[10] Popkin, R., (2011), 87.
[11] Grant, E., *The Foundations of Modern Science in the Middle Ages: Their Religious, Institutional and Intellectual contexts* (Cambridge: Cambridge University Press, 1996), 166.
[12] On the lack of practical utility of the Scholastic science and philosophy see: Schmitt, C.B., "Philosophy and science in sixteenth-century universities: some preliminary comments", *The Cultural Context of Medieval Learning*, ed. John Emery Murdoch (Boston: Reidel Publishing Company, 1975), 489; Grant, E., "Science and the medieval university", *Rebirth, Reform and Resilience. Universities in transition (1300-1700)*, eds. James M. Kittelson and Pamela J. Transue (Columbus: Ohio State University Press, 1984), 91.
[13] Cf. Popkin, R., (2011), 66-81.
[14] Cf. Ariew, R., *Descartes among the Scholastics* (Boston: Brill, 2011), 19-22.
[15] Farrell, A.P., *The Jesuit Ratio Studiorum of 1599* (Massachusetts: 1970), 40-1.
[16] Menn, S., (1998), 35.
[17] Brockliss, L., "Curricula", in *A History of the University in Europe (Vol. II)*, ed. Hilde de Ridder-Symoens (Cambridge: Cambridge University Press, 2003), 617.
[18] Hall, A.R., *From Galileo to Newton (1630-1720)* (New York: Dover Publications, 1981), 133.
[19] Governments and the royal and aristocratic patronage played an essential function in providing these scientific resources –laboratories, observatories, etc.– to the new institutions because of their greater economical capacity: Cf. Burke, P., *A Social History of Knowledge: From Guttenberg to Diderot* (Cambridge, Polity Press, 2008), 41-43; Westfall, R.S., *The construction of Moderns Science. Mechanisms and mechanics* (Cambridge: Cambridge University Press, 1977), 111-14; Pedersen, O., "Tradition and innovation", in *A History of the University in Europe (Vol. II)*, ed. Hilde de Ridder-Symoens (Cambridge: Cambridge University Press, 2003), 462, 484-5; Tuck, R., "The institutional setting", in *The Cambridge History of Seventeenth-Century Philosophy (Vol. I)*, eds. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), 25-26.
[20] McClellan III, "Scientific institutions and the organization of science", in *Cambridge history of science vol. IV,* ed. Roy Porter (Cambridge: Cambridge University Press, 2003), 88.
[21] Pedersen, O., (2003), 451
[22] Cf. Ashby, E., *Technology and the Academies* (London: Macmillan, 1966), 4; Bernal, J.D., *The Social Function of Science* (Faber & Faber, 2010), 71.
[23] Westfall, R.S., (1977), 105.
[24] Porter, R., "The Scientific Revolution and Universities", in *A History of the University in Europe (Vol. II)*, ed. Hilde de Ridder-Symoens (Cambridge: Cambridge University Press, 2003), 542.

[25] Ariew, R., & Gabbey, A., "The Scholastic background", in *The Cambridge History of the Seventeenth-century Philosophy (Vol. I)*, eds. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), 425.
[26] Menn, S., (1998), 35.
[27] McClellan III, (2003), 88.
[28] Ariew & Gabbey, (1998), 447: "the dominance of Peripatetic philosophy in the schools ensured that it continued to be common currency for much of the century"; Grant, E., (1984), 91: "the medieval university with its largely Aristotelian curriculum continued into the seventeenth century, its intellectual dominance".
[29] Houston, C., "Utopia and Education in the Seventeenth Century: Bacon's Solomon's House and its Influence", *New Worlds Reflected. Travel and Utopia in the Early Modern Period*, ed. Chloë Houston (London: Ashgate, 2010), 161.
[30] Bowen, J., *A History of Western Education* (Vol. III) (New York: St. Martin's Press, 1981) 44.
[31] Houston, C., (2010), 168.
[32] Rusu, D.-C., "Virtues and Collaborative Research in Solomon's House", *Studii de stiintă si cultura*, 4 (23) (2010), 61.
[33] This perspective was common in many educational reformers such as Comenius or Hartlib. Comenius, for example, demonstrated "his interest in the subjects of education and institutional reform. His 'pansophia' was ultimately a utopian plan to institutionalise knowledge and learning […] In his opinion, a man's whole life, including the role he could play in society, depended on his childhood education. In Comenius' view, didactic principles were revolutionary, 'capable of changing by slow degrees the aspect of civilisation' […] education had an important spiritual purpose and the capacity to help humanity improve itself" (Houston, C., (2010), 175).
[34] Schmitt, C.B., "The rise of the philosophical textbook", *The Cambridge History of Renaissance philosophy*, eds. Charles B. Schmitt, Quentin Skinner & Eckard Kessler (Cambridge: Cambridge University Press, 2007), 792.
[35] See Farrell, A.P., (1970), 41-2.
[36] Schmitt, C.B., (2007), 801.
[37] Lohr, C.H., "Metaphysics" in *The Cambridge History of Renaissance Philosophy*, eds. Charles B. Schmitt, Quentin Skinner & Eckard Kessler (Cambridge: Cambridge University Press, 2007), 618.
[38] The commentaries of the *Conimbricenses* represented one of those texts built upon commentaries which performed a "profound impact on generations of European scholars during the first decades of the seventeenth century" (Carolino, L.M., "Mixtures, Material Substances and Corpuscles", *Journal of Early Modern Studies*, 4-1 (2015), 12. In fact, in "their fully developed form, they became part of a *cursus philosophicus*, such as that of Coimbra at the end of the sixteenth century, which became a standard text in Jesuit universities" (Wallace, W.A., "Traditional Natural Philosophy" in *The Cambridge History of Renaissance Philosophy*, eds. Charles B. Schmitt, Quentin Skinner & Eckard Kessler (Cambridge: Cambridge University Press, 2007) 225). Despite, the Coimbra commentaries did not have the style of textbooks, many authors underline that they were used as a textbook: Cf. Solère, J.-L., "Conimbricenses (Coimbrans)" in *The Cambridge Descartes Lexicon*, ed. L. Nolan (Cambridge: Cambridge University Press, 2016) 149; Wallace, W.A., (2007), 229; Carolino, L.M., (2015), 12.
[39] Wallace, W.A., (2007), 226.
[40] Brockliss, L., (2003), 566-7.
[41] Cf. Schmitt, C.B., (1975), 509.
[42] Schmitt, C.B., (2007), 793.
[43] Cf. Menn, S., (1998), 40; Grant, E., (1996), 164-7.

[44] Cf. Schmitt, C.B., (2007), 797.
[45] AT IV, 122 (CSMK, 236)
[46] Cunning, D., *Argument and persuasion in Descartes' Meditations* (Oxford: Oxford University Press, 2010), 33.
[47] AT VI, 77 (CSM I, 151)
[48] AT II, 267 (CSMK, 118)
[49] See AT VI, 77 (CSM I, 151)
[50] AT III, 184 (CSMK, 153)
[51] See AT III, 185; VII, 1
[52] AT III, 233 (CSMK, 157)
[53] See AT III, 295-6; III, 503; V, 544; VII, 3
[54] Concerning the real institutionalization it is important to underline the differences between short-term and long-term. In the short-term Descartes' proposal, in the case of *Meteorology*, "received a very poor response from institutions" (Garber, D., "Descartes, the Aristotelians, and the Revolution that did not happen in 1637", *The Monist* 71-4 (1988), 473). See also Verbeek, T., *Descartes and the Dutch* (Illinois: Southern Illinois University Press, 1992). Nevertheless, in the long-term, Cartesian philosophy and science was progressively institutionalized: Cf. Brockliss, L., "Aristotle, Descartes and the New Science: Natural Philosophy at the University of Paris, 1600-1740", *Annals of Science* 38 (1981), 52-59; Lennon, T., *The Battle of Gods and Giants: The Legacies of Descartes and Gassendi, 1655-1715* (Princeton: Princeton University Press, 1993); Brockliss, L., "Descartes, Gassendi, and the Reception of Mechanical Philosophy in the French Colleges de Plein Exercice, 1640-1730", *Perspectives on Science* 3 (1995), 450-79. In relation to diachronic evolution of the Descartes' attempts for introducing his project in schools see: Gaukroger, S., *Descartes' system of natural philosophy* (Cambridge: Cambridge University Press, 2002) 33-63; Gilson, E., *La liberté chez Descartes et la théologie* (Paris: Vrin, 1913).
[55] AT VII, 577 (CSM II, 389)
[56] AT VII, 577 (CSM II, 389)
[57] See AT III, 233; III, 259
[58] Gaukroger, S., (2002), 34
[59] Cf. Ariew, R., (2011), 55-63
[60] AT III, 523 (CSMK, 210)
[61] See AT III, 259; III, 276; VII, 577; IX-B, 16
[62] See AT VI, 10; VIII, 35-7; IX, 179
[63] AT II, 378 (CSMK, 123-4)
[64] See AT III, 424; VIII-A, 35
[65] AT V, 192 (CSMK, 354)
[66] AT III, 424 (CSMK, 190)
[67] AT III, 260 (CSMK, 161)
[68] AT III, 259-60 (CSMK, 161)
[69] See AT III, 298; III, 470
[70] AT IV, 225 (CSMK, 252)
[71] AT III, 298 (CSMK, 173)
[72] Harrison, P., "The influence of Cartesian cosmology in England", in *Descartes' Natural Philosophy*, eds. Stephen Gaukroger, John Schuster and John Sutton (London: Routledge, 2000), 176.
[73] Garber, D., (1988), 472.
[74] AT I, 455 (CSMK, 75)
[75] AT VII, 573 (CSM II, 386)

[76] AT II, 267 (CSMK, 118)
[77] Martin, C., *Renaissance Meteorology. Pomponazzi to Descartes* (Baltimore, Johns Hopkins University Press, 2011), 141
[78] Petrescu, L., "Cartesian Meteors and Scholastic Meteors: Descartes against the School in 1637", *Journal of the History of Ideas* 76-1 (2015), 28.
[79] AT VII, 573 (CSM II, 386)
[80] See AT VII, 580; VIII-B, 26
[81] Martin, C., "Causation in Descartes' *Les Météores* and Late Renaissance Aristotelian Meteorology" in *The Mechanization of Natural Philosophy*, eds. Daniel Garber and Sophie Roux (London: Springer, 2013), 230.
[82] Gilson, E., "Météores cartésiens et météores scholastiques", *Revue Néo-scolastique de philosophie* 23 (89) (1921), 361.
[83] Martin, C., (2011), 125.
[84] AT VI, 239 [My translation]
[85] AT III, 420 (CSMK, 188)
[86] Martin, C., (2013), 217.
[87] Gaukroger, S., (2002), 34
[88] AT IV, 225 (CSMK, 252)
[89] AT VI, 61-2 (CSM I, 142)
[90] AT I, 455 (CSMK, 75)
[91] See AT I, 456; IV, 591; V, 362; X, 509
[92] See AT IV, 113; VII, 464; VII, 580
[93] AT VIII-A, 323 (CSM I, 286)
[94] See AT IV, 113; IV, 157; IV, 225; VII, 596
[95] AT IV, 141 (CSMK, 238)
[96] Ariew, R., (2011), 65.
[97] For an account of the whole argument see: Ariew, R., *Descartes and the first Cartesians* (Oxford: Oxford University Press, 2014), 23-6.
[98] See AT IV, 591; IV, 157; V, 362.
[99] AT VIII-A, 323 (CSM I, 286)
[100] AT I, 455-6 (CSMK, 75): "I want especially to point out that you have nothing to fear on this score so far as my own innovations are concerned"; AT IV, 157 (CSMK, 240): "Moreover, in publishing a new philosophy I have followed a path which makes it possible for me to derive so much benefit"; AT IV, 567 (CSMK, 301-2): "Knowing his character, and thinking I might publish my views, I did not want anyone else detracting from their novelty"; AT IV, 591 (CSMK, 305): "I have always believed would have the greatest interest in the publication of a new philosophy and would be least likely to pardon me".
[101] See AT I, 271; III, 231; IV, 225; IV, 511
[102] See AT VII, 580; VII, 596; VII, 3
[103] AT VII, 579 (CSM II, 390)
[104] AT IX-B, 318 (CSM I, 312)
[105] AT VII, 464 (CSM II, 312)
[106] See Clarke, D.M., *Descartes. A biography* (Cambridge: Cambridge University Press, 2006), 128.
[107] AT VII, 3 (CSM II, 4)
[108] AT IV, 141 (CSMK, 238)
[109] AT III, 298 (CSMK, 173)
[110] AT VII, 3 (CSM II, 4): "But in its eighth session the Lateran Council held under Leo X condemned those who take this position, and expressly enjoined Christian philosophers to

refute their arguments and use all their powers to establish the truth; so I have not hesitated to attempt this task as well".
[111] AT VII, 597 (CSM II, 394)
[112] AT VII, 581 (CSM II, 392)
[113] See AT I, 150; I, 153; IV, 119; VII, 429
[114] See AT III, 340; IV, 168-70; VII, 251-6
[115] AT III, 349 (CSMK, 177)
[116] AT I, 564 (CSMK, 88)
[117] AT I, 85-6 (CSMK, 14)
[118] AT III, 349 (CSMK, 177)
[119] Descartes' attempts for hiding to the religious authorities the novelty of his philosophy concluded in failure: Cf. Ariew, R., "Pierre Bourdin and the *Seventh Objections*", in *Descartes and his contemporaries. Meditations, objections and replies*, eds. Roger Ariew and Marjorie Grene (Chicago: University of Chicago Press, 1995), 221-5.
[120] AT IX-B, 18 (CSM I, 189)
[121] AT VI, 62 (CSM I, 142-3)
[122] See AT XI, 659-60
[123] Rossi, P., *Philosophy, Technology, and the arts in the early modern era* (New York: Harper & Row, 1970) 32-3.
[124] Descartes criticizes those craftsmen which, without scientific knowledge or "any proper plan, construct new instruments" (AT X, 380 [CSM I, 20]). Indeed, in the first pages of the *Dioptrics*, Descartes exposes the case of Jacob Metius, a craftsman whose invention were "achieved only as a fruit of experience and fortune" (AT VI, 81-2 [My translation]).
[125] Burnett, G., *Descartes and the Hyperbolic Quest: Lens Making machines and their Significance in the Seventeenth Century* (Philadelphia: American Philosophical Society, 2005), 71.
[126] AT VI, 82-3 (CSM I, 152)
[127] Gauvin, J.-F., "Artisans, Machines, and Descartes's Organon", *History of Science* 44 (2006), 188.
[128] Rossi, P. (1970), 31.
[129] Burnett, G., (2005), 36.
[130] AT XI, 659 [My translation]
[131] Descartes had to defray many experiments and researches whose cost forced him to borrow money. See AT I, 243.
[132] AT VI, 72 (CSM I, 148)
[133] AT VI, 65 (CSM I, 144)
[134] AT I, 251 (CSMK, 38)
[135] AT VI, 73 (CSM I, 148)
[136] AT VI, 63 (CSM I, 143)
[137] AT VI, 62 (CSM I, 143)
[138] AT II, 447 (CSMK, 130): "for the practical questions, I leave that to the craftsmen".
[139] Gauvin, J.-F., (2006): 188.
[140] Gauvin, J.-F., (2006): 205.
[141] AT VI, 61-2 (CSM I, 142)
[142] AT VIII-B, 26 (CSMK, 221)
[143] AT IX-B, 15 (CSM I, 187)