Ethical development in higher education curricula: A study in portuguese engineering courses

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There are many national and international documents that point out or refer the need of higher education include the mission of ethical, civic, moral and citizenship development of their students. Internationally, UNESCO (1998, 2009) and the European entities (in particular within the “2005 - European Year of Citizenship through Education” and the Bologna Process - 1999) have produced various documents that emphasize this need, although with some differences in the basic motivation and goals to achieve.

But the several documents and the Bologna Process, have left (and leave) free space for higher education institutions implement student’s education in the ethical, moral, civic and citizenship field. It is however important to point out that the framework of qualifications for the European Higher Education Area, resulting from the Bergen Conference (2005), define that (among other competences) for the first cycle qualification, students at the end of their training should be able to make "judgments that include reflection on relevant social, scientific or ethical issues” in the respective field of knowledge.

Thus, the study presented here aims to know how the Portuguese Higher Education Institutions implemented (or not) this training component in their curriculum. This study was limited to Engineering courses of the Polytechnic Higher Education and the Engineering courses of Universities, for the first cycle qualification and integrated Masters. In the study were covered 28 institutions (13 Universities and 15 Polytechnics), a total of 184 courses (126 first cycle qualification and 58 Integrated Masters).

The used methodology was the official curriculum document analysis of various courses and the curricular analysis of proposed options in the field of ethical, moral, civic and citizenship student’s education.

The study results show that 60.56% of the courses don’t included in its curriculum any subject or topic goals in this field. Only 28.9% of the courses have included in their curriculum a required subject training and 8.32% have the opportunity to be trained in this area through optional subjects. In 2.22% of the courses, the training institution offers extracurricular training that involves an additional fee.

Among 28 studied institutions, only 6 provide a general solution for all courses, 7 have no training in this area in any of the courses, and the remaining 15 have some with this type of training and other courses that have not.

Also resulted from this study the reconnaissance of the curriculum options diversity and focus of each of the options, which stated that the majority (63.4%) of the courses focus on Professional Ethics training (Ethics and Compliance) and only 36.5 % focus on ethics training and Citizenship.

Bergen Conference of European Ministers Responsible for Higher Education (2005). The framework of qualifications for the European Higher Education Area. Retrieved from: http://www.ehea.info/Uploads/QF/050520_Framework_qualifications.pdf

1. Introduction

Higher education, in its various courses, forms people whose professional practice, is, in some cases, regulated by ethical and deontological codes, such as engineering, Medicine, and law, among others. However, recent investigations indicate that the upper school students exhibit problem behaviors from the ethical point of view and of citizenship, such as plagiarism and practice of violence and humiliation among peers, notably the usual 'hazing'.

In what concerns plagiarism, an investigation made in 2013 indicates that 45% of students of higher education present indicators of high levels of fraud, in particular in the exams, and plagiarism (gamma, Pandey, Sandhu, Almeida, & Edwards, 2013). Another study, that Aurora Teixeira (public, 2011) coordinated in 2005, allowed the conclusion that 70% of respondents had already copied in an examination. This researcher stresses that, on the basis of her studies, it can be "concluded that plagiarism is currently a widespread practice among the Portuguese students " (*ibidem*:online). This study also shows that students of the Engineering courses are those who have a higher rate of fraud.

These alarming numbers do not seem to surprise the majority of teachers in higher education, according to the speeches at the Symposium "ethics and tolerance of professors and institutions before the academic fraud in higher education" (gamma et al., 2013). However, before the data cited, there are questions about the way the institutions of this level of education seek to promote the integral formation of their students, including ethics and civics, and what are the actions that they develop in that direction. Hence the relevance of the study to be carried out within the framework of the doctoral thesis presented in this project.

The issue of fraud and plagiarism by students in higher education is even more relevant given that, according to, Pešec and Petković (2014), one of the most obvious ways to analyze the ethical development of engineering students is through their behaviors in the light of the evaluations, considering this behavior as a good indicator of ethical development.

The levels of fraud and plagiarism by students in higher education are only one facet of this problem, which also reveals the difficulties that students manifest in reflecting on their relationship with their peers, which is publicly evident through, for example, the usual ' hazing '. But these aspects may be just the tip of the "iceberg" that is reflected also in the low levels of civic participation in their diminished associative experience and the participation in the bodies of the institutions where they study, and as such in their low involvement in the public domain (Ehrlich .2000).

Therefore, and bearing in mind that higher education forms people who, by their high level of training, will tend to occupy positions of training, management, coordination and governance, among others, it is a priority to promote a solid ethical education of higher education students, thus contributing to these ethical values to propagate in society (*ibidem*,2000). In this line, UNESCO (2000) points out that this facet of students' training is mortgaging a future society which is fair, democratic, peaceful and tolerant.

We must also consider that the higher education institutions omission, in the ethics and civic training field, is also the student trainer: permissiveness and apparent indifference are a way to express a position, and therefore is also educational intervention.

According to Estrela (2010:11), although pedagogy and ethics are inherent in any act of "education, ethics and pedagogy" they constitute little known dimensions of thought and practices of teachers of higher education ". But

the questions that Estrela (2010:17) places are: "Is it up to teachers of higher education the promotion of their students ethical-moral development?". And if in fact it is, are higher education teachers aware of this responsibility? And how is this training integrated into the curricula and accomplished? It is therefore necessary, according to this author (2008), to give visibility to the ethical dimension that should be more present in higher education, but that sometimes is a little hidden, justifying the need for studies in this training dimension in this level of education.

1.2. The ethical and civic development in higher education:

In the first decade of the 21st century there was a substantial increase in the interest in the ethical and civic training of students in higher education, particularly in the United States of America (USA). Such growth originated in the low level of political and civic engagement of young Americans (Ehrlich .2000), as well as in the need to train the young generations for the new global society (Jacoby, 2009b).

At European level, and on the basis of the international documents, it was found that the increase of this concern also became more noticeable from the beginning of the 21st century. However, unlike the UNITED STATES, the survey found that at European level, a widespread and organized involvement of higher education institutions in this field was still not verified.

Caryn Musil and Ehrlich studies, (2000) highlight the fact that too many students see themselves just as consumers, who want to obtain the course as quickly as possible, in the easiest and cheapest manner. However, Ehrlich (2000), Barbara Jacoby (2009b), and other authors, consider that higher education will only be completed when the student, in addition to acquiring technical knowledge specific to his area, can use it wisely in the world, which requires values, and ethical analysis and civic competencies. So, for these thinkers, the focus of higher education must be the global and integral development of the person, including these two dimensions: the individual moral development and social consciousness (worrying about the well-being of others).

Thomas Ehrlich (2000:3), which has been one of the authors who defend the need to "promote civic and moral development of higher education students", argues that there is a strong political students ' disinterest, coupled with the lack of civic and political participation. Although the author refers to the American reality is important to mention that this is also the argument that has been at the basis of European documents that focus on this issue (Council of Europe.2004).

According to Ehrlich (2000), low civic and political participation is associated with the excessive individualism of contemporary culture and its negative implications for society: disregard for others, the decline of civility, mutual respect, and tolerance, and the prominence of self-interest and individual preferences instead of the common good. In this sense, it's important to take into account that the author argues that the goal pursued with the civic and ethical development can not only aspire to turn students into obedient citizens, but should develop their ability to fight for justice and the common good, as well as their own individual self.

Following this line of thought, Peter Levine (2015) argues that although the civic development of young people is essential for society and democracy, is also for the young people themselves who will be most successful if they are involved and committed to their community and the common good. In his perspective, the ethical and civic training is not limited to aiming at social development, but also the development of the young people themselves, meaning is also of personal interest.

In his book "Civic Responsibility and Higher Education", Ehrlich (2000) notes that the personal and compensatory goals dominate contemporary culture, which calls into question cohesion and social justice, as well as democracy and peace. Thus, considers a moral and civic renewal necessary to build a humane society, inclusive, equitable and cohesive. It's also noted hat several countries have already demonstrated concern for this issue, but payed very little attention to higher education and its contribution to the students moral and civic development. In this perspective, according to the author, it is up to the higher education institutions the Mission of respecting diversity and, at the same time, promote the foundational values of democracy.

Also Barbara Jacoby (2009a) and the other contributors to the book "Civic Engagement in Higher Education: concepts and practices" advocate the importance of promoting the civic and ethical training of students in higher education, with a view to developing their involvement and civic engagement, i.e., prepare students for active citizenship and democracy, which, according to these authors, involves the ability to make judgments , to choose, and above all to act for the common good. So, they defend that having citizenship, literacy involves more than knowledge and information, because it includes personal responsibility, active participation and personal commitment to a set of values. Therefore literacy action and not just knowledge. Knowledge is necessary, according to these authors, but it is not enough to assume a civic and democratic responsibility.

In this context, all the authors studied defend that there is a clear relationship between civic and ethical (and moral) training, and as such, any training for citizenship also involves the development of values (Jacoby, 2009b

Thomas Ehrlich (2000) considers even that higher education has the potential to reinvigorate democracy, because almost all politicians and leaders have studied in higher education and the general public also has increased access to this level of education. On the other hand, and in the light of the studies carried out by this author in the United States, it was found that school education has little influence on political beliefs and values, which reinforces the role that higher education should be to promote maturity of ethical/moral judgment, racial and religious tolerance, as well as a greater civic and political participation.

Thus, the author argues that higher education must reach beyond being a database, promoting and developing skills so that their graduates can act in the world in a reflective and wise manner. To this end, considers that higher education must promote the moral, civic and political development, which implies the ability to develop a more sophisticated understanding and conceptually more evolved social complexity and ethical concepts, which also translates into a greater intellectual growth. This goal, which Ehrlich believes to be central in higher education should include, in the view of the author, the entire campus and relational activities outside the classroom, which should be the subject of moral judgments, including its purposes, its meanings, and action options.

Barbara Jacoby (2009b) defends a similar perspective, however, points out that for this to be possible the following strategies must be clearly defined, as well as the objectives to be attained. So, it should be done, according to this author, a study of learning and practical situations to promote civic and ethical development, and these situations must be explicitly embedded in the curriculum and in extra-curricular activities.

1.3. The need for ethical and civic training in teaching Engineering:

There are many questions, concerns and controversies that result from the rapid pace of change of contemporaneity and covering all sectors (technological, economic, environmental and social). Giddens (1998)

argues in his book "the consequences of modernity" that there is a "contemporary" disorientation, which results not only from the pace of change, but also of the "scope of change", which is no longer just local but global. Also stresses that it wasn't predictable that modernity could lead to potentially destructive forces such as the impact on nature, economic levels and the use of military and political power. For this author, these are just a few of the "dark side" of modernity, because as stated, although the concept of modernity and the base of his project have a "theoretical peaceful horizon," This contrasts with the fact that "we live today in a world that is scary and dangerous" (*ibidem*:7).

Another aspect that Giddens stresses, is the contemporary role of "symbolic guarantees" and the "expert systems", which are strongly related to confidence in science and specialized knowledge (*ibidem*). It is therefore essential to take into account the penetration of this specialized knowledge in the everyday life of each citizen (the so-called industrialized countries at least), and the preponderance in the life of the common citizen and institutions. However, the penetration of this specialized knowledge and the confidence vested in it adds an increased risk (Ibidem). See, for example, the influence of human activity on nature (serious environmental problems which mankind battles), or the influence of technology in contemporary society.

Arménio Rego and Jorge Braga (2014: XVII) argue that "is in this sea of uncertainty that we resort to ethics so that with reflection, we can shed some light on the best way forward". For these authors, ethical reflection is necessary to take "more responsible decisions towards greater harmony and wellness, reducing as far as possible the factors which result in injury to persons and/or of nature, and safeguarding the fate of future generations" (ibidem, idem).

In this context, the engineering activity takes a predominant emphasis because "there's perhaps no professional activity with greater impact on society than that exerted by the engineers" (*ibidem, idem*). In fact, the presence of engineers action is so embedded in everyday life that society has become dependent on engineering, without, however, being aware of their action. Engineering is present in almost all activities and lots of used equipment daily: from the phone, television or computer; from the clothes we wear, house furniture; means of transport, means of communication; the lighting, the water we drink; medical diagnostic equipment, medicines; agricultural production, to the satellites; that provide logistics of food distribution in refugee camps, to warfare. Engineering influence is immeasurable and "Nothing escapes the intervention of engineers, almost everything requires actions from them that are ethically responsible in order for the life and the convenience of humans to be safeguarded" (*ibidem, idem*).

In fact, engineering is present both in the breakneck development that humanity lives in recent centuries and in improving the living conditions of certain populations, such as in the destruction and the increasing environmental devastation. Their action is enhancing progress and well-being, but it's also potentially lethal.

It becomes obvious that the technical knowledge that engineers are given within the framework of their courses is in fact "powerful" (Young, 2010) and powerful, but the question of how that knowledge is to be used is raised here (Ehrlich, 2000). It is not enough to give the tools, it is also necessary to teach how to use them for the common good. To this end, it is essential to provide training and reflection, "providing engineers a close-up view of the ways in which they can fulfill their commitment to society responsibly" (Rego & Braga.2014: XVIII).

Ehrlich (2000) points out that traditionally the courses from the areas of exact sciences (engineering, physics, chemistry, biology, economics, mathematics) were considered as morally neutral, and do not need ethical and

moral training. However, the author points out that the apparent neutrality of the exact sciences had no impact on how the expertise can be used in practice. In the face of this issue, there are several authors who consider fundamental training in the areas of exact sciences to include scholarly content aiming to promote ethical, moral and civic development (Ehrlich, 2000; Nussbaum, 2014).

According to Rego and Braga (2014: XVIII), one of the important aspects to consider in engineering ethics education, is not to follow "moral relativism", in which each "each one does what he thinks best," because "moral relativism tends to represent a slew of social coexistence, where everything is accepted provided that it's generally accepted/practiced and in which there is a risk for the most fundamental rights of human beings to be desecrated". This aspect is also very strong in engineering, where new graduates face widespread practices which violate ethical and deontological principles, but which often are accepted based on "always done it this way" or with the supremacy of the economic aspects.

For the authors who are being summoned (Rego & Braga.2014), it is therefore urgent to strengthen the ethical development of engineering students in order to direct their actions for the Betterment of society, the respect for the human being and nature. In this sense, and according to these authors, it is important not only to promote the level of ethics training, but also an ' integral vision of ethics '. This integral formation of ethics result of an integral vision of the students themselves, and it is also defended by La Taille (2006:27) when he says: "it is to be hoped that the teachers of the University courses that introduce students to the code of ethics of the profession they have chosen to exercise, do not make the mistake to reduce them to a list of rules to be memorized".

1.4. The ethical and civic development in the Engineering course curriculum:

Keeping in mind the role of engineering in society, the vast area of its operations and the potential consequences of its actions (whether positive, negative and even dangerous), the various entities that aggregate or accredits these professionals have come to recognize the need and importance of ethics and deontology in engineering students' training (Finelli at all, 2012). In the u.s. this need was imposed on higher education institutions in 2000/2001, in Germany was recognized in 2002, in Canada, in 2001, in Australia, in 2010, in Japan in 1999, England in 2010 (ibidem.) and in Portugal was in 2002 by the Order of Engineers (OE.2014), and in 2011 by the Order of Technical Engineers (OET) (Carapeto, Fonseca.2012).

In Portugal´s case, and although the Order of Engineers (OE) has a Professional Code of conduct which was published in the statutes of the Order of the Engineer in 1992 (OE, 2002), it was only in 2002 that the OE considered the importance of ethics as being fundamental, so it decided to control the rate at which students, with an approval (by passing ethics and ethical training examinations), would have access to the Order of Engineers. However, this short-term training is granted only by the professional entity and implies a cost for applicants (ibidem, 2014).

The Order of Technical Engineers (OET) recognizes that the engineers are professionals with "decisive importance for economic and social progress" and therefore underlines the need for these professionals " to contribute with their share towards good governance, as active citizens" (Carapeto & Fonseca .2012:6). To this end, considers that it is imperative that an engineer, in addition to "possess a solid technical background and be available for change and continuous improvement, must also possess a solid general knowledge and awareness of the

importance of their role in society" (ibidem.). In this respect stresses that "in addition to know how to use their ingenuity and art, must also worry about the ethical dimension of their conduct, aspect which is currently so important in the profession as the mastery of technical subjects" (ibidem).

It is however important to keep in mind that the OET limits the need for ethics training of engineers to the deontological aspects of a practical nature: "specially dedicated to a practical analysis of professional values that underlie the rights and duties of technical engineers", focusing on "guidance for ethical decision in engineering that aims to help resolve the various dilemmas that technical engineers face in their daily practice" (idem).

From the academic point of view, Ehrlich (2000) points out that traditionally the training in the area of engineering was regarded as morally neutral, and does not require the consideration of values. However, this perspective of apparent neutrality of engineering, did not see a fundamental aspect: the modes and the purposes for which the expertise can be used in practice (Davis & Feinerman .2012). In this sense, there are several authors who consider the fundamental need of higher education in the field of the exact sciences, interconnect academic content with the development of civic and moral objectives (Ehrlich, 2000; Magellan.2006; Colon.2013; Nussbaum.2014).

In this same sense, Conlon (2013) considers it important to include content from the area of the humanities in Engineering courses as a way to promote ethics and social responsibility training. This perspective is also defended by Martha Nussbaum (2014), an approach that stresses the need to, in contemporary times strongly marked by globalization and by profit, be fundamental "to teach the human being", for which "an education in the area of Humanities is more necessary than ever as a way to cultivate and develop interest for others" (Pires.2007:132). This thinker says that "we will have Nations of docile engineers who do not know how to examine the claims of a political leader" (ibidem: 131). For this author, it is necessary to overcome the need for ethics training only aimed at the ethical component, to also cover the "need for general preparation for citizenship and for life" (ibidem: 132).

According to Ehrlich (2000), Barbara Jacoby (2009b) and Davis and Feinerman (2012), several methodologies are used at the level of higher education to promote ethical, civic and ethical training of students. Under the engineering courses, according to Davis and Feinerman (2012), the following 3 main methodologies are featured:

- Specific Curricular units (CU) (for example, engineering ethics and Deontology);
- Modules that have a wide insertion in technical disciplines, and apply to specific cases (for example lecture on the ethics of building steel structures);
- Inserting mini training classes in various curricular units that make up the curriculum.

Another way to approach the ethical education in engineering, though less used, is the promotion of voluntary public service, exercised in the context of extracurricular engineering format, but valued in the training certificate. Several studies refer to this methodology as a promoter of social responsibility and ethical direction of students (Conlon.2013).

For Conlon (2013) is still relevant the fact that most of the ethical training for engineers focuses only on the engineer as an individual, and ignore the action of professional context and professional policies, as well as the "great engineering, public purposes" that receive "scant attention in engineering teaching" (Conlon & Zandvoort,

2011:330). This author considers fundamental to take into consideration in the ethical and deontological training the action and pressure on engineering practice from a professional and social context.

Although the ethics training is considered important for engineering training, according to Finelli et al. (2012) few studies were done in this field, Particularly ones that contributed to identify aspects that have more of an impact on the ethical development of the students. This study is undertaken, and presented here, with the intention to contribute towards this reflection and elects as a theme civic and ethical training in Engineering courses.

As shown, the ethical and civic training of higher education engineering students is a current issue that constitutes a challenge to the organization of curricular and pedagogical practices encompassing all actors of the educational process, but is not deeply studied in Portugal (Estrela, 2010). It is within this framework that was considered important to carry out a study of the ethical and civic training of engineering students.

Thus, the study presented here aims to understand the place ethics and citizenship training have in the curriculum for training engineers in Portugal, highlighting how Portuguese higher education institutions have implemented (or not) this training component in the curriculum.

2. The presence of ethics and citizenship training in engineering courses curriculum in Portugal

In order to know how Portuguese higher education institutions (engineering) implemented (or not) ethical and civic training in their curriculum, a survey was conducted on courses from from Polytechnic higher education and College higher education.

The survey covered the first cycle courses and integrated Masters, covering 28 institutions (13 Colleges and 15 Polytechnic Universities), a total of 184 courses (126 Degrees and 58 Integrated masters degrees), corresponding to the existing Engineering courses in the public sector in Portugal.

The methodology used was the gathering of the prescribed official curricula for the various courses and proposed curricular option analysis within the framework of ethical, moral and civic education and students' citizenship.

Of the 184 courses examined it was verified that there are different curriculum options that include:

- specific compulsory frequency courses,
- inclusion of topics in the area of ethical and civic training in mandatory curricular units,
- optional curricular units, specific to ethics and/or civic training ,
- extra-curricular training units with additional payment.

The study results show that:

- 60.89% of the courses did not provide any mandatory or optional curricular units in their curriculum, specific or with any reference to the content, with goals in the context of the ethical, moral, civic education and citizenship of students;

- 31.51% of the courses have included in the curriculum mandatory training (specific course units or with any reference to, content, which includes objectives within the framework of ethical, moral, civic education and citizenship of students;
- 7.6% have the possibility to have training in this area through electives;
- 68.49% of the courses have no compulsory ethics or civic education units;
- 11.95% of the courses include specific curricular units for civic and ethical training;
- in 2.7% of the courses, the institution offers extracurricular ethical and civic training which implies additional payment.

Of the 28 Institutions studied, only 6 have a general solution for all their courses, 7 don´t show training in this field in any of the courses, and the remaining 15 features some courses that include the existence of this type of training and other courses that don't.

This study also found the diversity focus of each of the options on the institutions part that promote this training component, noting that most (54.54%) of the existing curriculum units focus on professional ethics training (Ethics and Deontology) and only 36.36% focus on Ethics and citizenship training.

3. Final Reflections

Although the documents consulted and the authors referred highlight that ethics and civic education should be a central component of higher education, from the empirical collection it was noted that this training in engineering courses in Portugal, is still absent from the official structure of most curricula. In fact, only 11.95% of the courses feature a specific curricular unit dedicated to ethical and civic training, and stress that these are focused mostly on ethics training strictly from the deontological point of view.

The low percentage of courses which include mandatory ethics and/or civic training in their curriculum seems to indicate that the concern with this type of training is not yet widespread and a priority among the teachers and coordinators of these higher education areas.

Given that Pešec, and Petković (2014) considers the relationship of students with evaluation an indicator of ethical and civic development of the students, and that, in Portugal, the engineering students are those who have a higher index of academic fraud (public, 2011), noted is the relevance of the diminished presence of ethics and civic training in the engineering courses curricula.

In this same vein, it's important to highlight the fact that only 7.06% of official curriculum course units show curricular units with goals that are in line with the civic training of their students, which reinforces the evidence that most engineering courses teachers and coordinators do not recognize the need for this type of training or do not assume this mission. However, it will be necessary to take into account the possibility of the existence of embedded training forms that do not have an explicit expression in the official curriculum, which will require additional studies.

It is also important to take into account that several authors referred emphasize the importance of ethical and civic training to be part of a global project that involves the entire higher education institution. Of the 28 public higher education institutions in Portugal that teach courses in the field of engineering, only 6 were found to have a proposed civic and/or ethics focused training curriculum that encompasses all of the courses. This indicator shows that most of the institutions do not consider this type of training as part of its institutional mission, leaving such consideration at the discretion of the faculty from each course (15 institutions feature some courses that include the existence of this type of training and other courses that don't).

References

Conselho da Europa (2004). Ano europeu da cidadania pela educação - 2005 - Documento de orientação. Retrieved from: https://infoeuropa.eurocid.pt/files/database/ 000034001-000035000/000034747.pdf

Conselho da Europa (2005). The framework of qualifications for the european higher education area - Bergen conference of european ministers responsible for higher education, 19-20 May 2005.

Council of Europe (2006). Higher education and democratic culture: Citizenship, human rights and civic responsibility – Declaration Strasbourg, June 2006.

Ehrlich, Thomas (2000). *Civic responsability and higher education*. Americam Council on Education e Oryx Press.

Carapeto, Carlos & Fonseca, Fátima (2012). *Ética e deontologia – Manual de formação*. OET – Ordem dos Engenheiro Técnicos.

Conlon, E. (2013). Broadening engineering education: bringing the community in: commentary on "social responsibility in French engineering education: a historical and sociological analysis". *Science And Engineering Ethics, 19*(4), 1589-1594. doi: 10.1007/s11948-013-9476-x

Conlon, E. & Zandvoort, H. (2011). Broadening ethics teaching in engineering: Beyond the individualistic approach. *Science & Engineering Ethics, 17*(2), 217-232. doi: 10.1007/s11948-010-9205-7

Davis, M. & Feinerman, A. (2012). Assessing graduate student progress in engineering ethics. *Science & Engineering Ethics, 18*(2), 351-367. doi: 10.1007/s11948-010-9250-2

European Ministers of Education (1999). The Bologna declaration - Joint declaration of 19 June 1999. Retrieved from http://www.eua.be/eua/jsp/en/upload/ OFFDOC_BP_bologna_declaration.1068714825768.pdf

Estrela, Teresa, Marques, Joana, Alves, Francisco & Feio, Mariana (2008). Formação ético-deontológica dos professores de ensino superior – Subsídios para um debate. *SÍSIFO – Revista de Ciências da Educação, 7,* 89-100.

Estrela, Teresa (2010). Ética e pedagogia no ensino superior. In Leite, Carlinda (org.). *Sentidos da Pedagogia no Ensino Superior* (11-27). CIIE/Livpsic, 2010, Isbn: 978-989-8148-44-5

Finelli, C., Holsapple, M., Eunjong R., Bielby, R., Burt, B., Carpenter, D. & Sutkus, J. (2012). An assessment of engineering students' curricular and co-curricular experiences and their ethical development. *Journal of Engineering Education, 101*(3), 469-494.

Gama, P., Peixoto, P., Seixas, A., Almeida, F. & Esteves, D. (2013). A ética dos alunos de administração e de economia no ensino superior. *Revista de Administração Contemporânea*, 17, 5, 620-641.

Giddens, Anthony (1998). *As Consequências da Modernidade*. Celta Editora.

Jacoby, Barbara (2009a). *Civic engagement in higher education: concepts and practices*. Jossey-Bass Books.

Jacoby, Barbara (2009b). Civic engagement in today's higher education: na overview, In Jacoby, Barbara (org). *Civic engagement in higher education: concepts and practices* (5-30). Jossey-Bass Books.

La Taille, Yves de (2006). *Moral e ética: dimensões intelectuais e afetivas*. São Paulo: Artemed Editora.

Levine, Peter (2015). *The future of democracy: Developing the next generation of American citizens*. Tufts University Press

Magalhães, António M. (2006). A identidade do ensino superior: a educação superior e a universidade. *Revista Lusófona de Educação, 7*, 13-40

Nussbaum, Martha (2014). *Educação e justiça social*. Edições Pedago.

OE - Ordem dos Engenheiros (2002). Estatuto da Ordem dos Engenheiros (Aprovado pelo Decreto-Lei n.º 119/92, de 30 de Junho). Retrieved from http://www.ordemengenheiros.pt/fotos/editor2/ordem/atribuicoeseorganizacao/estatutos_da_ordem_dos_engenheiros.pdf

OE - Ordem dos Engenheiros (2014). Programa de formação. Retrieved from http://www.oern.pt/documentos/movimento_associativo/Etica_2014_2.pdf

Pešec, B. & Petković, Z. (2014). Assessing higher education students ethicality. *Procjena Eticnosti Studenata, 12*(3), 263-269. doi: 10.7906/indecs.12.3.6

Pires, Laura (2007). *Ensino Superior: da ruptura à inovação*. Universidade Católica Editora.

Público (2011). Metade dos alunos admite já ter plagiado. *Jornal Público* de 19-09-2011. Retrieved from http://aulp.org/noticias/revista-de-imprensa/ensino-superior/396-conferencia-liderar-em-tempo-de-crise-

Rego, Arménio & Braga, Jorge (2014). *Ética para engenheiros* (3ªed). Lisboa: Lidel– edições técnicas.

UNESCO (1998). Declaração mundial sobre educação superior no século XXI: Visão e ação. *Conferência Mundial sobre Educação Superior – Paris.* Retrieved from http://www.direitoshumanos.usp.br/index.php/Direito-a-Educa%C3%A7%C3%A3o/ declaracao-mundial-sobre-educacao-superior-no-seculo-xxi-visao-e-acao.html

UNESCO (2000). *O direito à educação – uma educação para todos durante toda a vida*. Edições Asa

Young, Michael (2010). *Conhecimento e currículo: do socioconstrutivismo ao realismo social na sociologia da educação.* Porto Editora.