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**SECOND-LANGUAGE INSTRUCTION AT THE PH. D.
LEVEL. THE DOCTORAL PROGRAM IN
ARCHITECTURE AND BUILDING TECHNOLOGY AT
UPCT.**

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Indique uno o varios de los siete Temas de Interés Didáctico: (Poner x entre los [])

- Metodologías didácticas, elaboraciones de guías, planificaciones y materiales adaptados al EEES.
- Actividades para el desarrollo de trabajo en grupos, seguimiento del aprendizaje colaborativo y experiencias en tutorías.
- Desarrollo de contenidos multimedia, espacios virtuales de enseñanza- aprendizaje y redes sociales.
- Planificación e implantación de docencia en otros idiomas.
- Sistemas de coordinación y estrategias de enseñanza-aprendizaje.
- Desarrollo de las competencias profesionales mediante la experiencia en el aula y la investigación científica.
- Evaluación de competencias.

Resumen.

La comunicación analiza una serie de razones que aconsejan emplear una segunda lengua en la formación de los estudiantes de doctorado, que se pueden resumir en dos ideas: los alumnos de este nivel deben poseer competencias que les permitan *acceder a la información y presentar los resultados* de su investigación en una segunda lengua, en especial el inglés. A continuación, los autores tratan la aplicación de estas ideas en el programa de doctorado en Arquitectura y Tecnología de la Edificación de la Universidad Politécnica de Cartagena (UPCT), exponiendo cómo los alumnos interesados puedan desarrollar competencias lingüísticas aplicadas a la investigación, mediante seminarios y otras actividades: *comprender* presentaciones orales en inglés, *leer* trabajos en otros idiomas europeos, *exponer* oralmente sus resultados en inglés y *escribir* en inglés desde los rótulos de una presentación hasta un trabajo de investigación.

Keywords: Second-language instruction, Doctoral instruction, Architecture, Building Technology

Abstract.

The paper analyses a number of reasons for implementing second-language instruction at the doctoral level, stressing that Ph. D. students should be able to *acquire information and present the results* of their research not only in their mother tongue, but also in English. Next, the authors discuss the application of such ideas on the Ph. D. programme in Architecture and Building Technology at Universidad Politécnica de Cartagena (UPCT), explaining how seminars and other activities will enable interested students to develop linguistic skills such as *understanding* oral presentations in English, *reading* literature and sources in a number of European languages, *presenting* the results of their research in English in front of a specialised audience and *writing* presentations captions and full academic papers in English.

Reasons for second-language instruction at the Ph. D. level

A number of reasons suggest that Ph. D. education should be carried not only in the students' mother tongue, but in other languages, in particular in English. These reasons, however, can be summarised in a single idea: since Ph. D. education is essentially a training for research, a Ph. D. student should be able to *acquire information* in languages other than his or her mother tongue, to build on this information to arrive at new conclusions, and *present the results* of his or her research in other languages than his or her mother tongue.

Let us have a more detailed look at this idea. Unless the research field of a given Ph. D. program is specifically local - for example, national Law - the literature in this particular field will surely be written on different languages. The pattern and degree of internationalisation vary widely depending on the nature of each field of research. As we shall see further on, broadly speaking, almost all significant, original, world-class research in the scientific and technological fields is written in English, irrespective of the author's mother tongue or the institution where the research has taken place. Of course, this is not new; given the universal range of most scientific fields, science has always been in search of an international language, and in fact it has dropped Latin, the scientific language up to the eighteenth century, for English. Besides, in these fields, a great majority of significant research is presented by means of journal articles, which are seldom translated. Thus, a Ph. D. student in the scientific or technological fields lacking the skills to read and understand thoroughly English-language papers on his or her field of study will be unable to access the greater part of the significant literature on the subject of her or his dissertation. Such a student will be unaware of the state of the art in his subject, and quite probably his or her dissertation will be seriously flawed.

At the same time, the dominance of English as the international language of science implies that a Ph. D. student should present the results of his or her research in English, not only on international conferences, as expected in many universities around the world, but also on refereed journals. In fact, Ph. D. regulations at Universidad Politécnica de Cartagena (UPCT, from here on) require students to have published at least a paper in a journal included in Journal Citation Reports (JCR, from here on) which are usually published in English, although there are other possibilities in some fields, in particular Architecture, Building Construction, Town Planning and Civil Engineering. A paper can be translated for publication, of course, but delivering a presentation and answering questions in a foreign language is not so easy. Besides, Ph. D. instruction should look further than the day of the viva voce, enabling the student to conduct research at the highest level and present its result in an international setting, either orally or in written form, without the help of translators.

The situation is somewhat more nuanced in the Arts and Humanities field. Generally speaking, authors in these fields tend to write in their mother tongue, which is frequently tied with their research subject. This is evident in such fields as Literature, but is easier to forget that such areas as

Architectural History, Architectural Theory or Construction History, to name just a few ones connected with the Ph. D. program on Architecture and Building Technology at UPCT, depend on sources that are written on national languages. Thus, in subjects of local or national interest, the literature on the Humanities is usually written in national languages. By contrast, when dealing with subjects of international interest, or comparing national issues with a larger context, there is a growing tendency to present results in English. For example, papers for the International Congresses on Construction History must be read and published on English; edited books on this matters are frequently published in English; survey manuals on these fields are usually written in English, in order to reach an international audience, even if the author's first language is not English, as in Kirsti Andersen's *The Geometry of an Art* (2007) to cite a relevant example in our field. Thus, a humanities student wishing to go beyond the limited range of local studies and grasp at least an oversight of the international context of his or her research subject should, ideally, be able to read the literature about his or her field of study in a number of European languages; this is, of course, provided that his or her subject does not lie on the field of Islamic, African or Asiatic cultures. Also, for similar reasons, if he or she wishes to reach an international audience through international conferences or journals, the ability to write in English is essential, even more than in scientific fields, since ideas in the Arts and Humanities field cannot be conveyed by means of equations, the technical language is less standardised, and nuances, which are essential in the Humanities, are usually lost in translation.

As a result, in our opinion a Ph. D. program carried on at a non-English-speaking country should train interested students to *read and understand literature about their fields of study in other languages*, at least in English, and also to *present research about their field of study in English, both orally and in written form*.

Implementation of second-language teaching in the Ph. D. program on Architecture and Building Technology at UPCT

The School of Architecture and Building Engineering of UPCT has designed a Ph. D. program on Architecture and Building Technology that is scheduled to start in the academic year 2011-2001. In accordance to Spanish government regulations, in order to gain admission to a Ph. D. program, students should be in possession of a Master's degree on their field of research or at least have taken courses at Master's level for an amount of 60 ECTS. This implies that the Master's degree accounts as the formative period of the doctorate; once he or she is accepted in the doctoral program, the student must carry on a number of activities encompassed by the research period of the doctorate. Such activities in the research period are not rigidly defined by Spanish government regulations and in fact neither ECTS nor any other credit system applies to the research period of the doctorate. In particular, our program is subject to Royal Decree 1393/2007, which mentions only the Ph.

dissertation in connection with the research period. However, after the inception of our program, Spanish government has revised the regulations for doctoral programs by means of Royal Decree 99/2011. Although being still quite flexible, this recent Decree contemplates the possibility of research seminars and other activities in the research period of the doctorate. In some ways, our program is a "bridge" program: although regulated by Decree 1393/2007, the program anticipates a number of features of the 99/2011 Decree, such as the existence of research seminars, both methodological and field-specific.

In particular, the program contemplates *two methodological workshops*, one on scientific and the other on humanistic matters, and *fourteen field-specific seminars*. Both methodological workshops are scheduled to take place each academic year, while field-specific seminars are conceived as rotating; that is, each academic year a portion of the field-specific seminars will be staged. In any case, in the first two years after admission to the doctoral program, each student should have attended at least one methodological workshop and a subject-specific seminar. Of course, when appropriate, students will attend both workshops, in particular when dealing with "bridge" subjects encompassing both scientific and humanistic approaches, or more than one field-specific seminars, when their research is connected with two or more of the subjects of the seminars. In addition to these workshops and seminars, students are expected to attend Doctoral Study Days, such as the annual Jornadas de Jóvenes Investigadores in UPCT and national or international conferences, under the supervision of the Academic Commission of the doctoral program.

When preparing this program, we have taken into account all the reasons we have stated before for the inclusion of English-language instruction along all the process. Furthermore, in connection with the internationalisation policy of the University, we have considered the possibility of non-Spanish speaking students attending the program and the Spanish government regulation of the International Doctorate. However, in our opinion, English-language instruction should not be mandatory, but rather an option, both for students and professors, and should be introduced gradually.

In accordance with these starting points, methodological workshops are scheduled to be carried initially on in Spanish, taking into account that they are targeted to a large percentage of the students in the program and are meant to be directed by a number of professors, ranging from three to six professors for each workshop. Notwithstanding that, for non-Spanish speaking students, this workshops could be repeated in small groups if necessary, giving these students personalised instruction. These workshops aim to make students familiar with the core research methods of either the scientific or humanist disciplines relevant to architecture, in particular experimental design and execution, statistical analysis of results, treatment of archival sources or bibliographic citation conventions.

By contrast, three field-specific seminars are scheduled to be carried on in English, as a starting point. Generally speaking, these seminars deal with matters which are more international in nature

or where international context is more significant, such as History of Spatial Representation, Stonecutting and Stereotomy or Advanced Construction Technology. Later on, after reviewing the results of these seminars, other seminars could be scheduled in English, in particular in technological subjects. By contrast, it is quite adequate to teach such matters as Colonisation Villages in Post-War Spain or Art-Nouveau Architecture in Cartagena in Spanish.

As a rule, these seminars will include a short presentation of the subject matter by the instructor in charge, around 15-20 hours, in order to make students aware of the problems, methods and research opportunities of each particular field of study. The instructor of each seminar will also furnish students with appropriate materials to carry on research on this particular ground, in particular the relevant bibliography. With this background, students should prepare a short paper, akin to a conference presentation, on a particular subject on the field of study featured by the seminar. Since a main goal of the doctoral program is furnishing the students with skills for presentation of research results both in oral and written form, students should present their work to all seminar attendants with the appropriate visual aids, and also submit the written version of their paper, usually taking into account the instructor's or other students' criticism or questions during the presentation. As we shall see later, in English-speaking seminars, both the instructor's presentation of the field, students' presentations and written papers should be in English.

Anyhow, although these seminars are a salient feature of English-language instruction in our program, and will be analysed in detail in a specific section of this paper, the use of English is carried on to the dissertation stage. In particular, the student must present a dissertation project, including an abstract of the dissertation, goals, state of the art, bibliography and working plan. This dissertation project is to be approved by a panel of at least three members, appointed by the Academic Commission of the program. Such projects can be presented either in Spanish or in English; of course, the latter possibility appeals not only to non-Spanish-speaking students, but also to students that are planning to present a dissertation on a technological subject of international interest, where most of the literature is published in English and the student is expected to publish his or her research in English-language journals.

Such students can carry on, presenting their full dissertation in English. Once the project is approved, the student must go on to preparing the dissertation, under the supervision of at least one dissertation director. Along with the dissertation the student must submit at least one evidence of the quality of his or her work, as we have said before: in particular, in the field of Architecture and Civil Engineering, either a refereed article in a journal at JCR or similar level, or two book chapters or papers in international conferences. The dissertation will be assessed by a panel of five academics; no more than two of them may belong to UPCT, so it is fairly easy to form a panel able to understand and judge a whole dissertation in English.

There is also another possibility. Students can be awarded an "European Doctorate", provided that

the student has spent at least three months at a research institution in another European country, that a part of the dissertation is written in another European language, different from the official languages of Spain, that two experts from another country have signed a positive report about the dissertation and that the panel who is to judge the dissertation includes a member from another state. This applies to dissertations presented under the provisions of Decree 1393/2007, but the most recent Decree 99/2011 has enlarged the scope of this mention, creating an "International Doctorate", so that the relevant stays, reports and panel members can be carried on at, prepared and formed by nationals of any country outside Spain.

English-language seminars in the Ph. D. program on Architecture and Building Technology at UPCT

Although English-language instruction spreads all over our doctoral program, as we have seen, it is most significant at the field-specific seminars, so it is worthwhile to have a detailed look at the three seminars that are initially planned to be carried on in English; all in all, they furnish an interesting case study, since their learning methodologies and intensity of English-language instruction are different.

In particular, the seminar on History of Architectural Representation is quite representative of our general approach. While the history of linear perspective has been the subject of a great number of studies along the 20th century (Kern 1915; Panofsky 1927; Pirenne 1970; Kemp 1990, to name just a few), the literature on other systems of spatial representation, such as orthographic projection and axonometry and parallel projection, is rather scarce (Loria 1921; Taton 1954; Sakarovitch 1997; Scolari 1985; Alonso 1990). Also, the relatively few studies on orthogonal projection and axonometry deal with these subjects independently, without making the relevant connections with linear perspective (see Calvo 2008; Calvo 2010, as exceptions to this rule). Thus, the state of the art in this field furnishes a number of interesting research opportunities on the history of orthographic projections and axonometry, as well as their connections with linear perspective.

In order to kick start interested students into this field of research, a number of presentations will be carried on, with the aim of making the students aware of the general development of spatial representation techniques, dispelling at the same time a number of usual misconceptions about them. In particular, six 2-hour sessions are planned, dealing with Antiquity and Early Middle-Ages, Late Middle Ages, Renaissance, Baroque period, Enlightenment and 19th century, and 20th Century, respectively. Of course, such broad surveys can furnish a general view of this field, but do not allow to go deep into the inner workings of a research project on this field. In order to allow students to grasp research techniques on this field, one or two additional case-study sessions are planned, explaining in depth some studies in this subject carried on by the seminar instructor. Both the survey and the case-study sessions will be conducted in English, in small groups

between 3 and 5 students, that will be expected to place questions or make comments in English.

From this moment on, students will be asked to prepare a research essay on this field, between 3000 and 6000 words, written in English and following the usual style conventions in Anglo-Saxon humanistic literature. The instructor will put forward a number of suitable subjects and furnish the students with a bibliography of sources and literature in the field. The students will be allowed approximately three or four months to prepare and advanced draft of their essay and a visual presentation about the subject, lasting for 15 minutes. All along this period, the seminar instructor will be available for questions and advice about the essay. In a special meeting of the seminar, students will present orally their study, using adequate visual aids, which are of course essential in this field of research. These presentations will be subject to questions, comments and general discussion by other students and the instructor. At the same time, students should submit a draft of their work to the instructor. After the instructor has returned the draft with comments, students will be given an additional period, between one and two months, to present the final version of their paper. The whole process can span a period of approximately eight months, starting around November and finishing in June.

The seminar on Stonecutting and Stereotomy will follow similar guidelines. In fact, this matter is connected with the history of orthographic projection, since stonecutters were the first profession to use real orthogonal projection, as Dürer (1525) attests, and in fact, Gaspard Monge drew his *Descriptive Geometry* (1798), the work that raised orthogonal projection to the scientific field, from his experience as Professor of the Theory of Stonecutting at the Military Engineering School at Mézières. There are however, a few significant differences. Since Spanish regulations ask for Ph. D. students to be in possession of a Master's degree, a fair part, but by no means all, of the students in this programme are expected to come from the UPCT master's programme on Architectural Heritage, which involves a mandatory subject on Traditional Materials and Techniques in Architecture, including about 20 hours of lectures and practice about stonecutting, and also another compulsory subject on History of Architecture and Construction. Thus, most students attending the seminar will have a general grasp of stonecutting techniques and their relation to the more general context of Construction History. If any students coming from other backgrounds are to follow the seminar on Stonecutting and Stereotomy, they may attend the relevant sessions in the Master's programme in order to strengthen their knowledge about this subject.

Thus, survey presentations will not be necessary at this seminar; instead, about four case-study sessions will be devoted to the presentation of research in this field, explaining the broad range of techniques used in Construction History, from archival research, with a special reference to the interpretation of drawings and compass or ruler marks, to measuring techniques, involving laser total stations, multiimage photogrammetry and 3D laser scanning (Rabasa 1996; Guerra 2005; Calvo et al. 2005b; Tañ-Guzmán 2006; Alonso et al. 2009a; Alonso et al. 2009b; López Mozo

2009; Alonso et al. 2010; Calvo et al. 2010a; Calvo et al. 2010b). Starting from this point, students will be asked to prepare a paper and an oral presentation, much in the way of the ones prepared in the History of Spatial Representation seminar; the only significant difference is that students will be expected to make heavier use of 3D technology, including 3D PDF files in their presentation and their final paper.

The seminar on Advanced Building Technology departs in a number of ways from the main traits of the preceding seminars. First, its subject is much broader, so a larger number of students is to be expected, and it will be led by a number of instructors. Architecture, considered as a scientific discipline, is based on physical sciences and building technology. In such fields as Construction and Building Technology, Civil Engineering, Mechanical Engineering, Materials science, Ceramics-Materials science, Composites-Materials science, and Characterization and Testing most high-impact papers included in Journal Citation Reports (JCR) and other international databases are written in English. Quite significantly, such key international organizations in these fields, such as FIB (Fédération Internationale du Béton) or RILEM (Reunion Internationale des Laboratoires et Experts des Matériaux, Systemes de Construction et Ouvrages) begun using French as their main working language, as their names attest, but nowadays publish most of their materials in English. Besides, most European **and International** standards about Building Technology, such as Eurocodes, are published in English and most computer programs for **structural analysis and dimensioning** use English. At the same time, Spanish translations of literature in this field originally published in English are scarce, in contrast with the main textbooks on the Humanities.

Taking into account all these reasons, it is essential for graduate students in these fields to master the English terms for the main concepts on the fields of materials behaviour, construction, building services and structures. With this goal in mind, the first phase of the seminar on Advanced Building Technology will be focused on the **interpretation** and analysis of basic texts in these fields. At the same time, students will be trained in the necessary skills in order to retrieve articles and dissertations in the most significant databases in scientific literature, such as Science Direct or Springer Link. As a final phase in the seminar, students will be asked to put in practice their skills for writing and oral presentations in English, aiming to empower them to deliver papers at international conferences and symposia, mastering Anglo-Saxon vocabulary in order to internationalise their research.

References.

- Alonso Rodríguez, Miguel Ángel.** "La axonometría o el espejismo científico de la realidad...". Ph. D. dissertation, Universidad Politécnica de Madrid.
- Alonso Rodríguez, Miguel Ángel; Calvo López, José.** 2010. "Sobre el levantamiento arquitectónico mediante fotogrametría multiimagen". In *XIII Congreso Internacional de Expresión Gráfica Arquitectónica*: Universidad Politécnica de Valencia, p. 35-40.
- Alonso Rodríguez, Miguel Ángel; Calvo López, José; Rabasa Díaz, Enrique.** 2009. "Sobre la configuración constructiva del crucero de la catedral de Segovia". In *Actas del Sexto Congreso Nacional de Historia de la Construcción*. Madrid: Instituto Juan de Herrera, p. 53-62.
- Alonso Rodríguez, Miguel Ángel; López Mozo, Ana; Palacios Gonzalo, José Carlos; Rabasa Díaz, Enrique; Calvo López, José; Sanjurjo Álvarez, Alberto.** 2009. "Functionalism and caprice in stonecutting ...". In *Proceedings of the Third International Congress on Construction History*. Cottbus: Brandenburg Technical University, vol. 1, p. 31-38.
- Andersen, Kirsti.** 2007. *The geometry of an Art. The History of the Mathematical Theory of Perspective from Alberti to Monge*. [Berlin]: Springer.
- Calvo López, José.** 2005. *Cantería renacentista en la Catedral de Murcia*. Murcia: Colegio Oficial de Arquitectos de Murcia.
- Calvo López, José.** "La historia de la representación del espacio como disciplina de posgrado". In *XII Congreso Internacional de Expresión Gráfica Arquitectónica*: Instituto Juan de Herrera, p. 133-141.
- Calvo López, José; Alonso Rodríguez, Miguel Ángel.** 2010. "Perspective versus stereotomy: from Quattrocento polyhedral rings to Sixteenth-Century Spanish torus vaults". *Nexus Network Journal*, vol. 12, n° 1, p. 75-111.
- Calvo López, José; Molina Gaitán, Juan Carlos; Alonso Rodríguez, Miguel Ángel; López Mozo, Ana; Rabasa Díaz, Enrique; Pozo Martínez, Indalecio; Sánchez Pravia, José Antonio.** 2010. "El uso de montañas en los talleres catedralicios: el caso murciano". *SEMATA, Ciencias Sociales e Humanidades*, vol. 22, p. 519-536.
- Dürer, Albrecht.** 1525. *Underweysung der messung mit dem zirkel und richtscheyt ...* Nuremberg: s. n.
- Guerra Pestonit, Rosa Ana.** 2005. "La bóveda del presbiterio de ... Monforte de Lemos". In *Actas del Cuarto Congreso Nacional de Historia de la Construcción*. Madrid: Instituto Juan de Herrera, vol. 1, p. 572-580.
- Kemp, Martin.** 1990. *The science of Art*. New Haven: Yale University Press.
- Kern, G. I.** 1915. "Der Mazzocchio der Paolo Uccello". *Jahrbuch der Königlich Preussische Kunstsammlungen*, vol. 36, p. 13-38.
- López Mozo, Ana.** 2009. "Bóvedas de piedra del Monasterio de El Escorial". Ph. D. dissertation. Madrid, Universidad Politécnica de Madrid.
- Loria, Gino.** 1921. *Storia della Geometria Descrittiva, dalle origini sino ai giorni nostri*. Milano: Ulrico Hoepli.
- Monge, Gaspard.** 1798 [An VII]. *Géométrie descriptive, leçons données aux Écoles normales, l'an 3 de la République ...*. Paris: Baudouin.
- Panofsky, Erwin.** 1927. "Die Perspektive als 'Symbolische Form'". In *Vorträge der Bibliothek Warburg*. Berlin: Teubner.
- Pirenne, Maurice Henri** 1970. *Optics, painting and photography*. Cambridge: Cambridge University Press.
- Sakarovitch, Joël.** 1997. *Épures d'architecture*. Basel-Boston-Berlin: Birkhäuser.
- Scolari, Massimo.** 1985. "Elements for a history of axonometry". *Architectural Design*, n° 5-6, p. 73-78.
- Taín-Guzmán, Miguel.** 2006. "Fifteen Unedited Engraved Architectural Drawings Uncovered in Northwest Spain". In *Proceedings of the Second International Congress on Construction History*. Cambridge: Construction History Society, p. 3011-3023.
- Taton, René.** 1954. *L' Histoire de la géométrie descriptive*. Paris: Université de Paris.