INTEGRATED DIDACTICS: AN EXAMPLE OF A CURRICULUM MODEL ENHANCING KNOWLEDGE CROSSING

Carolina Gonçalves[1], António Almeida[2], Margarida Rodrigues[3], Alfredo Dias[4]

[1] Escola Superior de Educação de Lisboa / Centro Interdisciplinar de Ciências Sociais
CICS.NOVA - Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa
(PORTUGAL)
[2] Escola Superior de Educação de Lisboa / Centro Interdisciplinar de Estudos Educacionais
(PORTUGAL)
[3] Escola Superior de Educação de Lisboa / Unidade de Investigação do Instituto de
Educação, Universidade de Lisboa (PORTUGAL)
[4] Escola Superior de Educação de Lisboa / Instituto de Geografia e Ordenamento do
Território/Centro de Estudos Geográficos da Universidade de Lisboa (PORTUGAL)

Abstract

In this paper, we introduce an innovative course in the Portuguese Context, the Master's Course in "Integrated Didactics in Mother Tongue, Maths, Natural and Social Sciences", taking place at the Lisbon School of Education and discussing in particular the results of the evaluation made by the students who attended the Curricular Unit - Integrated Didactics (CU-ID). This course was designed for in-service teachers of the first six years of schooling and intends to improve connections between different curriculum areas. In this paper, we start to present a few general ideas about curriculum development; to discuss the concept of integration; to present the principles and objectives of the course created as well as its structure; to describe the methodology used in the evaluation process of the above mentioned CU-ID.

The results allow us to state that the students recognized, as positive features of the CU-ID, the presence in all sessions of two teachers simultaneously from different scientific areas, as well as invitations issued to specialists on the subject of integration and to other teachers that already promote forms of integration in schools. As negative features, students noted a lack of integrated purpose, applying simultaneously the four scientific areas of the course, and also indicated the need to be familiar with more models of integrated education. Consequently, the suggestions for improvement derived from these negative features. The students also considered that their evaluation process was correct, due to the fact that it was focused on the design of an integrated project for one of the school years already mentioned.

Keywords: Higher education, curriculum models, knowledge integration, curriculum evaluation.

1 INTRODUCTION – THE CURRICULUM CONCEPT

The curriculum, which etymologically contains the idea of a way or a route, began to be improved, systematically, only at the end of the twentieth century as a means to achieve the needs that the society of that time considered important ([1] Pacheco, Flores & Paraskeva, 1999). In 1918, Franklin Bobbitt wrote a book, *The Curriculum,* where he included several fundamental steps for curriculum design. With this project he is considered a pioneer in Curriculum Development, a new field that gained prominence during the twentieth century ([2] Lawton, 1981). During this century the focus of the curriculum changed and became less focused on teachers. In more recent years, the curriculum has been subject to intense debate, which is justified by the increasing challenges faced by schools. In fact there is a multiplicity of meanings attributed to the curriculum. According to [3] Pacheco (2001), the concept of curriculum has an ambiguous, polysemic and multi-faceted nature. This author identifies two curriculum conceptions in which we can integrate various definitions: (i) curriculum as a plan and a product, and (ii) curriculum as a dynamic process without a predetermined structure. The first conception points to a formal approach: a curriculum as a pre-planned product and translated into a linear process. This view is shared by several authors and covers several curriculum definitions understood as: a) students subject to a programme ([4] Phenix, 1962; [5] Beauchamp, 1981); b) experience- based learning (Dewey, quoted in [6] Sacristan, 1991/2000); c) objectives to be achieved through planned learning experiences and directed by the school ([7] Tyler, 1949, [8] Taba, 1962, [9]

Traldi, 1984); d) intended learning outcomes ([10] Johnson, 1980); e) learning experiences planned and organized in the school (Wheeler, quoted in [3] Pacheco, 2001).

The second conception points to a more flexible and open curriculum perspective. According to this conception, which is seen as a training project centered on students, a better interaction can be achieved between the previously planned intentionality and the daily experiences of students within the school context, inside or outside the classroom, inside or outside the school. Different authors (such as [11] Grundy, 1987; [3] Pacheco, 2001; [12] Roldão, 1999; [6] Sacristán, 2000; [13] Schawb, 1978; [14] Stenhouse, 1981) share this view of a curriculum as a dynamic process, permeable to the conditions of its own implementation.

We share this second conception of curriculum seeing it as a "practice in constant deliberation and negotiation" ([3] Pacheco, 2001, p. 39) which includes the interaction between teachers and students, while curricular participants are considered not as mere passive objects, but as important subjects of their own learning process.

2   QUESTIONING AN INTEGRATED CURRICULUM

One of the dimensions relating to the curriculum that has gained importance nowadays is its ability to integrate different areas of knowledge. To [15] Morin (2001), for instance, pertinent knowledge is the one that it is not compartmentalized, it is able to place the information in a context and allows the parts to be connected to the whole. In his view, the whole is made up of the interactions between the parts, and in turn, the whole will be retroactive on the parts. Also [16] Hernández and Ventura (1998) advocate this principle of globalization regarding the organization of knowledge:

> It is therefore the theme or the problem that calls for the convergence of knowledge. Its articulating function is to establish comprehensive relations which allow new generating convergence. It is, definitely, more than an interdisciplinary or transdisciplinary attitude, a position that aims to promote the development of a relational knowledge and understanding attitude towards the complexities of human knowledge itself. (p. 47)

The schools' compartmentalization of knowledge has led to an incoherent curriculum in which knowledge is not interrelated and it no longer makes sense for students. As [17] Jacobs (1989) mentions, in real life we deal with complex and integrated problems and situations, but school, when applying a fragmented curriculum, does not reflect this reality. This author also adds an important idea: when subjects are taught in isolation the more important principle is knowledge accumulation; on the contrary, an integrated curriculum demands higher order connections that stimulate a real long term understanding. To [18] Beane (2000) an integrated curriculum is in fact a much more coherent one. Its pieces are linked in a visible and explicit way and its actions are related to a broader and stimulating purpose. Integration calls for the mobilization of all kinds of knowledge for a greater understanding of the world. To this author, students using an integrated approach - emphasizing thematic units centred on questions collaboratively planned by teachers and students in a democratic environment - have similar or superior performance in standardized tests when compared to students who still use the traditional discipline approach. According to Beane [18] (2000), the more an event is significant, situated in context, and rooted in a cultural knowledge, the faster it is understood and learned. The "purpose of education is the making of meaning, and that can only occur if the culture of education is so designed as to make that happen" ([19] Kysilka, 2014, p. 209).

However, an integrated approach is a very demanding one, not only for teachers but also for students, even been aware of the several benefits to learning just stated. In the opinion of [19] Kysilka (2014), resistance to this integrated approach is strong and can come from parents, teachers, administrators, legislators and even from students. But there is evidence that curriculum integration has a great potential for making a difference in schools.

3   INTEGRATED DIDACTICS

The course namely Integrated Didactics in Mother Tongue, Mathematics, Natural and Social Sciences, was opened in Lisbon School of Education for the first time in the school year of 2013/2014. The course opened for in-service teachers that already had a degree, qualifying them for the First Cycle of Basic Education (the first four years of Schooling) or for the Second Cycle of Basic Education (the fifth and sixth years of schooling) in the areas just mentioned. Therefore, the students, already in-service teachers, all had several years of teaching experience.

The curriculum was designed over two semesters. The 1st semester was centred on the four specific didactics of the different areas of the course: Portuguese, Social Sciences (History and Geography), Mathematics and Natural Sciences. In the 2nd semester, Integrated Didactics, with 15 ECTS, was the curricular unit that aimed to promote integration.

As [17] Jacobs (1989) argues, students should have different experiences that include both a disciplinary and an interdisciplinary approach. And in agreement with this idea, we thought that with the design now presented students could be better prepared to articulate didactic knowledge from the different areas of the course, and could also deal at the beginning with a more familiar approach, the disciplinary one.

The main objectives of the CU-ID are the following:

- to Identify, analyze and discuss situations and contexts of curricular integration in the 1st and 2nd cycles of Basic Education (the first six years of schooling in Portugal);

- to promote integrated development of basic skills in specific areas;

- to develop, based on results of recent research, learning sequences of curricular integration appropriate to different levels of education, integrating at least two areas from the curriculum.

- to increase collaborative team-work and multi and interdisciplinary dialogue;

- to promote the ability to solve problems and develop action plans;

- to enhance the capacity to relate knowledge and specific didactic approaches, during their teaching practice.

To achieve these objectives, the CU-ID was organized in modules that included topics such as the definition of an integrated curriculum, the exemplification of how to integrate different areas of knowledge, the exemplification of how to apply a specific didactic approach to another area and also to discuss the principles of Project Methodology to help the design of future interventions projects. The syllabus contents of the CU-ID are systematized in Table 1.

Table 1: The syllabus contents of the curricular unit Integrated Didactics (CU-ID).

Contents	Hours
■ Module 1 - Specific Didactics and Curricular Integration	6
− From multidisciplinarity to integration	
− Contribution of each subject area for an integrated curriculum	
− Different ways of promoting integration (using a topic, a didactic approach or an activity, for instance)	
■ Module 2 - Language for developing different literacies	30
− The vocabulary for the acquisition and development of new knowledge	
− The scientific and literary languages. The types and textual genres of the scientific areas;	
− Literature as a way to approach concepts from social and natural sciences and environmental issues.	
■ Module 3 - Project Methodology	20
− Definition of concepts and steps for the development of this methodology.	
■ Module 4 – Integrated Projects	13
− Problematic situations that generate curricular integration	
− Development of curricular integrated projects	
− Evaluation of the design of the projects	

From the contents presented, it is clear that our intention was to put Language at the centre of curricular integration, as the matrix that could easily unite different areas. However, we also included other possibilities of articulation, giving a few examples of articulation between social and natural sciences and social sciences and mathematics.

Official documents recommend global learning, integrating knowledge from various disciplines, beginning with language ([20] Reis, 2009). Furthermore, the choice of language as an integrating element is justified by its centrality both in scientific and unscientific activities; the linguistic specificities of each subject area should be known as well as the matrix that connects/links them ([21] Jorba et al, 2010).

For instance, to become scientifically educated requires learning the specific language of science. Many of the data may take various forms (charts, tables) and can be treated mathematically and computationally represented, with the ensuing models a form of approximation to reality ([22] Osborne & Dillon, 2010). But in the learning of science and mathematics, language is also central to communicate ideas and to be able to work in science. Many science and mathematics concepts use words that are completely foreign to students' knowledge, hampering their learning. For this reason, it is important to define strategies that allow students to give scientifically correct meaning to these specific words. According to [23] Wellington & Osborne (2001), the use of current vocabulary in a scientific context and the lack of connectors constitute serious obstacles for learning science. However, many language skills make it possible to understand the genesis of these scientific words and also to improve the application of different connectors. Thus, strategies that promote language mastery in a colloquial context facilitate learning in different areas. At the same time, the rigor in the use of the words and in the type of speech required in each area, also lead to a progressive mastery of language.

The use of Project Methodology, dealing with situations that may involve real problems, has a social and political dimension that gives students the opportunity to practise some of the skills required by society, like critical learning and civic participation. It is a working method that favours the integration of knowledge, developing core competencies in specific areas and a curriculum management that also enhances the establishment of connections. All these competencies are normally poorly developed due to the fact that the disciplinary approach continues to be the most common in our schools.

For all these reasons, the teaching methodologies of the CU-ID included theoretical, practical sessions and tutorial sessions. The theoretical-practical sessions took different forms, among which we highlight: i) analysis and discussion of texts allusive to issues being studied; ii) presentation, discussion and systematization of information, based on reference authors and on the results of didactics research. For this specific issue, integration specialists and other Master´s students who had already completed dissertations related to integrated knowledge were invited; iii) critical analysis and discussion of examples of curriculum projects carried out in school contexts; iv) tutorial guidance to give support to the design of an integrated project.

This CU also aimed to be a space for research and reflection, where the identification of knowledge, methodologies and tools could help an integrated learning process.

The evaluation of the curricular unit was based on the quality and creativity of the project mentioned above, but other minor tasks related with the different topics of the syllabus were also required.

4   METHODOLOGY

In the first phase, decisions were made related to the operationalization of the objectives defined for the present study. Consequently, it was decided to apply a questionnaire with four open questions at the end of the semester, in June 2014. All the thirteen students who attended the CU-ID answered the questionnaire. The option for open questions ensures the collection of a wider set of information, sometimes richer and more detailed. Eventually, open questions could facilitate the emergence of answers with data that were not originally planned ([24] Hill & Hill, 2008).

To analyse students' answers we used content analysis. Content analysis is a set of methodological tools which applies to diverse speeches, based on deduction and inference. *"Il s'agit d'un effort d'interprétation qui se balance entre deux poles, d'une part, la rigueur de l'objetivité, et, d'autre part, la fécondité de la subjectivité"* ([25] Wanlin, 2007, p. 249). Inference is a kind of interpretation which is based on the observation data in order to assess the consequences and the potential generalization ([26] Deshaies, 1997).

This qualitative data analysis involved the development of a process through three chronological phases: pre-analysis; exploration of material and treatment of results; inference and interpretation ([25] Wanlin, 2007).

The second phase of content analysis consisted of the categorization and coding operations starting from the previously defined lines of analysis. In this sense, it proceeded to the definition of the categories, and to the construction of grid analysis and its application to texts produced by students.

In the third and final stage the analysis of the responses obtained was held through an inferential process, starting to group similar answers in the same category. Therefore, we defined *a posterior* categories for a better understanding of the students' opinions about the CU-ID.

The data was treated in a way to be valid and significant. Interpretation of results was based on information gathered from categorization, allowing for a more objective and original reading of the studied object.

The analysis of the students' responses enabled us: (i) to recognize the positive and negative aspects of the curricular unit; (ii) to identify improvement suggestions for future realizations; (iii) to identify the views of the students on the evaluation process; (iv) to better understand their opinion about the study plan.

5   RESULTS

In this section a summary of the opinions expressed by the students in the responses to the questionnaire is presented.

First, the positive aspects that students mentioned related to the CU-ID, are highlighted in Table 2.

Table 2: The positive aspects mentioned by the students related
to the Curricular Unit of Integrated Didactics.

Positive aspects	Frequency
− The guest teachers who evidenced forms of integration (in school project and in their own dissertations)	8
− The lectures with guest speakers who addressed the issue of integration	7
− The simultaneous teaching process always two professors together, which allows for a better articulation between specific didactics	5
− The moments of discussion and analysis of the issues that can be integrated at different areas of the course	5
− The availability of the professors to support the integrated projects	5
− The implications for improving teaching practice	2

Note: Every student mentioned two or three aspects. That is why the total of the answers is greater than the number of the students.

By reading the table, the positive aspects are sufficiently clear. Even so, it is important to highlight that the most frequent ideas were those related to the presence of the guest teachers and the invited speakers (lectures), who in different ways dealt with an integrated curriculum approach. Thus, the openness of the course turned out to be a highly valued aspect.

Once the curricular unit was conceived in order to enable the regular simultaneous presence of at least two professors from the four specific didactics, it also turned out to be an important aspect recognized by 5 students, and another 5 also highlighted the moments of discussion and analysis of integrated issues, which was also a result of the dynamics mentioned above.

The negative aspects given by the students are systematized in Table 3.

Table 3: The negative aspects mentioned by the students related
to the Curricular Unit of Integrated Didactics.

Negative aspects	Frequency
– A certain lack of liaison between the professors in terms of sequencing, articulation, and even in the conception of integration expressed	8
– The articulation between the four areas should have had more examples	4
– More exemplification of strategies and integrator models	4
– The lack of opportunity to expose integration experiences developed by the teachers in training	1
– The absence of the artistic areas	2
– The difficulty to develop all the proposed work (in number and design)	2
– An overloaded schedule for someone who is already a teacher	1

Note: The majority of the students mentioned two negative aspects. This is why the total of frequencies is higher than the sample.

From all the negative aspects mentioned by the students clearly stands out a certain lack of articulation between the professors responsible for the unit. Even knowing that the unit plan was design by the four professors, several inconsistencies were identified by the students. Of course, several reasons can help to justify this situation. It is possible that the involved professors had some different ideas about integration and the impossibility of a permanent four-hand class may have helped to show this fragility. Also, a less positive point was the design plan of the CU-ID, which only favoured links between two areas. The students argued that it would be even more interesting to extend the integration process to more areas at the same time. The other reasons were more focused on the difficulties of someone who is already working. In service teachers normally have considerable difficulties in conciliating their work at schools with the demands of a higher education course. It is also important to mention that two students also wanted to refer to the fact that it would be interesting to extend integration to the artistic areas.

After this evaluation, the students suggested several ways to improve the quality of the curricular unit. They were related to the negative aspects above mentioned as may be seen in Table 4.

Table 4: The suggestions mentioned by the students to improve the quality
of the Curricular Unit of Integrated Didactics.

Improvement suggestions	Frequency
– To present good examples of integration that can be replicated	5
– To improve the articulation of the four areas simultaneously	4
– To include artistic areas	2
– To present models of integrated curricula	1
– To give more time in class to carry out the work requested	1

All the suggestions are in fact relevant, excluding the integration of the artistic areas. In Portugal, in the 2nd cycle of schooling, the artistic areas are not so present as they are at the 1st cycle of basic school. Therefore, to act on this suggestion, the entrance requirements and qualifications for the course would have to change, excluding the teachers from the 2nd cycle, which we think would be

negative, since the contact between teachers of the first two cycles of schooling frequently with different models of teacher training, was also considered a very positive aspect.

Finally, the evaluation model was considered appropriate by six students. Another three mentioned that assiduity should be included in this process and a further two that the unit had too many tasks and that the design of the integrated project would be sufficient. Moreover, two students did not answer this question.

6   CONCLUSIONS

With this paper we present the first evaluation of the new Master's Course in "Integrated Didactics in Mother Tongue, Maths, Natural and Social Sciences. As it is possible to note, curricular integration is not an easy approach. In our institution it was not the first time that an experience of integration was implemented. Seminars that help the teaching practice of our students in real contexts have tried the articulation of different curricular areas. Also, several small courses with similar objectives were implemented in the past, like those relating Science and Language or Science and Art. However, the present experience was quite different in time and deepening.

This is why this experience was a very challenging one. All the professors responsible for the curricular units had a disciplinary education, and many hesitations and inconsistencies occurred during its implementation. But globally, we think that the challenge was worthwhile, considering students' opinions and our own perceptions.

At the conclusion of this evaluation process, we consider that we have a basis to implement several changes in the next course which will take place in the current year (2015/2016).

We hope that the description of this process can also help other professors from other institutions who want to promote and design similar courses, helping to highlight the advantages of curricular integration as a better way of promoting teacher education.

REFERENCES

[1]   Pacheco, J., Flores, M., & Paraskeva, J. (1999). Marco epistemológico. In J. A. Pacheco (Org.). Componentes do processo de desenvolvimento do currículo. Braga: Livraria Minho.

[2]   Lawton, D. (1981). Models of planning. In P. Gordon (Ed.). The study of curriculum (pp. 105-113). London: Batsford Academic & Educational, Ltd.

[3]   Pacheco, J. (2001). Currículo: Teoria e práxis (2ª ed.). Porto: Porto Editora.

[4]   Phenix, P. (1962). The uses of disciplines as curriculum content. In A. Passaow (Ed.), Curriculum crosswords (pp. 57-65). New York: Teachers College Press.

[5]   Beauchamp, G. (1981). Basic components of a curriculum theory. In H. A. Giroux (Eds.). Curriculum & instruction: Alternatives in education (pp. 63-68). Berkeley: McCutchan Publishing Corporation.

[6]   Sacristán, J. (2000). O currículo: Uma reflexão sobre a prática (3ª ed.). Porto Alegre: Artmed. (Original work in Spanish published in 1991)

[7]   Tyler, R. (1949). Basic principles of curriculum and instruction. Chicago: The University of Chicago Press.

[8]   Taba, H. (1962). Curriculum development: Theory and practice. New York: Harcourt Brace and World, Inc.

[9]   Traldi, L. (1984). Currículo: Conceituação e implicações; metodologia de avaliação; teoria e prática; formas de organização; supervisão (2ª ed.). São Paulo: Editora Atlas S. A.

[10]   Johnson, M. (1980). Definições e modelos na teoria do currículo. In R. Messick et al. (Eds.). Currículo: Análise de debate (pp. 13-32). Rio de Janeiro: Zahar.

[11]   Grundy, S. (1987). Curriculum: Product or praxis? London: The Falmer Press.

[12]   Roldão, M. (1999). Os professores e a gestão flexível do currículo: Perspectivas e práticas em análise. Porto: Porto Editora.

[13] Schawb, J. (1978). The practical: A language for curriculum. In D. E. Orlosky & O. B. Smith (Eds.), Curriculum development: Issues and insights (pp. 18-27). Chicago: Rand MacNally College Publishing Company.

[14] Stenhouse, L. (1981). An introduction to curriculum research and development. London: Heinemann Educational Books Ltd.

[15] Morin, E. (2001). L'enseignement des connaissances. In Fundação Calouste Gulbenkian (Ed.), Novo conhecimento nova aprendizagem (pp.25-33). Lisboa: Fundação Calouste Gulbenkian.

[16] Hernández, F., & Ventura, M. (1998). A organização do currículo por projetos de trabalho: O conhecimento é um caleidoscópio (5ª ed.). Porto Alegre: Artmed. (Original work in Spanish published in 1996)

[17] Jacobs, H. (1989). The growing need for interdisciplinary curriculum content. In H. H. Jacobs (Edit.). Interdisciplinary Curriculum. Design and implementation (pp. 1-11). Alexandria, VA: Association for Supervision and Curriculum Development.

[18] Beane, J. A. (2000). O que é um currículo coerente? In J. A. Pacheco (Org.). Políticas de integração curricular. Porto: Porto Editora.

[19] Kysilka, M. (2014). Understanding integrated curriculum. The Curriculum Journal, 9 (2), 197-209.

[20] Reis, C. (Coord.). (2009). Programas de Português do Ensino Básico. Lisboa: Ministério da Educação.

[21] Jorba, J., Gómes, I. & Prat, A. (2010). Hablar y escribir para aprender. Barcelona: Editorial Sintesis.

[22] Osborne, J. & Dillon, J. (editors)(2010). Good Practice Science Teaching, what research has to say (2ª Ed.). England: Open University Press – McGraw Hill Education.

[23] Wellington & Osborne (2001). Language and Literacy in Science Education. Philadelphia: Open University Press.

[24] Hill, M. & Hill, A. (2008). Elaboração de projectos sociais. Casos Práticos. Porto: Porto Editora.

[25] Wanlin, P. (2007). L'analyse de contenu comme méthode d'analyse qualitative d'entretiens: une comparaison entre les traitements manuels et l'utilisations de logiciels. In Actes du colloque Bilan et Prospectives de la Recherche Qualitative (pp. 243-272). Montpellier: Association pour la Recherche Qualitative.

[26] Deshaies, B. (1997). Metodologia da investigação em ciências humanas. Lisboa: Piaget.