

INTERDISCIPLINARITY IN THE 1ST CYCLE OF BASIC EDUCATION: TEACHERS' PERCEPTIONS AND PRACTICES

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Abstract

Interdisciplinarity is a complex and difficult concept to encapsulate. However, generally speaking, it is recognized to be characterized by a combination of knowledge from various areas, congregated to address a particular issue. Hence, it is particularly promising in the 1st cycle of basic education (CEB) [years 1-4 of schooling], at an educational level where a single teacher works different curricular areas. It is thus necessary to articulate the different content, in order to develop a more complete and whole view of knowledge.

The purpose of this communication, therefore, is to reveal an empirical study whose aim is to understand the importance and the meaning that 1st CEB teachers give interdisciplinarity, how often it is carried out, the main difficulties encountered, experiences and the most widely used resources and the curriculum areas where interdisciplinary practices are most evident.

For this, a descriptive methodology was used with a survey by questionnaire administered to a representative sample of 45 1st CEB teachers working in a school group in the municipality of Viseu (central region of Portugal). The vast majority are women with over twenty years of service and whose academic qualification is an honour's degree.

The data obtained indicate that teachers' general understanding of interdisciplinarity is in line with what Piaget [1] refers, in particular, as a reciprocal exchange and integration between the various disciplines resulting in enriching all of them. It is also in line with Japiassu [2] as a process in which there is an interaction and corresponding influence of some subjects on others. Interdisciplinarity is considered very important by most responding teachers and taken into account in their teaching, although with variable frequency, and it is included in most group plans.

Schools and teachers, in particular, are now faced with the need to help their students develop intelligibility frameworks of the real so that they can integrate the diversity of information from different media. The implementation of interdisciplinary practices appears as a relevant strategy, facilitating a more effective pedagogical action, able to respond to the current demands of society.

Keywords: Interdisciplinarity, 1st cycle of basic education (CBE), teachers, teaching practice.

1 INTRODUCTION

Primary education provides students with a first contact with a formal model of learning, being a crucial stage in their school path. This learning level presupposes a specificity that sets it apart from other levels, as it encompasses four years of schooling and is characterised by the existence of a single teacher. This level is marked by the integration of knowledge, given that the teacher addresses different subject areas.

In this context, taking into account that knowledge is becoming increasingly specialised, the teacher must connect the topics covered, if possible, by means of practice by pupils, in order to promote learning. To this end, interdisciplinarity is crucial [3].

Interdisciplinarity is undoubtedly one of the most complex concepts, being difficult to define and lacking a solid definition [4]. Guided by an evolutionary and chronological perspective on the notion, we define it according to Piaget [1], as a mutual exchange and reciprocal integration among a variety of branches of knowledge. This cooperation results in reciprocal enrichment.

Berger [5] complements this definition, describing this notion as the "interaction between two or more subjects", highlighting that it "can range from a mere expression of ideas to the mutual incorporation of

the guiding concepts, epistemology, terminology, methodology, procedures, data and arrangement of the corresponding research and education” (p. 21).

Although a single epistemological meaning is yet to be acknowledged, Japiassu [2] regards it as a process marked by mutual interactivity, i.e. all subjects covered by the process must influence and be influenced by the others. This process must allow generalisation and implementation of methods and techniques among different subjects.

Interdisciplinarity consists of a combination of branches of knowledge, assembled to study a given issue, i.e. only by linking these branches can a given problem be solved. This concept requires a contribution from two or more subjects, through the comparison of ideas and methods. Interaction among subjects is aimed at achieving a unified approach to knowledge.

The importance of interdisciplinarity in students’ learning, as well as the contribution of this approach toward a better understanding of reality, has been emphasized by several authors, some of whom we highlight.

Pombo et al. [6] stresses the fact that this teaching practice promotes the connection of subject knowledge, linking distinct branches of knowledge and merging a variety of views to analyse real problems, with less effort and even a better resource management. In this respect, Brown [7] highlights that this procedure makes contact with a variety of branches of knowledge easier and that pupils must be exposed to the content of combined subjects in order to form a coherent whole. In his turn, Gusdorf [8] emphasises the importance of interdisciplinarity in tackling global problems, whereas Vaideanu [9] considers that it allows a better approach to forming attitudes, skills and intellectual capacities that are crucial to each individual.

These definitions make us state that, by thinking about and analysing interdisciplinarity, we perceive an education guided toward an all-inclusive training of the student, leading him to increasingly specialised levels of integration into the world, in order that he is able to tackle global problems life presents, being thus able to produce knowledge, contributing to social innovation and resolution of the problems the different social groups face [10].

Pacheco [11] believes that “interdisciplinarity does not break away from subjects and merely seeks to address curricular content based on the incorporation or overall view of the different subjects” (p. 84). It is hence a strategy that helps the teacher in the transmission of knowledge and students in concept learning. Based on a constructivist learning theory, interdisciplinarity gives students a greater role. Students are an active element in the search for knowledge, which is unified by the contribution from the different subject areas [12].

Nevertheless, and although primary education is considered a particularly promising level of education, there are several obstacles that hinder the implementation of interdisciplinarity; some of the obstacles have an epistemological and institutional nature, and others a psychosocial and cultural nature, which are expressed in the attitudes of individuals; there are still methodological barriers in so far as interdisciplinary practice requires preparation and a new pedagogy [13].

In fact, this approach must be planned and included in an organised plan (e.g. the Class Plan), preferably involving teamwork amongst teachers, so that it contribute to a significant teaching/learning and provide a global, inclusive and critical education process.

2 METHODOLOGY

2.1 Research design

This research is aimed at gaining insight into the perception of teachers on interdisciplinarity in primary education, given its relevance to the understanding of teachers’ receptiveness to this practice. To that end, a descriptive methodology was used [14], adopting a survey by questionnaire.

The following goals were defined: *i)* gaining insight into the importance and meaning teachers attach to interdisciplinarity; *ii)* knowing the frequency of its use; *iii)* identifying the main obstacles to its materialization; *iv)* identifying the most commonly used experiences and resources to promote interdisciplinarity; *v)* knowing the subject areas in which interdisciplinary practices are more evident.

2.2 Participants

The target population of this study consists of teachers of the 1st CBE of one grouping of public schools in the municipality of Viseu (centre region of Portugal), an estimated total of 68 primary teachers. They were selected for practical reasons of facility of access to the subjects.

Of the total number of participants, 45 forms were filled in properly, and the rate of answers corresponded to 66.1%. It constitutes a convenience sampling, the majority being female (82.2%), ranging from 35 to 59 years old, holding a bachelor's degree (88.9%) and having a significant working experience, given that a large number (46.7%) has taught for over 25 years.

2.3 Data collection tool

Data collection was conducted through a questionnaire developed for this purpose. The tool we elaborated is divided into two sections: the first is composed of four closed-ended questions and regards data for the personal and professional characterisation of respondents, whereas the second is composed of eight questions, seven being multiple-choice questions and one being an open-ended question [15].

The preliminary version of the questionnaire was assessed by two PhD-qualified experts, one in the field of primary education and another in Education Sciences, mostly to detect possible faults or inconsistencies.

2.4 Procedure

Following completion of the questionnaire, we submitted the questionnaire to the Directorate-General for Education for approval, requesting permission for its implementation in schools. This request was granted, given that, as mentioned, it meets the requirements that are essential to their execution.

We also requested permission to the group of schools where we carried out the study, in order to obtain approval for the use of the questionnaire. Once we were granted the corresponding authorisation, we visited each school, meeting teachers in person. This process took a few days, as schools are relatively far from one another. On the whole, teachers were receptive, showing a clear understanding of the form.

2.5 Data analysis

The quantitative data analysis was performed using descriptive statistics, including the analysis of absolute and relative frequencies. In order to analyse the data from the open-response question, we resorted to content analysis, defined by Bardin [16] as "a set of analysis techniques to obtain communications by systematic and objective description of message content" (p. 42). Its categorization was based on the current Program of First Cycle of Basic Education.

3 RESULTS AND DISCUSSION

3.1 Importance and meaning teachers attach to interdisciplinarity

Interdisciplinarity is considered extremely important (44.4%) or very important (26.7%) by most teachers surveyed, and none selected the option "not important at all". Nonetheless, one of the teachers finds that interdisciplinarity is not very important, which goes against the view of several authors, particularly Vaideanu [9], who defends that interdisciplinarity is the best approach to forming attitudes, skills and intellectual capacities of learners.

We also observed that teachers pointed all definitions, but two were preferential, with a similar percentage. Firstly, teachers (35.5%) chose Piaget's definition [1], who regards interdisciplinarity as a mutual exchange and reciprocal integration of several branches of knowledge, resulting in a reciprocal enrichment. The definition by Japiassu [2], according to whom interdisciplinarity is a process marked by mutual interactivity, i.e. all subjects covered by the process must influence and be influenced by the others, was chosen by 31.6% of respondents. These results strengthen the idea that interdisciplinarity is a polysemic concept, regarding which there is no solid definition.

3.2 Frequency of implementation of interdisciplinarity in the classroom and difficulties encountered

Most teachers surveyed state that they apply interdisciplinarity often (40.0%) or very often (38.8%). It is worth emphasizing that 11.1% acknowledge that they use it always or almost always. Yet it is observed that there is an equal percentage (11.1%) of teachers who seldom use interdisciplinarity. None of the respondents selected the option "never".

Difficulties pointed out by teachers from primary education surveyed are, in descending order of importance, the scope of the curriculum for primary education, relevance attached to exam preparation, heterogeneous classrooms, the high number of students per classroom, the distribution of the number of hours by subject areas, lack of resources and absence of proper training.

The two first difficulties pointed by teachers surveyed were the scope of the curriculum of primary education and the importance attached to exam preparation. Most teachers agree (37.8%) or totally agree (44.4%) that the scope of the curriculum of primary education is an obstacle to the implementation of interdisciplinarity. Similarly, teachers agree (40%) or totally agree (31.1%) that the requirements for exam preparation are an important obstacle that must be taken into account.

Nonetheless, interdisciplinarity may be a solution to both situations, given that interdisciplinary practices must be conceived according to the content intended to be taught in the different areas, in an integrated manner. Therefore, all subject areas could work together using comprehensive themes to make better use of time [17].

The absence of proper training is the difficulty that teachers value the least. Most respondents totally disagree (37.8%) or disagree (24.4%) with the fact that this lack represents a barrier to the implementation of interdisciplinarity, which may reflect the tendency to associate difficulties in the implementation of interdisciplinarity to reasons unrelated to individuals.

3.3 Most commonly used educational strategies in interdisciplinary practices

When questioned about the most commonly used educational strategies/resources in interdisciplinary practices, teachers indicated several options. Nearly all teachers mention the use of integrative texts in interdisciplinary practices very often (60%), often (28.9%), or even always or nearly always (11.1%).

Most teachers state that they use teamwork to implement interdisciplinary practices very often (44.4%), often (44.4%), or even always or nearly always (4.4%).

Educational games are mentioned in similar percentages, being used by teachers often (46.7%), very often (22.2%), always or nearly always (6.7%), as well as research, which is reported as being frequently used by more than half of the sample (51.1%) and used very often by one-fourth of the sample (20%), or always or nearly always (4.4%).

As for the arrangement of the classroom, most teachers state that this strategy is frequently used (35.6%), very frequently used (28.9%), or always or nearly always used (4.4%). Nonetheless, 28.9% of professionals surveyed admit that this type of strategy is rarely used.

Field trips were mentioned by more than half of the sample as an interdisciplinary methodology rarely used (57.8%) or even not used at all (6.7%). This is probably due to the fact that field trips are not financed and to the responsibility and complexity associated thereto.

3.4 Subject areas in which interdisciplinary practices are more evident

Teachers consider Portuguese the subject area in which their interdisciplinary practices are more evident, i.e. very clear (75.6%), clear (13.3%) or totally clear (11.1%). This is followed by Social Studies, which is regarded by teachers as a field in which their use is extremely clear (60%), totally clear (24.4%) or clear (15.6%).

A large part of teachers states that Mathematics is a subject area in which their interdisciplinary practices are clear (51.1%), very clear (33.3%) or totally clear (4.4%). Nonetheless, 4 teachers (8.9%) admit that these practices are not very clear in this field.

As for Arts Expressions, 44.4% of the teachers surveyed assert that, in this area, interdisciplinarity is very clear. With the same percentage, 26.7% of the sample state it is totally clear and 26.7% admit it is clear.

In short, as regards to the curricular areas where interdisciplinary practices are more evident, Portuguese stands out because of its transversality compared to other curricular areas, followed by Social Studies, Mathematics and Art Expressions, in descending order.

3.5 Report of an example of interdisciplinarity

When teachers were asked to report a situation illustrating interdisciplinarity as a working methodology, answers varied significantly (see Appendix A). Of total participants, only 28 teachers (62.2%) answered this open-ended question. Issues related to physical/natural aspects and human/social aspects were the most mentioned by teachers, for being aspects where knowledge exchange is more favourable in the three fields (Portuguese, Social Studies and Arts Expression). These fields are also classified as those in which the use of interdisciplinarity is more manifest, possibly because it is easy to find integrated texts and information on a given topic.

Themes connected to mathematics and technology were the least mentioned, probably due to the fact that mathematics is usually regarded negatively from an early age. Nonetheless, Ponte [18] defends that “students must have a genuine mathematical experience, by dealing with mathematically rich contexts and ideas and using mathematical concepts in the interpretation and shaping of current social situations” (p. 1).

Although new technologies are considered important and a means of information based on the shared construction of knowledge in teaching-learning [19], they were not mentioned very often by the teachers surveyed.

Regarding activities illustrating interdisciplinarity, most teachers described activities of development of communication contexts, which is in line with what was previously observed, in which Portuguese is the subject area where interdisciplinary practices are more manifest, given their cross-disciplinary application in comparison with the remaining subject areas (Appendix B). Activities for the development of expression techniques were also the most commonly mentioned by teachers, a result which is in accordance with the fact that the field of Arts is one of the areas frequently chosen for interdisciplinary practices.

4 CONCLUSION

School, and teachers in particular, nowadays face new requirements arising from the evolution of modern societies. Interdisciplinarity appears as one of the most relevant, at a time when specialisation has deeply influenced education, increasingly fragmenting knowledge. The teacher must develop an ever-increasing holistic perception of knowledge, which presupposes having an open mind toward a new perception of education.

Teachers are currently called on to help students develop general frames of intelligibility of reality in order to incorporate the variety of information coming from different means of communication. Moreover, it is also important to develop local, regional summaries of knowledge, susceptible of providing a broad, gradually expanded view of human and natural reality [6].

As primary education is marked by a single teacher working on the different subjects and content thereof, it is possible to link contents among themselves, enabling a better acquisition of skills throughout the educational process. Therefore, materialisation of interdisciplinary practices seems to be a relevant and facilitative strategy to more effective educational action.

Nonetheless, although teachers acknowledge the importance of interdisciplinarity, materialisation of interdisciplinary practices requires not only the development of a better conceptualisation of the notion of interdisciplinarity but also a rethink of the way of implementation of the teaching-learning process, which inevitably includes the differentiation of methods, strategies and new experiences, able to regulate students' learning [20].

In fact, teachers point several difficulties in the effective implementation of interdisciplinary practices, referring not need training devaluing the importance professional training, which shows that there is still much work ahead to improve organisation and planning of these practices, so that this aspect may be regarded by teachers as an approach that, besides contributing to meet the requirements of the curriculum and programmes, enriches the full training of students.

This study has limitations, due to the fact that all teachers surveyed belong to a group of schools from the municipality of Viseu (centre region of Portugal). Therefore, our conclusions cannot be generalised

to cover population as a whole, being restricted to our sample. It would be very interesting to broaden research to other populations, in order to check whether results reflect the current perception of teachers.

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Appendix A - Themes more mentioned in interdisciplinarity practices

Category	Subcategory	Indicators	N	%
Physical/natural aspects	Animals	Domestic and wild animals	5	14,3
		Habitat and coating	2	5,7
	Plants	Flowering and growth	1	2,9
		Plants germination	2	5,7
		Herbarium	1	2,9
		Characteristics of plants	1	2,9
	Food	Health food	3	8,6
		Types of food	2	5,7
	Stars	Solar System	2	5,7
		Earth movements	1	2,9
	Hydrography	Rivers	1	2,9
Physical states of water		1	2,9	
Subtotal			22	62,9
Human/social aspects	Festivities	Children's Day	1	2,9
		Celebration April 25	2	5,7
		Festive days	1	2,9
	Transport means	Types of transport means	1	2,9
		Road Safety	1	2,9
	Trading	Commercial transactions	1	2,9
Subtotal			7	20,0
Mathematics and technology aspects	Geometry measurement and	Geometric figures	1	2,9
		Tangram	1	2,9
		Angles	1	2,9
	Numbers operations and	Composition numbers and decomposition	1	2,9
	Organization processing of data and	Venn diagram	1	2,9
Information communication technologies and	Using email	1	2,9	
Subtotal			6	17,1
Total			35	100,0

Appendix B – Illustrative activities of interdisciplinary practices

Category	Subcategories	Indicators	N	%
Exploration expression techniques	Expression and Plastic Education	Painting	4	5,3
		Cut, Collage Folding	4	5,3
		Posters	4	5,3
		Drawing	4	5,3
		Stamping (digitinta)	1	1,3
	Buildings (Tangram, mobile)	2	2,7	
	Expression and Music Education	Voice (singing songs)	3	4,0
Expression and Dramatic Education	Dramatic games	2	2,7	
Subtotal			24	32,0
Exploration of communication situations	Verbal Communication	Visualization slides (PowerPoint)	7	9,3
		Debate	6	8,0
		Reading and exploration of texts	14	18,7
		Presentation of works to the class	1	1,3
	Written Communication	Resolution of worksheets	2	2,7
		Creating / writing problem situations	2	2,7
		Writing	5	6,7
		Knowledge systematization (development schemes, pictures, synthesis etc.)	1	1,3
Subtotal			38	50,7
Exploration experientials situations	In the classroom	Experimental teaching	2	2,7
		Handling of laboratory equipment	1	1,3
		Exploitation of the Tangram	1	1,3
		Games	2	2,7
	Outside classroom	Study visit	1	1,3
		Web search	4	5,3
		Collect seeds	2	2,7
Subtotal			13	17,3
Total			75	100,0