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RESEARCH ARTICLE

Faculty Perception of a Multidisciplinary Experience: Art and Science in an Education Degree Program

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Abstract

This article presents an experience carried out by the faculty of the third year of the Infant Education degree at the Ramon Llull University in Barcelona (Spain). A proposal for multidisciplinary intervention that joins two modules: one for arts (musical, body, and visual education) and another for sciences (mathematics, and experimental and social sciences). The intervention stems from a generating idea—the book "Alice in Wonderland"—which allows for connections between the contents of the modules, involves co-teaching, multidisciplinary work, and shared evaluation experiences. The aim of the study is to get to know the perception of the participating faculty about the changes in the didactic components involved in the experience. For data collection, semi-structured interviews were carried out at three moments of the process and a discussion group at the end. The analysis of the data shows that the experience has been rich in terms of the multidisciplinary approach, shared teaching, growth of creative competence, the student´s cooperative work and leadership capacity. Weaknesses reside in the assessment process and difficulties finding adequate time and space to prepare and implement the proposal.

Keywords:
multidisciplinary, shared teaching, creative process, faculty training, didactic components.

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Percepción del Profesorado sobre una Experiencia Multidisciplinar: Arte y Ciencias en un Grado de Educación

Resumen

El presente artículo presenta una experiencia llevada a cabo por el profesorado del tercer curso del grado de Educación Infantil de la Universidad Ramon Llull de Barcelona (España). Una propuesta de intervención multidisciplinar, en la que se unen dos módulos: uno de arte (educación musical, corporal, visual y plástica) y otro de ciencias (matemáticas, y ciencias experimentales y sociales). La intervención parte de una idea generadora –el libro *Alicia en el País de las Maravillas*– que permite establecer conexiones entre los contenidos de los módulos, conlleva experiencias de codocencia, trabajos multidisciplinarios y evaluación compartida. El objetivo del estudio es conocer la percepción del profesorado participante sobre los cambios en los componentes didácticos que comporta la experiencia. Para la recogida de datos se realizaron entrevistas semiestructuradas en tres momentos del proceso y un grupo de discusión al final. El análisis de datos muestra que la experiencia ha sido rica en cuanto a la propuesta multidisciplinar, la docencia compartida y el crecimiento de la competencia creativa, el trabajo cooperativo y la capacidad de liderazgo de los estudiantes. Las debilidades se centran en la evaluación y en las dificultades para disponer de tiempo y espacios adecuados para preparar e implementar la propuesta.

Palabras clave:

multidisciplinariedad; docencia compartida; proceso creativo; formación del profesorado; componentes didácticos.

Percepção dos professores sobre uma experiência multidisciplinar: arte e ciências em um curso de Educação

Resumo

O presente artigo apresenta uma experiência realizada pelos professores do terceiro ano do curso de graduação de Educação Infantil da Universidade Ramon Llull de Barcelona (Espanha). Uma proposta de intervenção multidisciplinar, em que se unem dois módulos: um de arte (educação musical, corporal, visual e plástica) e outro de ciências (matemáticas, e ciências experimentais e sociais). A intervenção parte de uma ideia geradora –o livro *Alícia no País das Maravilhas*– que permite estabelecer conexões entre os conteúdos dos módulos, acarreta experiências de docência compartilhada, trabalhos multidisciplinares e avaliação compartilhada. O objetivo do estudo é conhecer a percepção dos professores participantes sobre as mudanças dos componentes didáticos que a experiência comporta. Para o levantamento de dados, realizaram-se entrevistas semiestruturadas em três momentos do processo e um grupo de discussão ao final. A análise de dados mostra que a experiência tem sido enriquecedora em termos de proposta multidisciplinar, de docência compartilhada e de crescimento da competência criativa, o trabalho cooperativo e a capacidade de liderança dos estudantes. As fraquezas centram-se na avaliação e nas dificuldades para dispor de tempo e espaços adequados para preparar e implementar a proposta.

Palavras-chaves:

multidisciplinariedade; docência compartilhada; processo criativo; formação de professores; componentes didáticos.

Introduction

In the 2009-2010 academic year, the Facultat de Psicologia, Ciències de l'Educació i de l'Esport Blanquerna (FPCEE-Blanquerna) started, for the first time, the degrees in Infant (Preschool) and Primary Education presenting a curriculum characterized by a modular structure, which allows working on different subjects sharing common objectives and evaluation instruments. The modules emphasize the development of competencies to be acquired by future teachers rather than the acquisition of content traditionally associated with each subject.

One of the modules developed during the third year of the Infant Education degree is the interdisciplinary artistic project: music, visual arts, and body expression. After three years of being a solo project, in the 2013-2014 academic year, the science module (Learning of Nature Sciences, Social Sciences, and Mathematics)–also from the third year— was incorporated into the artistic project. Thus, the Multidisciplinary Arts and Science Project emer-

ged from the intersection of these two modules. During the 2013-2014 academic year, the number of participants in the project was of 48 students, organized according to the activity in groups of 24. The project was carried out during the second four-month period, with four weekly sessions.

With the purpose of facilitating the integration of the different subjects into the project, the proposal was to share a generating idea that would allow establishing connections among the contents that were worked from the arts (music, visual arts, and body expression) and from the sciences (social and natural, and mathematics). The theme and introductory text were Lewis Carroll's *Alice in Wonderland*.

The studies carried out in the setting of the European Higher Education Area (Hernández, Rosário & Cuesta, 2010; Hernández, Rosário, Cuesta, Martínez & Ruiz, 2006) have highlighted the need for students to be able to carry out autonomous and self-regulated learning in order to achieve the required competencies and increase the quality of their learning. We consider that the multidisciplinary arts and science project (hereinafter, Project) is included in this paradigm.

In the same vein, Gargallo, Garfella, Sahuquillo, Verde & Jiménez (2015) underline the influence of a student-centered teaching methodology for improving the quality of learning. To place students in a creative situation and make them the main agents of their proposal means to focus on this autonomous, significant, multidisciplinary, and contemporary learning.

The objective of this work is to know the perception of the participating faculty regarding the changes in the didactic components of the Project. Appreciating the changes in these components through the faculty's point of view engages them in a process of reflective practice. This objective is established by the following:

- To describe the evolution of the faculty's perceptions during the Project implementation
- To collect the improvement proposals from the faculty at the end of the Project

The Project: The Multidisciplinary Arts and Science Project

The Project was organized into two different parts. During the months of February and March, the contents of each subject were developed in sessions organized and implemented by a single professor (music, visual arts, body expression, natural and social sciences, and mathematics sessions), alternated with collective sessions, shared by two or more professors. The second part of the Project took place during the months of April and May; it is the moment in which each group of students propose an artistic action (performance) from a generating idea, enter into a creative process, and finish with a multidisciplinary staging (music, video, theatre, dance, scenography, costumes, space...). At the same time, they plan a didactic proposal to carry out in the preschool that enables a global work where arts and sciences meet.

The collective sessions of the first part of the course addressed different concepts taken from the book *Alice in Wonderland*, such as identity, transformation (of oneself and the environment) or chronological time. In these sessions, proposals of learning environments are proposed, in the sense of interactive contexts in which learning occurs as a consequence of different teaching methods (Baeten, Dochy, Struyven, Parmentier & Vanderbruggen, 2016; Duarte, 2003).

During the second part of the Project, each group of students chose a topic (not necessarily related to the book) as the engine of their proposal, for example: Mourning, dreams, loneliness, projections, blue, roads, etc. This allowed them to enter a process of intense creation that led them to the execution of a *performance*, and later to applying this topic in preschools, in the format of a multidisciplinary educational proposal in which the five disciplines must be present.

With regard to the evaluation instruments, both modules involved in the Project share two evaluation evidences: a first work called *Connectors*, in which the students have to relate the contents worked from the different subjects, and the *Multidisciplinary Educational Proposal* that concludes the Project.

Beyond the Disciplines

The professors of the Project share the conception of knowledge called *pertinent* by the philosopher Morin (2001). This is a knowledge capable of contextualizing information so that it acquires mea-

ning, which seeks to understand totality, which recognizes the multidimensionality of complex units (such as the human being or society), and which faces complexity; the interdependent, interactive and inter-retroactive fabric between the object of knowledge, the context, the parts and the whole, the whole and the parts, or the parts among themselves. There is also a shared conviction that education divided into disciplines, subjects and courses does not respond to the training needs of today's society, and even less so, of future teachers, who must guide their students so that they understand the global, multidimensional and complex reality.

Disciplinarity, multidisciplinarity, interdisciplinarity, and transdisciplinarity are four arrows fired at the same time from the same arc: Knowledge (Nicolescu, 1998). The metaphor offered by Nicolescu (1998) underlines the need to work from the disciplines and, simultaneously, to look for the different ways of relating them in order to achieve the progress of knowledge.

In the interdiscipline, the boundary between disciplines is crossed, but the goal—the objective—still remains within the framework of disciplinary research. On the other hand, in multidiscipline, neither the object of study nor the methods are modified; instead, several disciplines work together to serve a single project or objective providing their specific vision (Nicolescu, as mentioned in Morin, 2012).

Morin (2016) updates the theses on transdisciplinarity and warns about the lack of recognition of complex problems and the transmission of fragmented knowledge in schools and universities. With regard to the different stages of the education system, Morin (2016) stresses that children spontaneously use their synthetic and analytical capacities by perceiving the links between knowledge. For this author, adults are the ones who create separate entities that promote learning in isolated categories. For this reason, primary school would allow us to try unifying thinking based on the big questions (what are we, where do we come from, where are we going); while the secondary education stage would be the moment where the humanities culture and the science culture meet. The university should counteract the trend towards professionalization, technification, and economic profitability in order to recover its historical role of conveying and renewing the collective cultural heritage.

Working under this premise presupposes focusing on teaching itself, and the role that the faculty plays in it (López, Pérez-García & Rodríguez, 2015). This process entails a drastic change in different aspects: programs, organizational variables, class dynamics, shared evaluation, the role of the faculty and students, etc., which places university education in a transforming dimension and with the capacity to respond to the different demands of the new society (Pozuelos, Rodríguez & Travé, 2012). In this sense, Martínez and Prats (2018) propose action measures to renew the role of university lecturers in a teaching context centered on the student's learning process. The first of these measures to be implemented is to integrate into teaching practice methodologies that promote collaborative learning, the learning-to-learn competency, and research-based learning. The representatives of the European Higher Education Area (EHEA, 2018) also encourage universities to create interdisciplinary programs, and to combine forms of academic learning with those based on professional practice. At the same time, they affirm that research should be present at all levels of higher education in order to develop a critical and creative attitude in students.

Co-teaching in Teacher Training

Education in the *21st century* demands a clear path towards teaching in teams (*team teaching*, co-teaching, collaborative teaching, etc.), with well-designed corporate work based on competencies and with methodologies that promote the involvement of students in the learning process. Team teaching offers students a more significant learning and, at the same time, increases the quality of attention given to the learner. For Acaso (2015), the improvement of the attention devoted to the students involves the evolution from an industrial education to a handmade one, which values quality over quantity, based on the care of students over the sanction. To achieve these changes, the learning community must be balanced: Including a small number of students and a faculty working as a team, since networks built among professors increase creativity, innovation,

motivation, plurality, and transdisciplinarity.

Co-teaching or collaborative teaching involves the participation of a team in the classroom, made up of two or more professors from different specialties. The professors teach collectively and are significantly involved in the teaching process, exploring new methodologies, and sharing the same physical space. In his analysis of European education systems, Schleicher (2015) concludes that the most effective systems have transformed traditional school organization: regrouping faculty and educators (promoting teamwork from the core); regrouping students (organizing groups under different criteria); rethinking schedules (to achieve longer and more flexible periods), and expanding pedagogical repertoires (research, collaborative work, learning through real problems, etc.).

According to Dugan and Letterman (2008), shared teaching can take different shapes; e.g., two professors teaching simultaneously in one course (*co-teaching*), two professors alternating teaching (*alternate*), or groups of professors working together in the planning of a course and where each member is responsible for teaching a part of the course (*team teaching*). Suárez-Díaz (2016)–based on the works of Cook (2004), Sileo (2011), and Beninghof (2012)–goes further and describes the six possible approaches to co-teaching. Thus, based on the degree of interaction among co-professors, she distinguishes the following approaches: One teaches, one observes; one teaches, one assists; parallel teaching; teaching stations; alternative or differentiated teaching; and team teaching (Suárez-Díaz, 2016). It becomes evident that the model is, by no means, unique and allows each group of professors to prepare their own proposal according to their interests and teaching needs.

With its three components: Co-planning, co-education, and co-evaluation (Conderman & Hedin, 2012), co-teaching allows professionals who share teaching to combine their knowledge and skills in order to create learning environments in which teaching is rigorous but flexible (Friend, 2008). Students participating in the research presented by Friend, Cook, Hurley-Chamberlain & Shamberger (2010) said according to an informant: "Co-teaching breaks paradigms, not only for the professor, but also for the student. [...]. It is difficult to get used to this system, because it forces you to question many schemes." (p.7).

In the university setting, co-teaching is a way of offering a model of collaborative practice to students, and, at the same time, of bringing the professors themselves closer to an understanding of reality, of the benefits and challenges posed by the different forms of collaboration for which we are preparing future teachers (Winn & Blanton, 1997). To implement the different models of co-teaching at the university, Professors Kluth, Straut & Douglas (2003) highlight three necessary conditions: An interdisciplinary curriculum that allows professors to work collaboratively (even when they do not share the same classroom), common objectives, and a shared evaluation process.

Based on their own experience, Kluth et al. (2003) provide a series of recommendations to university professors and schools of education interested in promoting collaborative models. Firstly, they suggest showing different forms of collaboration as an example for students, since there is evidence that they tend to apply, in their practice, the models of collaboration that they have experienced at the university. The truth is that schools face logistical difficulties in implementing collaborative models, which is why university programs must show how collaborative and co-teaching models may be diverse and variable.

Second, Kluth et al. (2003) advise explicit collaboration between the professors help students realize that taking risks is easier when shared with a partner. There should be no fear of hiding disagreement between the professors, and a respectful dialogue between different points of view should be shown. Thirdly, these authors underline the importance of seeking institutional support in order to have the necessary space and time conditions: Consecutive time slots and the same space available throughout the development of the Project. Finally, they point out the need to research collaborative experiences themselves: How do they affect student learning? What benefits do they obtain? What is the role of universities in promoting collaborative models?

Creativity in Initial Teacher Training

Another aspect of the new challenges faced by the 21st century education is the state of availability

in which professors must live, open to new proposals, in a state of desire and commitment towards their environment, tolerant to uncertainty, and facing with creativity the educational proposals regarding their students (Cela & Domènech, 2015; Civís, 2017; Marina, Pellicer & Manso, 2015; MECD, 2015; among others).

For Batet, Ponti & Segarra (2015), creativity means approaching a project from different perspectives. For these authors, to establish connections between different realities and to be able to establish links of union where apparently there is nothing in common demand to seek beyond what is known to us. From the Project we propose—by motivating them—to lead the students into a state of reflection, for them to question, think, and open their minds, so that they can find alternatives beyond what is established and known.

According to the ideas presented by Batet et al. (2015), this artistic process involves a bit of magic and debauchery, and a lot of systematic and rigorous work, since it is a continuous appeal between the divergent thinking (open and beyond the canons) and the convergent thinking (focused and disciplined).

To carry out this creative process experienced by students, we propose to them the four stages of a creative process, according to Batet et al. (2015):

- Immersion: Knowing, choosing, searching for information, mapping, and developing an ethnography: In short, acquiring a referential framework.
- Reflection: Organizing the collection of data and the emotions experienced during the immersion.
- Ideation: Generating ideas to create as many creative alternatives as possible, seeking originality.
- Review: Validating the proposals and redirecting them if necessary.

Arts education encompasses a broad spectrum that includes education in movement and music, visual arts, and certain types of literary composition. In addition, from the point of view of arts education, we must consider the ideas presented by Greene (2005, p. 213):

> Aesthetic education understood as the deliberate effort to foster increasingly informed and involved encounters with art [...]. Students and professors seek and question [...] and reflect on their process of choice [...], thus seeking the stimulation of their imagination and perception, the sensitivity to the various modes of vision and creation of meaning, and the foundation in the life situations experienced.

Arts and science meet in this creative paradigm to offer new forms to knowledge, to place us in front of the creative questioning, such that neither judges nor evaluates, but research alternatives, new angles (De Bono, 1994). For Greene (2005): "Professors and students need not only to explain and choose, but also to point to possibilities yet to be exploited: To light the fuse, to explore what the transformation of that possibility could mean" (p. 72). Educating *in* and *from* the arts is a commitment in teacher training: "Arts and education are symbolic contexts that are built on a daily basis and within the daily imagination. Thus, they may happen anywhere. They are not something ineffable, and they are part of the routines of any person." (Abad, 2012, p. 151)

> Education through art will bring professors and students closer to a broader vision of their environment; it will stimulate their creativity; and, above all, it will provide them with stimulating experiences in the relationship of teaching and learning, giving them the option to think from a divergent perspective in which there are no given paths or unique solutions, thus opening up the possibility of building, and discovering in the process the multiple ways of thinking and acting, convinced that we are going to develop sensitivity, intuition, and intelligence (Batlle & Capdevila, 2013).

These approaches have been innovative for both the faculty and the students participating in the Project. This paper presents the vision of the faculty. The vision of the students was collected by the faculty by means of systems of self-evaluation and peer evaluation for each student throughout the process. In the beginning, students put up resistance, because they find themselves facing a proposal for a creative pro-

cess that they see as a confrontation with emptiness, and they express fears and confusion. They demand guidelines and seek the safety of a guided work. Little by little, they discover the advantages of a more open and free option that allows them to be masters of their learning. Along the same lines, Navaridas and Jiménez (2016) emphasize that students with deeper approaches prefer teaching methods that promote constructive and cooperative learning; while students with a more superficial approach, prefer more directive professor-guided teaching.

Method

Design

The research that we present is classified within the socio-critical paradigm. A research-action methodology is used, aimed at approaching the understanding of the changes that take place in the teaching task.

Participants

The sample of participants is made up of the five female professors in the FPCEE-Blanquerna's Infant Education degree involved in the project, all of them committed to the implementation of multidisciplinary work, and in charge of the idea, the design of the activities, and their evaluation. They are professors with more than ten years of teaching experience in their fields, and committed to research: (1) N. B., professor in the area of Visual Arts Education; (2) R. C., professor in the area of Musical Education; (3) R. D., professor in the area of Didactics of Social and Experimental Sciences; and (4) M. P., professor in the area of Didactics of Mathematics. The fifth participant, C. F., professor of body expression, assumed the role of principal investigator, and tried to formulate the questions without conditioning the answers.

Instrument

This research used qualitative instruments, interviews and discussion groups in particular (Del Rincón, 1995). All interviews and the discussion group were recorded in audio and video for further transcription and analysis. The images allow non-verbal information from the speech of each person interviewed to be included in the analysis.

The interview consisted of two open-ended questions that were asked to each participant individually at three different moments in the development of the Project: Before starting it, during the process, and at the end. Thus, 12 interviews were recorded. This way of applying the instrument was intended to observe the evolution in participants' perceptions as the process progressed. The timeframe of the Project when the interview was conducted required adapting the question formulation.

> *Q1: What are your general expectations/impressions about the Multidisciplinary Arts and Science Project?*
> *Q2: What changes do you think may happen, are happening or have happened in the different components of didactics: the professor, the learner, the method, the subject, and the context?*

The second data collection instrument consisted of a discussion group, which allowed the participating professors to share opinions, experiences, points of view, doubts, and improvement proposals after the implementation of the Project. The question that started the discussion group was:

> *Based on the assessment of the experience of this course, what are your improvement proposals for the Multidisciplinary Arts and Science Project?*

The data collection instruments were validated by three experts in Education from the Ramon Llull University (Spain), selected for their knowledge of General Didactics. In order to carry out the validation process, all the experts had the final version of the instrument, together with a guideline including the elements to be evaluated for each question.

With regard to the ethical considerations of the data collection process, participants were informed—at all times—of the research purpose, and the subsequent use of the results obtained. To this end, the participants were required to provide an informed consent, respecting their anonymity, and accepting the interventions of all

Table 1.
Objectives, Dimensions, and Categories (Folch, 2014)

Main Objective	Secondary Objectives	Dimensions	Categories:
To learn the faculty's perception regarding the didactic implications of the Multidisciplinary Arts and Science Project.	To describe the evolution of the faculty's perceptions during the Project implementation	Faculty's general impressions on the Project	General impressions
		Perceptions about the implications of the Project in each of the elements of didactics	Implications for the professor
			Implications for the learner
			Implications for the method
			Implications for the content
			Implications for the context
	To collect the improvement proposals from the faculty at the end of the Project	Faculty's improvement proposals	Improvement proposals

of them equally, giving them the same value and significance.

Procedure

Based on the objectives, dimensions are defined and organized into the seven categories to be evaluated. Five of the seven categories evaluated correspond to the elements of didactics: the professor, the learner, the subject, the method, and the context, established by Fernández (1997). The two remaining categories are specific to this research: general impressions and improvement proposals of the Project.

In a first level of analysis, key words were established to allow the comparison of the professors' answers and help to meet the objectives of the research. Ten key words emerged from this inductive analysis: *Multidisciplinary work* (relationship among subjects), *shared teaching* (collective sessions, shared tutorials), *relationship among peers*, *enrichment* (progress), *attitude*, *creative process*, *common thread*, *evaluation*, *space*, and *time*.

The interviews focused on the first six categories: General impressions regarding the Project, implications for the professor, implications for the learner, implications for the method, implications for the content, and implications for the context; while the discussion group focused on improvement proposals.

Results

The results are presented below—category by category—based on literal phrases taken from the speeches of the participants in the Project. Comments on keywords are highlighted in the text.

Category 1: Faculty's General Impressions on the Project

At the beginning of the process, the professors expressed contradictory feelings. The professors with previous experience in multidisciplinary projects expressed excitement (N.B.: *I've always wanted this;* R.C.: *I hope this year…*); while the two professors who joined the Project for the first time considered the experience as a challenge (R.D.: *It is a challenge for us*; M.P.: *For the professor, it is a very big challenge.*), and expressed some fear or anxiety. At the end of the process the Project is considered as an effort with room for improvement (R. C.: *It has been like a first try […] we have to improve it, for sure*; M. P.: *It is a first step and, from here, a lot is learned; ideas are reworked; and something much more powerful is generated.*). In particular the need for greater **depth in the relationship among subjects** is pointed out (R. D.: *A much deeper interaction among the five subjects could be achieved.*). On a positive note,

the **enrichment** for them as professors stands out (M. P.: *I have learned from my teammates, from the students, and from the Project.*). In addition, they agree on the **lack of shared time** (R. C.: *More time has been necessary: More time to prepare ourselves, to coordinate, and to hold collective sessions.*).

Category 2: Implications for the Professor

In relation to **shared teaching,** the **collective sessions** in which different professors take part simultaneously (R. D.: *Seeing students work in the collective sessions modifies and broadens the vision that the professor has of the students.*) and the **shared tutorials** are very positively valued. However, two professors express opposite opinions on the same situation in which the professors have shown their disagreement with the students: *The tutorials or sessions shared by more than one professor enrich the student, who receives different visions of the same subject, which makes him/her make his/her own decisions* (R.C.). *There has been a lack of union among the five professors in order to share the same approach* (R. D.).

The **aspect perceived as the most positive one is the relationship** established **among the teammates:** *We have worked in a very intense and united way* (N. B.).*The generosity and the work conducted among teammates has been perfect* (M. P.).

Category 3: Implications for the Learner

Regarding the evaluation of the students, the faculty highlight their **positive attitude** (N.B.: *The students have worked and shown interest.* R.C.: *They have been very active in the classes.*), in spite of noting different levels of involvement and some difficulties in facing the **creative process**: *It has been difficult for the students to understand what a creative process is, the symbolism, the metaphor...* (N.B.).

As far as the **multidisciplinary work is concerned**, they consider that the Project helps students to establish connections among the subjects of the module, although these relationships could have been further deepened: *The students hatch out in the second part of the Project and understand multidisciplinary work* (N. B.). *Students require assistance to better understand the links among the subjects* (R. C.). *Seeing the overall work in the classroom has been a very positive experience for the students* (R. D.).

Category 4: Implications for the Method

In order to deepen the relationship among subjects, the professors agree on the need to–jointly and previously—reflect on the connections among the disciplines they teach, and to clarify the common thread that forms the backbone of the Project: A greater coordination of the teaching staff is required in order to deepen the interaction of the five subjects (R. D.). A well-defined common thread among subjects from the beginning would facilitate the participation of the teaching staff in the Project (M. P.).

The shared evaluation of students is, perhaps, the most controversial element of the Project. While some professors consider that it broadens the vision of the student, others are concerned about the difficulty of evaluating the specific contents of each subject through multidisciplinary activities: The shared evaluation is both enriching and challenging and needs to be improved (R. C.). The evaluation based on activities shared by the two modules does not allow reflecting the weaknesses presented by some students in one of the two modules (R. D.).

Category 5: Implications for the Content

The professors agree that multidisciplinary work provides students with the ability to relate the arts and science contents of the modules taught, through creative and global proposals: *Students discover—in this second part of the project—that they are capable of joining the arts together, that they have an artistic and creative capacity* (N. B.). *Students have lived the experience of global work in the classroom and recognize the contribution of each subject* (R. D.).

Category 6: Implications for the Context

The limitations of the physical spaces in the school—not prepared for multidisciplinary work—and the lack of flexibility in the schedules of the professors and students have represented, according to the professors in the Project, the main obstacle for shared teaching: *It would be necessary a large space, or several connected spaces, to experience how a same problem is solved from the*

scientific and artistic approaches, and to establish connections (N. B.). *For the next academic year, it would be necessary to make the schedules flexible to share more class sessions* (R. D.).

Improvement Proposals

The improvement proposals are grouped by subject, based on the interventions of the professors participating in the Project.

Concerning Time. Things that should be improved. *To have more time to prepare ourselves, to coordinate, and to conduct collective sessions; We lack time to be able to reflect with the students on the reason of things. They just get as far as the anecdote, the game, the song, the dance, the practical activity* (R. C.).

Concerning the Relationship Among Subjects. *I think that the five of us have done a good job, a good connection among us, but we need to go deeper. I am convinced that, for the next academic year, we will be able to do it perfectly. (N. B.). If we clearly understood the thread from the beginning, it would help us in all the actions conducted... I would not have this feeling of running; I had the feeling that the project was a little ahead of me* (M. P.).

Concerning the creative process. *It has been difficult for them to understand what a creative process is, to understand the more symbolic and metaphorical approach... I am not very optimistic regarding this point* (N.B.).

Concerning the Shared Evaluation. *As professors, I find that is both enriching and challenging, and that we still have to improve it* (R. C.). *We have to assess which cross-curricular competencies from the two modules (arts and science) should be evaluated* (R. D.).

Concerning Context: Space and Time. *We dreamt of a big workshop where everyone could work at the same time, some of us in arts production, others dancing or playing music... Since this is not possible, we work in three different spaces, and so it is difficult to find the connections (among disciplines), which is exactly what we ask of the students* (R. C.). *I have participated in some collective sessions, and this has helped me a lot to see the students in a very different situation from the one in the laboratory. I would try for our schedules, in the future, to be much more flexible, so that I could go to your sessions, and that you could come to my laboratory session, and that we would co-teach* (R. D.).

Concerning the Continuity of the Project in the Infant Education Degree. *The interesting thing would be for this –(referring to the Project) to continue during the fourth year, because the professors have carried out a highly intense work [...] that the students do not lose this way of working, this way of thinking, this way of seeing and feeling the world. This global idea of training the person must begin from the first year in the university because—very much to my regret—I dare to say that students have not experienced it during their school years* (N.B.).

Discussion

The analysis of the results allowed to confirm the most significant ideas in relation to the objectives set out in this research.

As for the faculty's perception regarding **the didactic implications** of the Multidisciplinary Arts and Science Project, the appreciation of multidisciplinary work and shared teaching as an enrichment process stands out, since—as stated by Blanco (1999) and Acaso (2015)—collaborative teaching allows the team to build new competencies and practices that cause an impact on learning processes.

The faculty values the collective sessions as a differential fact of the Project, offering educational proposals that transcend the limits of the disciplines and that, for the faculty, represent an opportunity to get to know the students in a context different from the traditional sessions, broadening the vision of the professors, who discover in their students competencies that they had not been able to work before, and that facilitate the shared evaluation. This also provides students with a model of collaborative practice (Kluth et al., 2003; Winn & Blanton, 1997) that will be useful to them in their future as teachers.

For the participating professors, the creative process of the students represents a strength of the Project, as it places the students in a decision-making situation; helps them to unders-

Table 2
Synthesis of the Strengths and Weaknesses of the Project (Folch, 2014)

Strengths	Weaknesses
1. The multidisciplinary work, as a coherent and necessary response to the competency character of the studies of Education in FPCEE Blanquerna, in the holistic conception of knowledge and the education of teachers of the 21st century students..	6. The lack of deepening of the relationship among disciplines, expressed by the professors and evidenced in the difficulties of the students to identify the links among subjects.
2. The shared teaching, the transfer of knowledge as an enrichment process for the professor in particular, but also for the learner.	7. The difficulties in evaluating the specific contents of each area of knowledge.
3. The transformation of the teaching team, the communication, the generosity, the creation of a link beyond the academic and professional task.	8. The lack of shared time among the faculty to prepare and anticipate the contents worked and the activities conducted.
4. The collective sessions, as an example of globalizing work that students will be able to translate into infant (preschool) education, and as an opportunity for the professor to broaden their vision of the student.	9. The lack of time to reflect with the students on the reason for each activity, to go beyond the anecdote.
5. The experience of creative process, as a powerful learning tool for the students who discover their ability to join disciplines together, make decisions, and transcend literality.	10. The context, the organization of time and space. The lack of flexibility in the faculty and student schedules. The lack of sufficiently large and conveniently equipped spaces to work in a multidisciplinary manner.

tand multidisciplinary work; and allows them to discover that they are capable of joining the arts together and combining the arts with science. The work of the students based on the four stages of the creative process proposed by Batet et al. (2015) has allowed them to receive a good evaluation of the creative processes in each of the groups. On the contrary, the professors state that the levels of achievement are lower in the activities that require relating the concepts worked on, and their application to the design of educational proposals.

Regarding the aspects to be improved, the professors express the difficulty of evaluating the strengths and weaknesses of the students in each of the modules involved in the Project. It should be noted that perhaps the differences shown in the different evaluation evidences may be related to the degree of follow-up or tutoring carried out by the professors.

Finally, we should highlight the reflection made by all the professors: The context in a university organized from a disciplinary perspective hinders the implementation of multidisciplinary proposals, which require a lot of time shared among professors, flexible and compatible schedules, and sufficiently large and well-equipped spaces, in line with the results presented by Schleicher (2015).

Regarding **the evolution of the faculty's perceptions** during the implementation of the Project, it is perceived that the professors from the artistic module (Musical, Visual and Body Education) feel safe both regarding the experiences of co-teaching and the shared evaluation, while the professors from the science module express—at all times—their concern for both the evaluation and for managing the knowledge specific to the subject. In this sense, there is a need to share not only objectives, but also an interdisciplinary curriculum and a shared evaluation process; this result coincides with the conditions that professors Kluth et al. (2003) point out as necessary to implement the diverse models of co-teaching in the university: An interdisciplinary curriculum that allows collaborative work among the faculty, common objectives, and shared evaluation. However, upon completion of the Project, all the professors agree in considering multidisciplinary work, shared teaching, and collective sessions as

potentialities.

Once the Project is finished, the **faculty's improvement proposals are related to** maintaining the same generating idea (the text *Alice in Wonderland* by Lewis Carroll) during the next academic term, with the aim of optimizing the resources generated, and to deepen the concepts and competencies to be developed. Secondly, the possibility of extending the Project to include Language Didactics is considered. Thirdly, there is a proposal to review the number of collective sessions and the participation of the Project's faculty in the sessions designed from the science module, and to review and improve the evaluation activities. Finally, there is a proposal to compensate for the lack of spaces in the school by using alternative spaces located around it. These improvement proposals must be carried out, analyzed, and evaluated again in order to prove their efficiency, which will be key to make the Project progress and improve, which is what the chosen research methodology seeks.

As a final conclusion, we present a Decalogue that shows—based on the data collected and its analysis—the strengths and weaknesses of the Project.

As a future projection of this study, we propose a comparison between the faculty's perceptions collected by the interviews and the perceptions expressed by the students in the survey, applied upon completion of the whole process. This data—which was collected, but whose analysis is not presented in this paper—will allow us to continue the research.

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