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Editors:
Kristiina Kumpulainen & Auli Toom
University of Helsinki
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Preface

The 22nd ETEN Conference was held in Coimbra, Portugal in April 2012. The overarching theme of this ETEN Annual Conference 2012 focused on the futures of education and learning requirements. The keynote speech ‘Education: Key Competences for the Future’ by Professor António Dias Figueiredo set the scene for further discussion and reflection during the sessions of the Thematic Interest Groups (TIGs).

This conference proceedings publication is based on papers that were presented in the TIG-sessions during the conference. These papers introduce research studies, document professional practices and development programs and take stands on educational policy issues, reflecting the theme of the conference. The papers included in this publication represent the following TIGs:

1. Mathematics Education
2. Myths and Fairy Tales
3. Reflective Practice
4. Special Educational Needs
5. Urban Education

The papers presented in this publication contribute to the global discussions surrounding 21st century education and learning. In addition, the papers evidence the richness of educational themes that were discussed in the conference. Many of these themes and the ways in which they are approached are novel and they are likely to be of interest to the ETEN community and beyond. We can, thus, be proud of our ETEN Conference Proceedings publication due to its timeliness and pioneering contributions.

As editors of the ETEN Conference Proceedings and JETEN, we are pleased to observe continuous developments in the quality of papers that are submitted to ETEN publications. It is delightful to notice the multilevel expertise of our ETEN authors, representing both educational practice and research in a variety of important fields. This richness of expertise is one of our most important strengths within the ETEN community and its publications.

Kristiina Kumpulainen
Professor
Department of Teacher Education
University of Helsinki
Helsinki, FINLAND

Auli Toom, PhD
Adjunct Professor
Faculty of Behavioural Sciences
University of Helsinki
Helsinki, FINLAND
CONTENTS

I Mathematics Education

1. Young Children’s Perceptions in 3D Construction Tasks
   Cristina da Silva Alves and Alexandra Gomes ........................................6

2. Young Children Solving Partitive Division Tasks
   Ema Mamede and Amália Silva ..............................................................14

3. Mathematics in Engineering: The Perspectives of Students
   M. Emília Bigotte de Almeida and Ana Maria Sarmento Coelho .............21

4. Informatic Tools, Isometries and Communication (in) Mathematics
   Lúcia Matos and Isabel Cabrita ............................................................27

5. Cross-curricular Mathematics – A Case Study
   Maria João Naia and Isabel Cabrita ......................................................37

6. Mathematical Tasks in Digital Image Processing
   C.M.R. Caridade .....................................................................................46

7. Teaching and Learning in Calculus: Is Learning Really Useful?
   C.M.R. Caridade, M. Cêu Faulhaber and P.M. Rosa ..............................55

II Myths and Fairy Tales

8. Animals in the Fábulas of El Pensador Mexicano
   Robert K. Fritz ......................................................................................63

9. Kangaroos, Koalas, Kookaburras and Many More… in Aboriginal Dreaming Stories
   Cristina Ferreira Pinto ........................................................................74

10. The Canis-lupus Duality: A Narrative History of the Wolf
    Dawn Bessee ........................................................................................84

11. Who Is the Beast? The Portrayal of Animals in Multicultural Folklore
    Anne Drolett Creany ...........................................................................90

III Reflective Practice

12. Fostering Reflective Practices in Childcare for Children Under Three: The Project Crescer na Creche (Growing in childcare)
    Ana Maria Sarmento Coelho and Vera Maria Silvério do Vale ................96

13. The Analytical Tools to Work Gender-equality Issues at the Pedagogical Practices and Formative Level
IV Special Educational Needs

14. Differentiated Classroom Observation Scale – Short Form
Cheryll M. Adams and Rebecca L. Pierce.................................................................108

15. Special Education and Inclusion in Teacher Training in Portugal
Cláudia Maia and João Sampaio Maia.................................................................119

16. Dyslexia Over-diagnosed: The Problem of Labelling
Pieter Van Biervliet.................................................................................................125

17. The New Educational Technologies Available for Students with Special Educational Needs
Anabela Ramalho Panão and Carla Gameiro Ferreira da Costa.............................131

V Urban Education

18. Paradox, Pedagogy and Praxis: Rethinking Ethics in Education
M. Francyne Huckaby, Mila Zhu, Amanda Hutson, Victoria Reneau, Ashly Spencer, Julie Vu, and Freyca Calderon Berumen.................................................................140

19. Field Experiences and Teacher Education Programs: What Is and What If?
Reuben L. Yarmus and Nurun N. Begum.............................................................148

20. Motivations for Choosing a Teaching Career and Deciding Whether or Not to Teach in Urban Settings
Yong Yu and George Bieger................................................................................156
I Mathematics Education
1. Young Children's Perceptions in 3D Construction Tasks

Cristina da Silva Alves and Alexandra Gomes
Agrupamento de Escolas de Vila Cova, Universidade do Minho

Abstract
As part of a broader investigation, aiming at analysing in what ways the visual abilities are worked on, both in preschool and first grade and how children exhibit those abilities, clinical interviews with 16 children ages 3 to 7 have been conducted in order to find out how they perceive, compare and reproduce colourful blocks constructs. In this paper we present results related to two of the proposed tasks: one involving the reproduction of a construction with color cubes and the other concerning the identification of different views of a construction.

Keywords: visualization skills, mathematical tasks, colored cubes, 3D constructions.

Introduction
Several authors argue that young children reveal surprising and specialized skills in several areas, including mathematics (Barros & Palhares, 1997; Gelman, 2006; Ginsburg, Cannon, Eisenband, & Pappas, 2006). Gelman (2006) mentions that the way how young children do a set of concepts is similar to the adults and the knowledge that they build is a singular blend of early skills and conceptual reorganization. The concepts formed and internalized are used as support for the acquisition of additional knowledge. Everything children learn and how they do it influences future learning (NCTM, 1994; Abrantes, Serrazina, Oliveira, Loureiro, & Nunes, 1999; Clements, Swaminathan, Hannibal, & Sarama, 1999; Maia, 2009) and this becomes more evident in an area such as mathematics, where knowledge is hierarchical, that is, the understanding of a certain knowledge supports others and misunderstanding makes it more difficult, and in some cases prevents the understanding of others. In fact, learning certain concepts does not start at the time when corresponding formal definitions are shown but, in some cases, several years before when the first contact occurs, in an informal way, with those concepts. The mathematical ideas that children acquire in kindergarten and primary school are the basis for the later development in mathematics; therefore, teachers of each level of education should know the children they have in their classes and how they acquire knowledge (Maia, 2009).

Concerning the teaching of geometry, Van Hiele (1999) defends that it can be stimulated and enriched by activities with different manipulative materials such as mosaics, blocks or tiles with patterns, tangram puzzles or others, but the key is to provide an education appropriate to the level of thought of children. According to this author, the geometric thinking of children is developed according to five levels: visual, which begins with non-verbal thinking and where the figures are judged by their appearance; descriptive or analysis, in which language is crucial to describe the properties of shapes and figures, though there is no logical ordering of the properties; informal deduction, where the properties are arranged logically and are deducted from one another; formal deduction, where theorems and propositions are deduced from axioms and definitions and so geometry is understood as a deductive system; and finally rigor level, where the different aspects of formal axiomatic systems for geometry are compared and analyzed. In turn, Clements, Swaminathan, Hannibal, and Sarama (1999) confirm Clements and Battista, on the existence of a level of
geometric thought before the visual level of van Hiele, the level of pre-recognition, and suggest a reconceptualization of the visual level of van Hiele, calling it syncretic level. They reported that on the level of pre-recognition children are able to learn and distinguish shapes, considering only one aspect of their visual characteristics – distinguish the square from the circle, because the first is rectilinear and the second is curvilinear; however, they do not distinguish figures of the same class as the square and triangle.

This reconceptualization of the first level of van Hiele to syncretic level is based on the type of evidence that children make when they select the pictures. Clements, Swaminathan, Hannibal, and Sarama (1999) argue that on this level there is “a synthesis of verbal declarative and imagistic knowledge” (p. 206); these interact with each other and reinforce the knowledge and allow the child to use more easily the declared type of the justifications for the non-inclusion of a figure in a class than otherwise. According to Vygotsky, the “child becomes aware of the differences earlier than the similarities (...) because awareness of the similarity structure requires a more developed generalization and conceptualization than the awareness of differences” (2001, p. 207).

According to Frostig, Horne and Miller, visual perception is “[the] ability to recognize and discriminate visual stimuli and to interpret them by associating them with previous experiences”, that is, it is not just the ability to see a figure or object correctly, but the ability to analyze and interpret what you see, relating it to the observer and other objects, since the interpretation of visual stimuli does not occur in the eye, but in the brain (1994, p. 7). Frostig, Horne and Miller (1994) identified five abilities of visual perception: visual motor coordination, which is defined as the ability to coordinate vision with movements of the body or its parts (hand, foot, head, ...); figure background perception, which is the ability to relate and distinguish one figure (the focus) from what is around it (background); perceptual constancy, which is the ability to recognize an invariant feature of the figure (size, shape, position, colour, ...); perception of position in space, which is the ability to relate an object in space with the observer and the perception of spatial relations, which is defined as the ability of the observer to perceive the position of two or more objects in relation to oneself and in relation to one another.

However, some years later, Hoffer has added two skills to the five visual perception abilities described above: visual discrimination, which is the ability to compare images or objects finding similarities and differences, and visual memory, which corresponds to the ability of remembering an image or object that is no longer visible, comparing its characteristics with those of others that are visible or not (Del Grande, 1987). According to Del Grande (1987) only a clear understanding of the abilities of space perception will allow to create appropriate geometry programs and select stimulating mathematical activities enhancing improvements in visual perception of students. Gordo (1993) calls these seven skills of visual perception, spatial visualization skills.

Research in this area, in Portugal, is reduced; two studies have stood out, though, over the last years: Gordo’s work (1993) on the relationship between spatial visualization and the development of spatial visualization and construction of mathematical concepts in primary school children and Arriaga, Silva and Esteves’s study (2001) on the effects of a computer game in perceptual and spatial skills.

Since “geometry is a privileged way of developing intuition and spatial visualization” (Abrantes, Serrazina, Oliveira, Loureiro, & Nunes, 1999, p. 67); spatial visualization is “at the same time a facilitator of Geometry learning and developed by geometrical experiences in the classroom” (Matos & Gordo, 1993, p. 13); and “[the] normal period of maximum development of visual perception is between three and a half and seven years and a half” (Frostig, Horne, & Miller, 1994, p. 10), we decided to study how young children acquire and
develop their geometric knowledge, focusing, in particular on how spatial visualization skills are worked in preschool and first grade and how children exhibit these visualization skills.

In this article we will present two tasks proposed to children aged between 3 and 7 years old, and analyze the results obtained and the difficulties experienced by them towards perceiving spatial relationships.

The study

This study is part of a broader investigation, which aims to study how the spatial visualization skills are worked in preschool and first grade and how children exhibit these visual skills.

Methodology

After an initial diagnostic evaluation performed on two classes of preschool and two classes of the 1st grade (Alves & Gomes, 2011), from out a total of 61 children we selected two children from each age and each school (16 children), to perform ten more tasks, aimed at collecting information about children’s abilities of perception of position in space and perception of spatial relationships. The selection of these 16 children was done based on the diversity of answers given at the time of the diagnostic evaluation and age.

Considering the age of the children involved and the type of work proposed, we decided that data collection would be made from a set of semi-structured interviews (in pairs), recorded in video and audio. The children already knew the investigator who conducted the interviews, as she had previously been with them when performing the diagnostic evaluation and she had also been attending their classroom, informally, since the beginning of the year. Each interview, was conducted in a room for individual work; its duration varied depending on the task, the attitude and receptivity of the children, never exceeding one hour; it usually took place during late morning (after the morning break) and/or in the afternoon, in the case of pre-school; and during the hours corresponding to the Curriculum Enrichment Activities (CEA) for the 1st grade.

The tasks

As mentioned above, the following tasks are two of a set of 10 tasks that have been proposed to the children. The first task (adapted from the game Organicubos) consists in asking children to do the same construction as the different trials of the cards (see Figure 1), which have an increasing degree of complexity. Apart from identifying the number of cubes of each color required, the child has to relate them to one another and themselves in order to put them in the right position. Younger children (aged 3) just made the first trials (practice, A and B), while the other children performed all trials.

Figure 1

The second task consists in asking children to identify the view (top, front, back, left, right view) each animal has according to its point of view (see Figure 2). For this task the children have at their disposal coloured cubes to make the construction, an answer sheet and a pencil,
and they are asked to stand up from the chair and look at the construction from the same point of view as the animal.

<table>
<thead>
<tr>
<th>Practice Trial</th>
<th>Trial A</th>
<th>Trial B</th>
<th>Trial C</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Practice Trial" /></td>
<td><img src="image2" alt="Trial A" /></td>
<td><img src="image3" alt="Trial B" /></td>
<td><img src="image4" alt="Trial C" /></td>
</tr>
</tbody>
</table>

**Figure 2**

Children of all ages performed four tests, but the three year-old children were only asked to identify one animal’s view (practice trial: parrot; trial A: snail; trial B: frog, trial C: snail); children aged four were asked to identify two animals’ views (practice trial: parrot and snail; trial A: snail and elephant; trial B: parrot and frog; trial C: snail and elephant) and children aged five and six were asked to identify the views of all animals (parrot, snail, frog, crocodile and elephant). All answer sheets presented the animal or animals according to age and different views of construction (5 views). For example, we present the answer sheet corresponding to the five and six-year-old children (Figure 3).

<table>
<thead>
<tr>
<th>Answer paper Practice Trial</th>
<th>Answer paper Trial A</th>
<th>Answer paper Trial B</th>
<th>Answer paper Trial C</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Answer paper Practice Trial" /></td>
<td><img src="image6" alt="Answer paper Trial A" /></td>
<td><img src="image7" alt="Answer paper Trial B" /></td>
<td><img src="image8" alt="Answer paper Trial C" /></td>
</tr>
</tbody>
</table>

**Figure 3**

In both tasks the practice trial aims to establish if the child understood the task or if is necessary to repeat the procedure. From the beginning, children felt engaged in carrying out the proposed task and were at ease towards the camera and recorder. The use of attractive manipulative materials was an asset, as we could see the children’s desire in participating, moving and exploring the materials, in part because the materials used in the resolution of the tasks were different from the materials existing in the different classrooms. Although in the preschool classrooms there exist some wood cubes that are part of kits with other solids (cylinders, prisms, pyramids, etc.), those are not coloured, and are usually used by children in their make believe games. In the first year classrooms it is not so usual to find this type of material.
Some results

As for the first task given only a 3-year-old child failed the practice trial. Although the child has correctly identified the number of cubes of each required colour, she hasn’t positioned the cubes correctly (Figure 4).

![Figure 4](image)

Regarding trial A, all children of different age groups have made the construction correctly with the exception of two young children (aged 3) who have revealed difficulties in their execution, once that they started them from the centre (see Figures 5 and 6). There was a great concern for preserving the number of blocks of each colour to be used. In fact, the first strategy used by children in solving this task was to select the number of cubes of each colour needed for the construction based on the number of coloured cubes that they see.

![Figure 5](image)  ![Figure 6](image)

In trial B, even though older children (aged 6) revealed no difficulties, the number of children who failed the construction was slightly higher. Only one child aged 3 made it correctly, whereas another one only changed the position of the blue and green cubes (Figure 7); two children (one child aged 4 and one aged 5) made an acceptable construction (Figure 8); and other two (also aged 4 and 5) made other constructions (Figure 9).

![Figure 7](image)  ![Figure 8](image)  ![Figure 9](image)

Trial C was by far the most difficult to perform by children. Only two children (5 and 6 years old) did it without difficulty; two other children, aged 4 and 5, made a construction very similar to the requested one (see Figures 10 and 11).
As for the second task presented, and regarding the practice trial, all children aged 3 wrongly associate the parrot to a back or front view and not to a top view (three children associated it to the front view and another child to a back view). Although at first two children did not perform the construction correctly (see Figure 12), since the purpose of this task was not specifically to build correctly, but identify views or perspectives, children just started the matching task after the construction was corrected.

Children aged 4 (who were required to do two matching tasks) correctly associated the snail to the front view, but two children did not correctly identify the top view with the parrot (one has also associated the parrot with the front view and the other one associated it with the back view). Most children aged 5 and 6 (who were asked to match all animals to views) answered the practice trial correctly and only one child of each of these age groups failed it. A 5-year-old child correctly associates the parrot with the top view, the crocodile with the right side view and the elephant with the left side view, but then swaps the view of the snail with that of the frog. A 6-year-old child correctly associates the frog with the back view, the crocodile with the right side view and the elephant with the left side view, but ends up switching the view of the parrot with that of the snail.

Despite children performed the construction facing it in the same position as that of the animal, we find that it is difficult for young children not to focus on what they visualize (front view when looking at the card or construction). Young children feel the need to include all the cubes they see in the construction.

In trial A children aged 3 are asked to identify the snail’s view (front view), a task that was well performed by all. As for the children aged 4 these were asked to identify the snail’s and the elephant’s views, respectively front view and left side. All children in this age group did the trial correctly except for one child that linked the snail to the back view. In the 5-year-old group only one child was not able to correctly associate all views of the construction with the corresponding animal (switches the parrot’s and the elephant’s views), while in the 6-year-old group two children failed the trial (one child switches the front view – the snail’s – with the back view – the frog’s; the other child switches the elephant’s view with the frog’s).

None of the 3-year-old children have succeeded in trials B and C. In trial B, all children wrongly associated the frog to the front view, while in trial C two children linked the snail to the top view and the other two to the side views, left and right. Only one child from this age group revealed difficulties in the execution of the construction, placing the cubes that were ahead (observer’s position) more distant (see Figures 13 and 14). There seems to be a
predominance of the front view in relation to the other views, when the constructions are relatively simple, which does not happen when the constructions are more complex.

![Figure 13](image13.jpg) ![Figure 14](image14.jpg)

All children aged 4 have done trials B and C correctly. As for the children aged 5, one failed trial B (switched three views) and another one firstly failed trial C (associated the parrot with the back view) and then corrected it after seeing what the classmate did. All the children aged 6 did trial B correctly, but only one did trial C correctly (one child switched the frog’s and the parrot’s views; another one switched the parrot’s and the snail’s views, and the other correctly associated only the top view with the parrot).

Although the strategies used by children in solving this task were not all effective, they were diversified: count the number of faces that are visible without having in mind the characteristic colour of the cube(s); see the number of faces of each colour that is visible in each position (front, top, left side, right side or back); place oneself as the animal towards the construction, etc.

**Conclusion**

There seems to exist a relationship between the figure background perception ability and the identification of spatial relations ability, as that children relate cubes two by two, being these cubes both their focus and background. Despite the increased difficulty observed over the different trials, children should be confronted with new challenges, since it is in this confrontation, between what they are already able to achieve and the difficulties which arise, between doing and not doing, between what they see and relate (with other and themselves) that the children structure their spatial relations. As can be seen, the children had success in some trials (or all), which confirms van Hiele (1999) who says that cognitive development is more a result of instruction than age or biological maturation.

**References**


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2. Young Children Solving Partitive Division Tasks

Ema Mamede and Amália Silva
CIEC – University of Minho; J.I. Esposende

Abstract
This paper focuses on a study with 4- and 5-years-old children understanding of partitive division when discrete quantities are involved. The study analyse how young children understand the inverse divisor-quotient relationship when the dividend is the same. The participants were 30 kindergarten children from Braga, Portugal. Individual interviews were conducted when solving tasks involving the division of 12 and 24 discrete quantities by 2, 3 and 4 recipients. Results showed that 4- and 5-years-old children have some ideas of division, can estimate for the quotient when the divisor varies and the dividend is constant, and can justify their answers. Educational implications of these results are discussed for kindergarten activities.

Framework

Literature refers that kindergarten children possess an informal knowledge relevant for many mathematical concepts (see Nunes, 1992; Nunes & Bryant, 1997). This informal knowledge should provide the building of formal mathematical concepts. Concerning the division, several authors suggest that young children can divide discrete quantities successfully (see Frydman & Bryant, 1998; Pepper & Hunting, 1998; Kornilaki & Nunes, 2005; Squire & Bryant, 2002), arguing that these children possess some type of informal knowledge related to the division of quantities, understanding the inverse relation between the divisor and the quotient when the dividend is the same.

When considering the division of discrete quantities it becomes relevant to distinguish the partitive and the quotitive division. In partitive division problem a set of objects is given to be divided among recipients, and the share that each recipient has received is the unknown part. (e.g., there is a set of 10 candies to be shared among 5 children. How many candies does each child get?). In a partitive division problem, the divisor is the number of recipients and the quotient is the share they receive. In quotitive division, there is an initial quantity to be share into a known number of parts. The size of the parts is the unknown (e.g., Mary has 12 candies and wants to give 3 candies to each of her friends. How many friends are receiving the candies?). In quotitive division problems, the divisor is the share to be given to each recipient and the quotient is the number of recipients. Concerning these types of divisions Kornilaki and Nunes (2005) argued that children understand more easily the partitive division than the quotitive division.

Research presents several results of young children procedures when solving division tasks involving discrete quantities (see Piaget & Szeminska, 1971; Desforges & Desforges, 1980; Frydman & Bryant, 1998; Squire & Bryant, 2002). Particularly, Correa, Nunes and Bryant (1998) when investigating the development of the concept of division in young children, examined whether children who could share would be able to understand the inverse divisor-quotient relationship in partitive division tasks when asked to judge the relative size of 2 shared sets. The participants were 20 children of 5-year-olds, 20 of 6-years-old and 21 of 7-years-old from Oxford, England. The authors investigated the children’s understanding of the three-term quantity relationship in division when the dividend was constant and the divisor varies. Their results showed that 9 of the 20 five-years-old performed
significantly above chance and about 30% were able to verbalize this inverse relation in their justifications and 11 out of 20 of the 6-years-old scored above chance and verbalized the inverse relation between the divisor and the quotient in the partitive tasks. The authors also report age improvements between 5 and 7 years. Correa, Nunes and Bryant (1998) also analysed children’s justifications according to children’s age. Most of the 5-years-old were not able to give a mathematical justification for their choices and did not mention facts relevant to the solution of the task. The 6-years-old presented justifications that revealed a progress from some comprehension of sharing and numerical equivalence to the understanding of the inverse divisor-quotient relationship. The majority of the justifications presented by the 7-years-old showed a logicomathematical approach, referring the inverse divisor-quotient relationship.

More recently, Kornilaki and Nunes (2005) investigated whether the children could transfer their understanding of logical relations from discrete to continuous quantities. Among other things, the authors analysed 32 five-years-old, 32 six-years-old and 32 seven-years-old solving partitive division tasks involving discrete quantities. In this type of problems the number of recipients varied to produce two conditions: 1) in the same divisors condition, the size of the divisor was the same; 2) in the different divisors condition, the number of recipients varied. The results showed that the different divisors condition was clearly more difficult than the same divisors condition. Thus, the authors argued that the inverse relation between the divisor and the quotient is understood later than the equivalence principle of division. The authors also pointed out that in partitive division tasks, one-third of the 5- and 6-years-old justified their responses as “the more recipients, the more they get”, but this response decreased markedly with age as only slightly more 10% of the 7-years-old used this incorrect reasoning.

The studies of Correa, Nunes and Bryant (1998) and Kornilaki and Nunes (2005) give evidence that, at age of 6 and 7, children have an insight into relations between the division terms, long before they are introduced to this operation at school. If previous research reports some success with 5-years-old children, how would children of 4-years-old would perform? Besides, it becomes relevant to get a better insight on young Portuguese children’s informal knowledge of division.

This paper focuses on young Portuguese children understanding of division of discrete quantities, when solving partitive division problems. For that we tried to address three questions: 1) How do children estimate the quotient in a partitive division in which the divisor varies and the dividend is kept constant? 2) How do children perform the partitive division tasks involving discrete quantities? 3) What procedures do they use in this process?

Methods

A study focused on young children’s ideas of partitive division was conducted to address these questions. The participants were 15 four-years-old (11 boys and 4 girls, mean age 4 years and 6 months) and 15 five-years-old (7 boys and 8 girls, mean age 5 years and 6 months) from Braga, Portugal. The participants were interviewed individually by one of the researchers when solving the problems. Each problem was presented to each child using a story and manipulatives representing the items involved in each story were available.

Each child was presented to 6 problems: 3 involving the division of 12 units (carrots) by 2, 3 and 4 recipients (rabbits), respectively; and 3 problems involving the division of 24 units (cabbage) by 2, 3 and 4 recipients (rabbits). In the interview, first children were invited to estimate the effects on the quotient of increasing the divisor keeping the dividend constant. Then they were asked why they thought so. The idea was to have an insight on children’s understanding of the inverse divisor-quotient relationship when the dividend is constant.
Then children were asked to carry out the division. In this process, their ability to perform the division was assessed as well as the procedures used by them.

The story presented to the children involved a context in which a white little rabbit had 12 carrots. Then he had to share them fairly with his friend, the brown rabbit. At this moment the child was asked: “Do you think that the white rabbit would be with more or less carrots? Why?” Then the child was invited to accomplish the division between the two rabbits. Them the child was asked: “Do you think that both rabbits are happy with this division of the carrots? Why?” “How many carrots did each received?” Then a little grey rabbit came around and they had to put all the carrots together again and share them among the three rabbits. “Do you think that each rabbit is going to have more or fewer carrots now?” “Can you help the rabbits to share the carrots?” “Do you think that all the carrots are happy with this division? Why?” The story continues to include the black rabbit. The same questions were asked. When the 24 units were involved, an analogous story was presented to them but now involving the 2, 3 and 4 rabbits and 24 cabbages. Each child took approximately 20 minutes to solve all the problems, in spite of having no limit of time for it.

Results

In order to understand children’s ability to estimate the quotient in a partitive division in which the divisor varies and the dividend is kept constant, their correct responses and justifications were analysed. Table 1 resumes the percentage of correct estimates and the respective valid justifications for the division of 12 and 24 units, according to the age. A valid justification is an argument in which a child expresses some ideas of the inverse divisor-quotient relationship, such as “because there are more rabbits and each one get fewer carrots.” or “they will have fewer carrots because now there is the X rabbit”.

**Table 1.** Percentage of correct responses and valid arguments when estimating for the quotient with the dividends of 12 and 24 units, respectively.

<table>
<thead>
<tr>
<th>Dividend</th>
<th>4-years-old</th>
<th>5-years-old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct response</td>
<td>Valid argument</td>
</tr>
<tr>
<td>12 units</td>
<td>67%</td>
<td>43%</td>
</tr>
<tr>
<td>24 units</td>
<td>71%</td>
<td>52%</td>
</tr>
</tbody>
</table>

It is interesting to note that children’s performance in the estimating tasks improved from the first part of the problems (involving 12 units) to the second one (involving 24 units), in spite of the sizes of the initial sets. Perhaps this is due to the fact that when the problems involving the 24 units were presented to the children, they were not a novelty anymore. Among those of the 5 years of age, there were 78% of correct responses when 24 units were involved, and in 83% of them the children presented a valid argument.

Another remarkable point is the success observed among the 4-years-old when asked to estimate and justify their judgement. Almost half of the children presented a valid justification for their correct answer when dividing the 12 units; when they were asked to divide the 24 units, their valid justifications increased slightly above 50%. These results suggest that children of 4-years-old may have some ideas about the inverse divisor-quotient relationship presented in these conditions.

Children performance was analysed solving division tasks involving 12 and 24 units by 2, 3 and 4 recipients, respectively. Table 2 resume the percentage of children’s correct responses by age level, in these problems.
Table 2. Percentage of correct responses by age level when solving the division of 12 and 24 units by 2, 3 and 4 recipients.

<table>
<thead>
<tr>
<th></th>
<th>4-years-old (n=15)</th>
<th>5-years-old (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 units</td>
<td>24 units</td>
</tr>
<tr>
<td>Division by 2</td>
<td>87%</td>
<td>60%</td>
</tr>
<tr>
<td>Division by 3</td>
<td>67%</td>
<td>86%</td>
</tr>
<tr>
<td>Division by 4</td>
<td>67%</td>
<td>67%</td>
</tr>
</tbody>
</table>

The results suggest that for young children it becomes more difficult to accomplish the division of 24 units than the division of the 12 units set, possibly due to the magnitude of the set.

As the children’s performance was not normally distributed a Mann-Whitney U Test was conducted in order to analyse children’s performance dividing 12 and 24 units according to the age level. The results show no significant differences on children’s performance when dividing 12 units according to the age levels (age 4, Mdn=3, age 5, Mdn=2, U=149, n.s.) and when dividing 24 units according to the age levels (age 4, Mdn=3, age 5, Mdn=3, U=128, n.s.). Thus, results give evidence that there is no difference of 4- and 5-years-old children’s performance in this division tasks.

Trying to explain these results, children’s procedures were analysed when dividing 12 and 24 units by 2, 3 and 4 recipients, respectively. The same procedures were observed when children were dividing 12 and 24 units. The procedures observed were: sharing relying on the one-to-one correspondence by the recipients; counting procedures that were adjusted in the final to produce equal shares; sharing based on perceptual influence ignoring the size of the shares; and sharing combined with counting to produce equal shares.

Figure 1 shows a child using one-to-one correspondence when dividing the 12 carrots among the 4 rabbits. Figure 2A-2B shows children using counting procedures when sharing the carrots between 3 and 2 rabbits, respectively. Figure 3A-3B gives examples of children using procedures based on perception only, ignoring the size of the shares obtained. Figure 4A-4B gives examples of children using sharing activity combined with counting to produce equal shares.

Figure 1. A child using one-to-one correspondence.
Figures 2A-2B. Two children using counting procedures.

Figures 3A-3B. Two children using procedures based only on perception ignoring the size of the shares.

Figures 4A-4B. Two children using sharing combined with counting to produce equal shares.

Table 3 resumes the observed procedures used by the children of both age groups when solving the division problems of 12 and 24 units, respectively. The procedures used by children did not change much according to the magnitude of the set to divide.

Table 3. Children’s procedures solving the division of 12 and 24 units by 2, 3 and 4 recipients, according to the age level.

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>4-years-old (n=15)</th>
<th>5-years-old (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 units</td>
<td>24 units</td>
</tr>
<tr>
<td></td>
<td>By By By By By By</td>
<td>By By By By By By</td>
</tr>
<tr>
<td></td>
<td>2 3 4 2 3 4</td>
<td>2 3 4 2 3 4</td>
</tr>
<tr>
<td>Sharing &amp; corresp.</td>
<td>10 9 9</td>
<td>8 8 8</td>
</tr>
<tr>
<td>Counting</td>
<td>0 0 1 0 1 0</td>
<td>2 2 2</td>
</tr>
<tr>
<td>Sharing ignore shares</td>
<td>3 5 3 1 3 4</td>
<td>6 5 4</td>
</tr>
<tr>
<td>Sharing &amp; counting</td>
<td>2 1 2 4 2 1</td>
<td>2 1 1</td>
</tr>
</tbody>
</table>

As each child was presented to 6 problems, there were a total of 90 resolutions by age level. The procedure mostly used in these resolutions by both age groups of children was correspondence one-to-one, used by 57% of the resolutions of the 4-years-old and by 51% of the resolutions of the 5-years-old. This procedure conducted children to correct resolutions. The procedures using sharing activity based on perceptual influence ignoring the size of the shares were also popular among children of both age groups, conducting them to wrong answers. It was used by 21% of the resolutions of the 4-years-old and by 30% of the resolutions of the 5-years-old. The relevance of producing equal shares when accomplishing a sharing procedure seems to be an issue for young children, but it is essential to understand fundamental relations in a partitive division situation.

Discussion and conclusions
The findings of the study reported here suggest that young children possess some ideas related to the division of quantities, understanding the inverse relation between the divisor and the quotient when the dividend is the same. The analysis conducted here give evidence that children of 4-years-old reveal some understanding of the effect of increasing the number of recipients when the amount to share is constant. These children were able to estimate the result of division. In agreement with Frydman and Bryant (1998), Correa, Nunes and Bryant (1998) and Kornilaki and Nunes (2005), who previously studied these issues, the results of this small study also suggest that children have some ideas of the inverse divisor-quotient relationship in partitive division tasks, when asked to judge the relative size of shared sets.

The study reported here has some similarities with some presented previously in the literature (see Correa, Nunes & Bryant, 1998; Kornilaki & Nunes, 2005), but also offers some original contributions. Correa, Nunes and Bryant (1998) investigated 5- to 7-years-old children’s understanding of inverse divisor-quotient relationship, when partitive division was involved. Their findings give evidence that 5-years-old children can succeed in these tasks. Also Kornilaki and Nunes (2005) give evidence of 5-years-old children success when solving this type of tasks. In our study we analysed how children of 4- and 5-years-old behave when dealing with this type of problems. Some positive signs arise from this investigation. Four-years-old children are able to understand some ideas of divisor-quotient relations in particular conditions.

The procedures used by the children of this study suggest that one-to-one correspondence can play an important role on children’s sharing activity and on their accomplishment of division. Some authors argue that sharing activities can be relevant in the understating of the inverse relation between the divisor and the quotient (see Correa, Nunes & Bryant, 1998) and that understanding the sharing activity helps children to understand the relation between the dividend, the divisor and the quotient (see Kornilaki & Nunes, 2005). In agreement with these ideas, one-to-one correspondence sustaining the sharing activity seems to allow young children to understand the logical relations involved in the division of quantities.

These findings suggest that kindergarten activities can include sharing activities in particular conditions, in order to stimulate children’s early ideas of division. These ideas are crucial to understand some complex mathematical concepts such as fractions, later on in the formal traditional school.

References


3. Mathematics in Engineering: The Perspectives of Students

M. Emília Bigotte de Almeida and Ana Maria Sarmento Coelho
Instituto Superior de Engenharia de Coimbra; Escola Superior de Educação de Coimbra

Abstract
In recent years the increase and diversification of students attending higher education in Portugal pose new challenges the polytechnic and university institutions. At the same time, the principles underlying the Bologna Paradigm, focusing the teaching / learning in the student also bring new challenges to students as well as to teachers, demanding the firsts to be more autonomous and the seconds to have greater ability to reflect upon their pedagogical practices.

Starting from the experience of one of the authors with students of engineering bachelor programs at the Engineer College of the Polytechnic Institute of Coimbra, Portugal, an ongoing research seeks to question the perspectives of these students about their own process of integration and adjustment to higher education, in particular in regard to the course of Differential and Integral Calculus.

In this paper the authors present the context, object and methodological design of this research, as well as some preliminary data.

Introduction
In Portugal the number of students attending higher education has been growing in the past ten years. Students may enroll in higher education programs via a variety of ways to access (Secondary Education, Professional and Technological Courses, exam for those over 23), and coming from diverse backgrounds they also show a multiplicity of personal and motivational characteristics. This diversity brings new challenges to the university and polytechnic institutions, requiring their ability to adjust and make academic programs more attractive and competitive, in order to motivate a heterogeneous audience.

Additionally, the paradigm underlying the Bologna Declaration also entails the institutions to change in relation to the teaching, demanding them to replace the traditional teacher-centered model (focusing on transmission of knowledge) to a learner-centered approach with its focus on construction of knowledge by students.

As a result institutions of higher education are being asked to show an increased ability to motivate a heterogeneous audience, but also to conduct research on how students learning takes place, to link teaching methods and students learning styles and also to build learning environments that enable co-responsibility of actors.

Starting from the experience of one of the authors with students of bachelor programs on engineering, the research presented in this paper seeks to question the perspectives of these students about their own process of integration and adjustment to higher education, in particular in regard to the course of Differential and Integral Calculus.

The research design
The data presented in this paper is part of an ongoing research that is being carried out on the topic of mathematics in the engineering with students from several bachelor programs on engineering (from the Engineer College of the Polytechnic Institute of Coimbra, Portugal). In the larger study interviews, epistemological and learning style questionnaires, and methodologies for assessment of students learning are being employed to explore potential relations
between students’ beliefs, styles of learning and academic achievements. This specific study explores the perspectives of students of engineering programs about their integration and adjustment to higher education, in particular in regard to the course of differential and integral calculus.

Exploring students’ perspectives about their experience provides an opportunity to understand how they apprehend that experience, what are their beliefs regarding learning in that specific context, and how they interpret what may facilitate or undermine their success. The justification for this form of phenomenological inquiry is that understanding is gained about how individuals structure their thoughts and form their experiences and perceptions of experience (van Manen, 1990).

In this specific study a qualitative research design has been drawn and grounded theory methods are being used (Glaser & Strauss, 1967). The research design was chosen in order to start the study with a general approach, rather than a detailed plan, allowing the accommodation of issues that emerge as the study progresses.

Participants have been asked to present written statements, following the topics: 1. Your feelings concerning the course of Differential and Integral Calculus; 2. Your opinion about the syllabus; 3. Your expectations concerning this specific course unit. These statements were collected in the beginning of the academic year, after 3 weeks of classes. The moment of data collection was chosen because: 1. the first 3 lessons correspond to the first thematic unit, which focuses on primitive function; 2. according to the experience in previous years, many students drop out the course at the end of this thematic unit.

The aim of this first data gathering was to explore how students face their mathematic learning experience at this stage of their training, in order to elicit students’ initial thoughts and beliefs. Widely open-ended questions for written statements were used in order to appreciate students’ singular perspectives, as part of several exploratory studies that integrate the first stage of the overall research.

Sample

The sample of this specific study includes students enrolled in the course on Differential and Integral Calculus of the first academic year of two engineering bachelor programs: Biomedical Engineering (37 students: 13 male /24 female) and Computer Engineering (86 students: 82 male / 4 female).

Analysis

The analysis of the data is being undertaken by two researchers, using the constant comparative analysis (Glaser & Strauss, 1967). The topics used for demanding the written statements were viewed as inductors likely to bring out the perspectives of students about their current experience, and not as closed questions. We were interested in analyzing the contents and identifying their emerging organization and not separately categorize the responses obtained in each of the topic.

Thus after first scrutinizing separately students’ written statements, they were pooled as one data set. Each researcher individually derived mutually exclusive categories from the data pool in order to identify common themes and ideas. The emergent categories were justified by examples from the material. The researchers’ sets of categories were discussed and negotiated until they reached major agreement. A first set of categories and their descriptions were then determined. A second moment of analysis was later carried out, from which three major categories have been set out, which are presented below.

Results
This paper focuses on students’ responses to the three topics above. At the time of writing, the content analysis is not quite finished, so the following results are based on preliminary data analysis. At the moment coding categories are being reconstructed in order to achieve more distinctive categories that can guide further data analysis and allow a more complete comprehension of phenomena.

Two main features caught the attention of researchers at the first stage of analysis. First, the fact that reported feelings (in a continuous range from feelings of satisfaction, pleasure, interest, to expressions of discomfort, unhappiness, and even despair and anguish) focused strongly on references to previous experiences of learning of mathematics and to themselves as learners. And second the evidence that perceived engagement in the course was clearly associated to the idea of being in control of the situation, that is, a sense of self-control and self-regulation in relation to himself/herself as learner, the learning process and the content of learning.

From systematic analysis of data three major categories have been set out so far, which have been labeled as “knowledge base”, “go-betweens of learning” and “self-regulated learning”.

I Category “knowledge base”
Two major properties in this category were identified:
- The link between previous and current learning experiences
- The role of previous knowledge base

The way students perceive their previous mathematical experiences and achievements is closely linked with the way they face their current learning process. In fact this aspect emerged as one of the most emphasized on students’ statements revealing that the conviction of having or not having “enough” knowledge base plays a key role, in some cases impairing students to face the learning process as an opportunity to really learn something. Analysis of the data placed in this respect the students in a continuum between two contrasting positions.

On the one hand students who show feelings of helplessness and disorientation, claiming not to have the required knowledge bases and being unable to envisage a way out of their predictable failure. In these cases the predominant idea is that the content of learning is something fixed (entailing an invariant sequence of content and skills they need to master), and that their incompetence is also something “invariant” that cannot be addressed during the course unit. "Not having bases" means in these cases a kind of “invariant condition” that students cannot change (either in the present or in the future). Since data under analysis was collected in the beginning of the course unit (in the 3rd week of classes) we can assume that these are students who most probably will give up and drop out.

On the opposite we find those students who express feelings of satisfaction when linking the current experience with their previous learning on mathematics. These students stress the importance of appropriate attitudes (hours of studying, reviewing, applying and rethinking) for the learning process to be effective. Although many of these students mention the high level of difficulty of the course, they view themselves as having the knowledge base and the tools to achieve success through consistent work.

But the data also showed us that some students (although less common) relate “knowledge bases” and “perceived chance of success” in a quite different way. In those cases, students acknowledge their previous experiences and learning on mathematics as manifestly inadequate, also reporting feelings of displeasure and even unhappiness associated with the experience of not understanding the content and not keeping pace with teaching. But, they also consistently report the expectation of being able to face the challenges of the new situa-
tion, viewing their knowledge base as something that although fragile can be a starting point for new learning.

II Category “go-between of learning”
This category emerged from our reviewing of data asking the following question: Besides their previous experiences and knowledge base what are the issues that students state as affecting their learning? And how can we understand the differences we found before?

Properties of this category:
• Predicted workload
• Effectiveness of effort
• Sources of support

The large majority of students view Differential and Integral Calculus as a course unit which implies hard work, long hours of study and training in problem solving, and those regarding this as easy, manageable and enjoyable are quite rare. For most students the expected workload in this course unit exceeds what is common in other units of their study plan.

But what seem to be distinctive are the expectations students have regarding the effectiveness of their efforts. In fact, a significant part of students does not anticipate their effort will be effective. This comes with a feeling of being deprived of any chance of success which, as we pointed out before, is linked by students with their previous bad experiences on mathematics and lack of skills and knowledge.

However, for some students this unit will require effort but they will succeed. In these cases we did not find the feelings of helplessness we described above. And it is interesting to note that one of the distinctive features of these students seems to be the sources of support they identify, since they associate hard work with the expectation of getting support from their context of learning.

In fact we found that students who expect to be able to achieve success (either feeling at the moment competent or incompetent, and expressing subsequent feelings of enjoyment or of discomfort) show more expectations concerning their learning environment and the support they can get within it, including from teacher, peers and the group as a whole. This seems to be linked with the expectation that their learning process can be fostered by their ability to acquire a set of mathematical procedures but also to engage themselves in a deeper understanding of mathematics, which is linked with expectations about the possibility of discussing their mathematical doubts and thoughts with peers and teachers.

III Category “self-regulated learning”
A third category emerged from data analysis that we have labeled as “self-regulated learning”. We found it also to be a key issue within the perspectives of students about the course unit of Differential and Integral Calculus.

Properties of this category:
• Personal agency
• Self-will and planning of learning

This category brings together and elaborates what had already caught our attention in the first phase of open analysis: the evidence that students differ in terms of how they feel in control of their learning process and the ability they identify in themselves concerning the auto-regulation of that learning.
A central feature of this is what we labeled as self-perceived personal agency, ie, the personal sense of efficacy students report and the scenarios of success/failure they picture for themselves.

There is no doubt that for most of these students previous learning experiences on mathematics were not a source of empowerment or enablement. When these past experiences are stressed as almost the sole argument to their current difficulties it is likely that these students do not find ways and will to improve their proficiency and also to plan their study. These are also students who seem to fail to understand the essence of mathematics, showing small expectation about processes of conceptual understanding. So, it can be stated that students differ on their previous learning experiences on mathematics not only in terms of the knowledge subject and skills, but also in terms of the empowerment they get from that as learners.

These differences, which relate with the above mentioned aspects (discussed in the other categories), are closely linked with their current willingness to work on mathematical problems, their readiness to discuss mathematical ideas, and in general their acceptance of responsibility in their own learning process.

**Preliminary conclusions**

The way students perceive their previous experiences and knowledge base on mathematics seems to be a key issue on how students face their current experience, establishing a foundation which can foster or undermine their mathematical dispositions and current attitude and, in fact, their ability to succeed.

Since at this point of research we are only working with data obtained from self-reported statements (not having in consideration data from the evaluation of each of the students) one can argue that in reality students lack of knowledge bases that are essential to their effective learning, and that students perceptions about their lack of capacities, knowledge and skills are in fact realistic. Indeed, for most students of our sample previous experiences on learning mathematics have not been a source of empowerment, and it seems they view themselves as incompetents on mathematics.

However, we also found out that some students who report current significant difficulties in learning do not face their previous “lack of knowledge” as something fixed and seem ready to learn, often expressing the belief that hard work will be necessary but rewarding, since it opens the possibility of success.

These results have raised a set of questions which we are now exploring through data review and literature review (using in fact literature as “more data”, procedure that is central in Grounded Theory). The concept of “self-efficiency” as formulated by Bandura (1986) is being especially useful at this moment of analysis, since it can help us to conceptualize the data on the differences students show regarding their beliefs about the possibility to succeed in Mathematics Analysis. In fact, the assumption of Bandura (1993) that positive attitudes toward mathematics are better predicted by self-efficacy than by actual ability is now under consideration. We are also exploring an extended body of literature that addresses the relation between self-efficacy beliefs, mathematical self-concept, and performance in mathematics in order to integrate it in the analytical process (e.g. Neves & Faria, 2007; Pajares & Miller, 1994, 1997; Schunk & Zimmerman, 1994).

Simultaneously we are starting to identify the pedagogical implications that stand at this phase of analysis. This reflection is being framed by the assumption that it is vital to ensure that teaching process alongside with the teaching of content should allow the empowerment and enablement of students on mathematics and thus their ability to take control over their learning process.
We are, of course, aware that, as Felder and Brent (2005) argue, tailoring instruction to each individual student is not realistic, but “it is equally misguided to imagine that a single one-size-fits-all approach to teaching can meet the needs of every student” (p. 57). This aspect is especially critical in the case of the bachelor on computer engineering where the course Differential and Integral Calculus have many students enrolled, and the rates of drop out and academic failure are very high.

References


Abstract
In Portugal, the current Mathematics Program of Elementary Education and the document of the "Learning Goals" give the geometry the place it deserves. And advocate an approach of geometric topics, they also renovated, that gives space to the action of the student in the understanding of geometrical concepts, supported by dynamic environments of dynamic geometry. One topic that has undergone considerable changes was "geometric transformations". On the other hand, the "Patterns" have been gaining ground as an innovative way to contribute to the resolution of student’s disinterest, lack of motivation and school failure. But there are few studies which are situated at the confluence of these dimensions. In this perspective, we developed a research that aimed to assess the impact of an approach of isometries through the study of patterns and using dynamic geometry environment, at the level of the development of transversal and specific skills in Geometry. We decided for a multiple case study, essentially qualitative, which took place in a context of action research. It involved a 9th grade class and, in particular, four pairs of students from an elementary school. We used inquiry, direct observation and document analysis, supported by several instruments, including log-book, questionnaires, informal conversations, tests, students’ productions and internal documents of the school, as data collection techniques. For data processing, we used, mainly, content analysis. The study concluded that the approach of isometries centered on patterns, using the Geometer's Sketchpad (GSP), contributed, generally, to the development of geometrical knowledge; of mathematical communication; autonomy and to a more friendly relationship with geometry. In this communication, we highlighted the impact of the study at the level of interactions established during the mathematical activity.

Introduction
Following what has been happening internationally, in Portugal, the current Mathematics Program of Elementary Education – MPPE - (Ponte et al., 2007) gives Geometry a central role in the school curriculum, particularly with the introduction, since first grade, of a new way of facing and addressing the several geometric transformations. The isometries, in the Euclidian plan, can be explored from friezes and rosettes, establishing the foundation for a more thorough and deeper learning process as one advances in education.

Another vital aspect concerns the importance of the use of the computer and, in particular, the dynamic geometry environments (DGE). There are many authors and documents that have been stressing the importance and the advantages of using computational tools in the representation of geometric objects, while favoring an active role of the students in their leaning. (Candeias, 2005; Ribeiro, 2005; Ponte et al., 2007; NCTM, 2000/2007; Hoyles & La-grange, 2010; Breda et al., 2011).

In learning Mathematics, the “Patterns” have also been gaining ground as a supportive and innovative context for students to engage in mathematical activities and develop mathematical communication. However, there are few studies which are situated at the confluence of these three dimensions.
The current article aims to present some results of a research work (Matos 2011) oriented by the following question – *To what extend can an approach of the rotations centered on the study of the patterns contribute to the development of mathematical transversal and specific skills?* It focused, therefore, on the students and aimed to assess the impact of an approach of the isometries, centered on the study of patterns and using Dynamic Geometry Environments, at the level of:

- Geometrical knowledge, specially related to the isometries;
- Communication;
- Autonomy;
- A more affective relationship towards Geometry,

In this article, it is underlined the impact at the level of the social interactions established.

**Communication in mathematics**

The communication in Mathematics has been, recently, a highly valued area by the results that the investigation has reached so far. In fact, studies like the ones of Cobb (1995), Voigt (1995), Wood (1998), Brendefur & Frykholm (2000), Lampert e Cobb (2003) and Martinho (2007) allow us to conclude that the communication can be a catalyst for learning mathematics, meaningful for the students. The *National Council of Teachers of Mathematics* (NCTM, 2000/2007) gives it a central role, too, highlighting the importance of: organizing and reinforcing mathematical thinking through communication; communicating the mathematical thinking consistently and clearly among students, teachers and others and using mathematical language to express mathematical ideas accurately.

So, it is not surprising that, in Portugal, in the current MPPE (Ponte *et al.*, 2007) the mathematical communication is highlighted, as a transversal capability to be developed throughout the entire academic life “both with the problem solving and the mathematical thinking”. Emphasis is placed on: “the students should be able to communicate their ideas and read the others’ ideas, organizing and clarifying their own mathematical thinking” (id: 5), and it is considered that the creation of opportunities for communication constitutes a crucial aspect while working, in particularly, within the classroom.

Although the importance of the written communication is emphasized as a way to “help the students consolidate their thinking, once it makes them think about the work and clarify their ideas in relation to the issues developed in class” (NCTM; 2007: 67), the oral communication is a fundamental part to the development of mathematical competence, both in terms of the (re)construction and disclosure of the knowledge, and of the development of other transversal and specific capabilities and attitudes. Alrø e Skovsmose (2006), for example, considers that the oral interactions while part of the dynamics of the communicative process constitute a privileged means for negotiation of meanings, in the Mathematics class. NCTM (2000/2007) also emphasizes the building of meanings, as well as the consolidation of ideas and their revelation. But, so that the interactions can gain added value, Boavida *et al.* (2008) reveal those which are created around the resolution of certain tasks, rather than the mere presentation focused on the product – “the interactions that occur in the course of the mathematical activity triggered by a task, create numerous learning opportunities that are unlikely to occur in a class of individualized work in which the interaction is, frequently, confined to the presentation, on the board, of the procedures used to get to the solution.” (78). They stress, this way, its social dimension, an aspect investigated by Guerreiro (2012).

However, it is not enough that the students participate, explain their reasoning and listen to each other for learning to occur. The teacher has a crucial role in this process, by organizing the interactions that happen in the classroom, making them easier or inhibiting
them (Menezes, 1995). In fact, the teacher’s practice can vary from “traditional” asking questions to a dialogue praxis in which the students play a more significant role, expressing their views and explaining their own way of thinking about the matters under discussion (Wood, 1998). In this case, the teacher creates favorable conditions so that Mathematics makes sense for the students and also so that students don’t see it as a set of procedures, rules and processes that must be mechanized and stored for further use. Regardless of the paradigm that supports such actions, the questions assume a relevant role and those which request intervention, inviting students to participate, gain special importance (Menezes, 1995). But, above all, it is important to motivate and make room for the students to ask questions and reflect, key ingredients to an effective learning (Pedrosa et al., 2005).

Method

We have opted for a multiple case study (Stake, 2007; Yin, 2005), essentially qualitative (Bodgan e Biklen, 1994). As suggested by these authors, the techniques for the data collection were very varied, considering the inquiry, the direct observation and the data analysis, backed up by a lot of tools, namely the logbook, the questionnaire, informal talks, the evaluation test, other students’ works and internal documents of the school. For the data processing, we used statistical analysis and content analysis (Krippendorff & Bock, 2008) oriented by defined categories from the subjacent question to the study.

Due to some issues that have to do with the restrictions imposed upon this article, we will only refer to the results obtained by four pairs of students (G2, G4, G7 and G8) of a class of 21 students of the 9th form, related to the communication as social interaction, that emerges from a discursive practice, deriving from collective and individual processes of sharing meanings. The choice of the four pairs (made by the students according to their preferences) had to do, mainly, with their different school performance and also their easiness in communicating ideas, both orally and in writing.

We developed nine learning experiences within the unit “Circumference and Polygons. Rotations”, and in its approach, by the researcher/teacher of the class, in Maths class, Supportive Study and Study Room, methodologies for collaborative work were privileged, using Geometer’s Sketchpad (GSP).

We also had in mind to see, describe and interpret the learning process experienced by the students, in real-time and in the natural environment of the classroom which, together, integrated the individual work, the work in small groups and the large group discussion.

Results and discussion

The case G2

A2 and A14 showed great expectations in relation to the working sessions using GSP, once, in spite of using the computer to work and to do research at School and in Maths lessons, they had never used Geometry software. Both liked school but only A2 said that Maths was one of her favorite subjects. She was an attentive, organized and participative student, asking relevant questions and used to help her classmates whenever they needed. Her best friend was A14 and they used to work together in every school subject. Maths wasn’t her favorite subject. She liked the new technologies, handling them well. Both of them showed commitment in the assigned tasks; however, A14 was more talkative and less hard-working. A2 liked to learn new things a lot more and showed great sense of responsibility in the work she performed.

Regarding interactions, A2, in many moments, assumed an “inquiring” role relatively to her workmate, questioning her about what they were going to do, which objects they were
going to need to do what they wanted. This attitude was taken in a natural way, maybe due to the fact that she was a good student. She helped her classmate to think, encouraged her in her learning process, helping her to think of it. Nevertheless, it was A14 who took the leadership of the mouse in the constructions although she recognized in her classmate someone to trust:

A2: In this issue what do you need to know? The picture only shows rotational symmetries!
A14: So this belongs to the group of the rosettes…dihedral (controlling the mouse).
A2: And what do we have to do?
A14: We have to complete the rosette.
A2: Yes, but what do we have to find in the picture?
A14: I think it is the measurement of the amplitude of the rotation.
A2: Exactly. Do it.
A14: But, what points do I have to consider?
A2: Let’s see… perhaps we have to consider these. (pointing at the screen) What do you think?
A14: I’ll measure it to find out.

A2 helped A14 in her learning process, making her understand what she was doing, not only through the questions she answered but also through the clues of resolution she was releasing.

Throughout the sessions, both students argued a lot, based on the feedback seen on the computer when manipulating the constructions:

A2: Do you want to try different amplitudes, to see if they maintain the relationships?
A14: OK. I was thinking of making an angle range of 70º first and then a different one.
A2: Use the menu “Rotate” to see what is maintained. Don’t select everything, just the hexagon.
A14: OK. I know how to do that, first I select the picture and only then I trigger the command.
(A2 reads the question again)

Technology constituted, this way, a context for the discussion about the objects seen on the screen and about the effects of the several transformations that the software enabled. The use of the DGE also enabled to create, within the group, contexts of collaborative learning, which led them to clarify and structure their thinking – increasing the possibilities of a conceptual growth.

Thus, the context of the interaction set up a collaborative learning environment, since there was an active and shared involvement of the group in the resolution of the different issues, discussing ideas and situations. Indeed, the discussion generated around the records was constant and the horizontal interactions established within the pair were, in a symmetrical way, characterized by a mutual negotiation where it is acknowledged the contributions of both parts to carry out a final common conclusion. (Fernandes, 1997)

Concomitantly, dissipated vertical interactions were also verified in issues of focusing and short answers, in order to help the students overcome their doubts and truly engage in the task:

Researcher: Observe the images you have built and take conclusions.
A14: It is a rotation with the same centre.
Res.: And what can you tell about the amplitude of the rotation angle?
A14: We have already measured; it equals the sum of the measurements of the other two.
Res.: OK. Try with other amplitude measurements and see if the relationships are maintained.

It was also observed, in the groups’ exhibitions, that the researcher assumed an inquiring role, in an attempt to clarify and summarize the claims of the students. From the collected data, one can infer the importance of social interaction in learning Mathematics (Schoenfeld, 1992)
and, in particular, Geometry, for its decisive function for the construction of geometric knowledge. The idea that through the exchange of ideas knowledge is better understood by everyone was reinforced.

**The case G4**

A4 and A12 had a computer at home, which they used to play, to work and also to talk on Messenger. A4 could keep up, easily, the various issues and was responsible, even though, during classes, he seemed to be “distant”. He didn’t like going to the board, because he was afraid of failing in front of his classmates. A12, although rather reserved, was nice. She liked Maths but was not good at this subject. In class, she was attentive and hardworking, engaging herself in all activities, both by herself and within a group. However, she was more comfortable solving problems than in more open or complex tasks. She pointed Geometry as her favorite topic, because it was easier for her to understand.

The pair stood out by the way it mingled in the class. A significant contribution to this was the group work, without which the number of interactions would be smaller and, possibly, without much impact on the development of the relational competence.

**Picture 1. Photographic record of A12 helping colleagues**

The students worked, in a general way, collaboratively, both in the performance of geometrical constructions and in the preparation of responses, which allowed them to think about what each one of them was doing on the computer screen and to talk about the constructions. The fact that they worked well together was beneficial to their learning.

It was also clear that the fact that they had used the language of *menus* and had the possibility to point at the screen, with the finger or the mouse, helped them to think and understand what they were discussing, thereby, facilitating the development of arguments:

A12: You have to consider these points to the vector associated to the translation/slide.
A4: Isn’t it the one which has the opposite direction? This one (pointing at the screen).
A12: Yes. But we have to consider the two vectors in the continuation of the frieze.
A4: But it isn’t correct!
A12: You are right. We have to repeat the new motive formed by the two letters F.

In general, A12 was the one who stood out during the experiment, both by the involvement in the achievement of the activities, and the presentation of the results to her peers, having placed pertinent and relevant issues for a better understanding of the general discussion:

Researcher: *G4, can you explain how you built the frieze of the last question?*
A4: We started by drawing a parallel line to the given vector. Then we determined the image of the crown by the flip. Afterwards, we applied the vector to the image and obtained the crown.
A12: But now we need to repeat the new motive. What is the vector associated to this slide?

However, the ideas of A12 not always prevailed and, sometimes, they expected a recognition of validity. Most interactions were made equally, based on a hierarchical organization, according to its status, in particular, in the last sessions of intervention.
Thus, interactions confined collaborative learning contexts, since they influenced the way they shared geometric concepts and meanings. The exchange of ideas enabled a more active involvement in learning, as they became aware of their ideas in that dialogue. On the other hand, the discussions, moderated by the researcher, aimed to promote interactions within the group and other students in order to detect difficulties in understanding, help to reason and encourage participation and initiative.

**The case G7**

It was the first time that A15 and A19 worked together. A19 liked Mathematics and viewed it as one of his favorite subjects. He participated in class, did all the homework and enjoyed working in groups. He was good at Mathematics. A15 always had a lot of difficulty in Mathematics and always had bad grades at this subject. He did not participate orally; he wasn’t attentive and did not solve tasks. He was nice and friendly but took advantage of every opportunity to get distracted. In general, he had poor school performance and showed a lack of motivation for studying. He was sorry that Mathematics meant nothing to him, only showing some interest when the issues did not require much mathematical knowledge.

A19 showed great enthusiasm for the proposed activities. His participation and hard work were constant. He showed a fairly good level of integration of knowledge and was quite sure when intervening to defend his views. He revealed great persistence in the discovery of conjectures and, in some cases, he continued investigating extra class. When the group was faced with an impasse, it was A19 who found a way to overcome it. There was a clearly asymmetry in the power relations in this group. Although his classmate told him what to do, A15 resisted participating in the task. He just wrote the answers thought by his classmate and did it without much personal involvement. Before the first difficulty, he used to ask him for help to write the requested replies:

A19: *Now, build the rosette generated by successive rotations of 90º.*
A15: *I’ve already understood that.*
A15: *Do it. It’s very easy!*
A19: *Not now. I’ll make the records. I know how to do that.*
A19: *I’ll see if you can answer the next question.*

It was notorious the evolution of A19’s satisfaction in exploring this kind of tasks. He stood out from his classmate, by his involvement in doing the proposed tasks and by his role in sharing his ideas either with his classmates, or with the large group. The Sketchpad influenced, by far, the way people see Geometry and its learning. This aspect was not observed in A15. His participation consisted, basically, of following the path outlined by his classmate.

A19 was the one who, in the group, wanted the researcher’s help more often, and who established verbal interaction with her more frequently, either by raising issues and putting questions, or by answering her questions. He was fully engaged in solving tasks, working with his colleague in a healthy way. They were usually the last ones to finish and could not always fully complete the activities. In spite of putting questions during their resolution, they showed some previous work in trying to overcome the problems which were emerging.

Indeed, the student-student interactions confined to a little collaborative learning, since there was not a joint cooperation for the work set. There was, by A15, a passive interest in building his own knowledge. His role was not decisive for the way how the exploitation of the tasks occurred. They played very different roles in the group, most probably due to their different academic performance. Therefore, the development of every task was always carried out by A19.

**The case G8**
Both A8 and A17 liked school, but A8 expressed a special preference for Mathematics and A17 for History. A8 was a very responsible student, and carried out her work very seriously, always trying to be the best. She was attentive and organized and could express herself, orally and in writing, very easily. She enjoyed going to the board and helping her classmates but when she needed help she wanted the teacher’s help. On the contrary, A17 was very shy and introverted. She saw herself as an average student and didn’t like the subject very much.

The dyad was pleased to work together and the A8’s role was determinant to integrate her classmate in all activities, although this one didn’t like this way of working very much. Especially in the beginning, A17 showed more difficulties than her classmate in taking initiative. Even though A8 took possession of the mouse more often, she was always concerned with sharing and discussing their ideas and make room for her classmate to participate. As the experience of the group increased, the role of A17, although not so crucial for taking initiative or solving problems, was still important. But it was mainly A8 who never gave up looking for new ways and tried not to ask for her researcher’s support. On the other hand, in some situations, A17 was less comfortable in the exploitation of the tasks, maybe because she was a rather timid student. In the group, her participation consisted of, in most cases, following the path outlined by the classmate.

Picture 2. Photographic record of the group G8

In spite of working well together, who dictated the answers was A8 and it was not seen in the other student the need to change the situation or contradict her classmate. In this regard, let’s see the solution presented by the pair on the third question:

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Picture 3. Solution of the pair G8 on the task 8 – question 3

We made a reflection/flip of the figure associated with the line K, and then we flip the figures obtained through the axis l. Afterwards, we made successive translations associated with the vector m.

It was notorious the weak involvement of the group in the execution of the tasks, which resulted in a less active participation in the discussions, perhaps because they didn’t like Geometry very much:
For the interaction context, it was acknowledged a collaborative learning environment. However, the horizontal interactions established within the group, were characterized by an asymmetry in relation to the role that each one assumed in the exploitation of the tasks. Thus, the collaboration was based on an unequal relationship of power, in which A8 sought to dominate, not recognizing, sometimes, the other’s contribution to the construction of meanings.

Regarding vertical interactions, the few that existed, as it sought to develop a more autonomous work, questions were directed to a focus point, in order to help the group overcome their doubts. The way they tried to respond to the different challenges that have been suggested allow us to assess that the work in small groups was important, since knowledge is best understood by each one, although not always had A17 profited from that interaction.

Conclusions

As Abrantes et al. (1999) recognized, it was also seen in this study that the geometric activities set excellent opportunities to develop mathematical communication and Geometry, in particular, appears to be a favorable field so that they can express their ideas and arguments. The fact that the tasks have been carried out in pairs involving a DGE enhanced the exchange of ideas, negotiation of meanings and development of arguments.

However, the difficulty in communicating ideas in written conditioned the way this teaching experience took place. On the other hand, it was clear that the open and difficult tasks are a challenge for which most students, especially these four cases, were not prepared. Indeed, the reaction of the pairs was very similar to the other dyads: a lot of levity in the way of facing the work of reflection on the tasks and the way of expressing and communicating that reflection, particularly in matters concerning the formulation of conjectures and the establishment of generalizations.

With respect to the way how the different groups interacted, the importance of the social interaction can be inferred for its decisive function to the construction of geometric knowledge. Although there were asymmetries in the involvement of the students in each pair, the interactions, in general, were always based on the work to be done.

On the other hand, the researcher’s speech was, primarily, oriented to the making of questions that helped the students through their work assignment. Therefore, she assumed the role of moderator of the discussions, by managing the sequence of interventions and orientating, whenever necessary, the content. The questions were made to spot difficulties in the understanding of the geometric concepts and processes, helping them to think, motivating them to participate and also to see if they were following the work of the class.

Thus, the results suggest that the interactions established among the students in the groups G2 and G4 and the researcher, along with all collaborative work, point, clearly, to a positive evolution in their way of communicating, which was reflected in the work carried out throughout all tasks. The fact that the students felt more comfortable in small groups led to the confrontation of different understandings and to the emergence of new meanings. However, in the other two cases, in spite of interacting well together, the interactions established among them configured a collaborative learning environment but characterized by an asymmetry regarding the role that each one took on during the exploitation of the tasks. In fact, the cooperation was based on a disparity of power among them and the activities developed within the subgroups were always held under the initiative and guidance of A19 in the group G7 and of A8 in the group G8. Hence, although the verbal interactions were frequent,
there was little discussion around mathematical ideas among the members of the subgroups. A17 and A15 recognize some failure in the involvement in the work, making it clear that not everything went well, concerning the way they carried out the tasks within the group.

From the above, it can be concluded that interactions have taken a key role in the communication that occurred in the classroom and featured, in a decisive way, the nature of teaching and learning the subject, by establishing the difference between what can be done with others and all alone. In fact, the approach of rotations centered on the study of patterns, using DGE’s and the work, mainly, in small and large groups constituted a good resource to promote communication in Mathematics (in most students).

References


5. Cross-curricular Mathematics – A Case Study

Maria João Naia and Isabel Cabrita
School Group of Arada; CIDTFF-University of Aveiro

Abstract
A research was developed to explore how the process of inter-year and inter-cycle Cross Curricular Mathematics is interpreted, planned and experienced, as set out at a ministerial level, within a vertical grouping of schools. A qualitative and interpretative case study was chosen. The participants were 11 teachers, some with management positions. For data collection, a document analysis, observation and inquiry were included. The data show that teachers unanimously believed in the potentialities of collaborative work. And that, despite all efforts and measures introduced, there continues to be a difference between the scholar cycles. In fact, there are horizontal articulation regarding the several years of the same cycle but, in what concerns vertical articulation, there is a gap between the 1st and the others cycles.

Introduction
The “general crisis” system which has been repeatedly denounced by several sources lead, in the Portuguese political-educational panorama, to continuous reforms, which translated in legislative measures that intended to resolve problems resulting, namely, from the mass generalization of Education.

A school network structure was implemented, organized in School Groups and, more recently, in mega School Groups. School autonomy emerged, which allowed them to create their own development projects. This was made clear by the decision-making at a strategic, pedagogic, administrative, financial and organizational level. Such autonomy legitimizes the increase of autonomous participation of teachers, providing them and the management structures they belong to with the power and the means to define their own school policies and to establish their development plans. And is assumed specifically that the collegial spirit promotes efficient and innovative collaborative practices, based on a constant reflexive confront of ideas, experiences and knowledge among the teachers within the same or different school cycles and/or years.

Within this framework, it is pertinent to understand in particular the way different school structures are organized in order to accomplish the articulation, the mathematics, between school years and cycles, contributing thus for an effective learning of the subject.

Therefore, the defined main research question was: How is the process of inter-year and inter-cycle Cross Curricular Mathematics interpreted, planned and experienced, as set out at a ministerial level, within a vertical grouping of schools? From this starting point, seven research objectives were outlined:

• To identify the process of student characterization in the School Groupings in mathematics and to assess the impact on the teaching planning;
• To learn more about the organization of Curriculum Department and its influence on teachers’ work;
• To understand the process of inter-years and inter-cycle Cross Curricular Mathematics;
• To identify the impact of the school Project – Mathematics Plan – in the teachers’ work;
• To identify the difficulties and benefits of collaborative work among the Mathematics teachers, to characterize the type of teachers’ culture;
• To obtain teachers’ points of view on what it means to be a mathematics teacher today;
• To obtain teachers’ points of view on what the work of a mathematics teacher entails - the link between cycles.

Theoretical framework

This study’s theoretical framework is based on three main connected themes: vertical grouping of schools, curricular articulation and teachers’ work.

The creation of the Vertical Grouping of Schools – which is the current privileged model of administration and management of the Basic Education in Portugal – was assumed as one of the responses by the Official Authority to the current demands, which requires a more integrated and inclusive school, that should not promote a compartmentalization of knowledge. In opposition, it should assure a comprehensive teaching of all Basic Education students. This was firstly legitimized through the Normative Resolution number 27/97, published June 2nd, and by the Autonomy, Administration and School Management Regime (Decree-Law number 115-A/98) published May 4th. An autonomy perspective emerges and assumes a conception of School with its very own identity, where teachers interact and their participation is valued and promoted, which allows a better management of resources and, in consequence, a better educational public service performance, as stated by Nóvoa (1992), Alonso (1998), Roldão (1999), Canário (2001), Barroso (2001), Simões (2005), Dácio (2005), among others.

Therefore, all teachers should mobilize and assume themselves as co-creators of a more pertinent curriculum for their schools or school groupings, as they should take responsibility for the promotion and structuring of the learning process of their students. Such curricular management is essentially linked with the way teachers interpret and shape the curriculum in two levels: a macro level, which is related to the planning of the teaching practice, and a micro level, which corresponds to the class room and the execution of the teaching practice (Ponte, 2005; Roldão, 2005).

Taking into account a periodic evaluation and reflection of its professional practices, the curriculum is always subject to adjustments and should be based on a true curricular articulation, which, in a logical and sequential way, assures the continuity between the school years and cycles – “The Mathematics School Curriculum should provide a sort of map, which should help the teachers to lead their students towards increased levels of complexity of knowledge. This guidance requires a well-articulated curriculum allowing the teachers, in each level, to understand the mathematics learned by their students in the previous level, as well as contents in which they should focus in the following levels.” (NCTM, 2007: 17).

In fact, the curricular articulation, either at a vertical level, between school cycles and years, or at a horizontal level, between subjects and non-subject curricular areas, seem to be the keyword in all the legal documents which regulate the Portuguese Educational System, as far as the mandatory basic education goes, regarding the 9 school years as whole. Such articulation is clear in the teachers’ work, which should be based in collaborative behavior.

These behaviors are currently promoted and developed by the pedagogic structures, particularly the Curricular Departments, created by the Decree-Law number 115-A/98 and published May 4th. In its 35th article is defined that “in the 2nd and 3rd Cycles of the Basic and Secondary Education, the curricular articulation is ensured by the Curricular Departments, in which the Subject Groupings and Areas are represented according to the courses, the number of teachers by subjects and the dynamics which should be developed by the School” and “in the pre-school and 1st Cycle of the Basic Education, the articulation is ensured by the Teach-
ers Councils, which in each school integrate the pre-school teachers and 1st Cycle teachers (this competency was initially legislated by the Regulate-Decree number 10/99, 3rd article). According to Simões (2005: 78), “the advantages of School Grouping, however, are limited by its structure, which continues to contemplate the separation of the Cycles”. Therefore, in the Decree-Law number 75/2008, published April 22nd emerges the designation of Curricular Department, embodied as an educational structure and pedagogic supervision structure. In its 43rd article, it can be read: “the curricular articulation and management are ensured by curricular departments, in which all the recruitment groups and subject areas are represented, according to the courses and the number of teachers” (43rd article, item 2). And, as stated in item 3, article 43rd, the 1st Cycle of the Basic Education can also be integrated.

The current Basic Education Mathematics Program aims to promote vertical and horizontal articulations, as stated previously (Ponte et al, 2007). Particularly, in what concerns vertical articulation in each school cycle, in the introduction of each mathematical theme and cross abilities, it is anticipated the articulation between a specific cycle program and the previous cycle relative to that theme or ability.

Teachers should assume the role of connecting the cycles, since their work is, with the most certainty, one of the elements which most influences the quality of education and learning, as underlined by Thurler (2001), Arends (1999), Bolivar (2000) Nóvoa (2007), Ponte et al (2007), Frota (2011) among others. Such demanding task will be certainly facilitated and fostered if developed in collaboration with their peers (Aston and Webb, 1986; Fullan and Hargreaves, 2001; Frota, 2011). In fact, team work promotes the resolution of common and specific problems and provides mutual support for their professional development, targeting innovation and education quality and efficiency (Hargreaves, 1998; Bolivar, 2000; Frota 2011). It is through participation that teachers can make decisions, together and actively, present, confront and share ideas and, in particular, develop curricular management interpreting and promoting the curriculum taking into account the specific characteristics of their students, existing resources, school conditions and social-economic and educational framework (Correia, 2007). By getting involved in reflection processes, this participation will allow the existence of a critical debate about their tasks, their problems and the way to resolve them, in short, to intervene fully in all the education activities e contribute actively for their professional development, as stated by Correia (2007) and Guerra (2002).

For the schools and, specifically, for the teachers to consider and develop what will be the new and great challenges in all plenitude, they will have to overcome constraints and obstacles, but also (re)invent other conditions and factors which promote and optimize the work of the teacher, of mathematics in particular, namely, within a framework of curricular articulation between school cycles and years.

Research methodology

In this item, we start to explain the methodology options and participants of this research work. We proceed with a brief presentation of the chosen information gathering tools and techniques for each research phase and a summary description of the case study. Finally, we explain the method used for data processing and its presentation.

Methodology options and participants

Taking into account the research objectives, it was decided to undertake a qualitative study, based on a constructivist paradigm, and to follow the single study strategy, micro ethnographic study form (Bogdan & Biklen, 1994; Stake, 1995; Gomez, Flores and Jimenez, 1996; Crosswell, 2003; Coutinho, 2011).
The study focused in a Vertical Grouping of Schools, selected due to the schools’ accessibility, since it was geographically close to the researcher residence area, which allowed easier access, more frequent visits with lesser costs, as well as for the schools’ voluntary participation to implement a project at the 1st Cycle level, suggested by a school inspector and which contemplated an actual vertical curricular articulation.

At the macro level, this study had the participation of the President of the Executive Council and the president of the Pedagogic Council. At the meso level, the study counted with the participation of the coordinator of the Curricular Department of the Basic Education 2nd and 3rd Cycles, which integrates the Mathematics subject, and the coordinator of the Curricular Department of the 1st Cycle. Finally, at the micro level participated three math teachers from the 3rd Cycle, three from the 2nd Cycle a one teacher from the 1st Cycle. Nine of the participants were females and two were males, ranging from 8 to 39 years of teaching experience.

**Information gathering tools and techniques and study description**

The information gathering techniques used in this study were the document analysis, which was based on formal records at an exo and macro level, the inquiry, using script-oriented semi-structured interviews, and the direct observation, supported by field note registration and logbook, which permitted a complete perspective of the studied phenomena.

This research occurred during the 2008/2009 school year in a Vertical Grouping of Schools of the Central Coastal Region, which assembles nine 1st Cycle schools (all geographically separated from each other and from the Head School) and one 2nd and 3rd Cycle school. The 1st Cycle schools are built according to traditional architecture models, although well preserved and globally well equipped. In the Head-School facility there is an exclusive classroom for the Mathematics subject.

The empiric study was organized in three distinct phases. The first phase consisted in the planning of the study in what concerned the theoretical framework, method definition of the research, question preparation, setting of research objectives, selection of School Grouping and participants. After the acceptance of all participants, a guided visit to the 2nd and 3rd Cycle School and some of the 2st Cycles Schools facilities was carried out. During this guided tour we were able to observe all areas and collect some field notes. At that same time, the School Grouping documents were gathered: School Grouping Curricular Project, School Grouping Education Project and Internal Regulation Documents. It was then created the interviews script, which were promptly individually carried out onsite. In the last phase, we proceeded to the sorting and analysis of the collected data.

**Data analysis and presentation**

The data was analyzed through content analysis and sorted by categories, which were created taking into account the research purposes. The data was then presented using a descriptive approach, transcribing some of the most relevant statements.

**Data analysis and discussion**

In a Vertical School Grouping, the students are considered 9 year residents – from the 1st to the 9th grade. Their Individual File gathers information such as their social-economic context, family background and their school path. However, these elements are not enough to have a general perspective of their development stage comprehensively and individually, as far as Mathematics is concerned. Therefore, to complete this characterization it was taken into account test results, exams and other records from previous school years, and also the question-
naires filled in the classrooms, which completed the information recorded in the Class Curricular Project and the diagnostic forms. A participant from the 1st Cycle further stated that Individual Student Files “are assembled throughout each school year. I have a chart composed of specific student evaluation items, which ranges from problem solving, to memorizing and communication skills in Mathematics, which I use to record the related values” (1st Cycle teacher).

Other source used to characterize the students was the meetings carried out at the beginning and at the end of the school year. These meetings’ agenda included the execution of the curricular management and involved the three Basic Education Cycles – “In the first meetings we prepare and organize the entire school year and the final meetings are used to evaluate the execution of the programs and to improve some aspects of the work carried out during the year and to plan specific activities for the beginning of the following year” (2nd Cycle teacher). According to the interviewees, the collected information influenced, at a meso level, the management of the Subject Group activities and, at a micro level, it affected the planning and organization of the class tasks. The 1st Cycle coordinator stated that the student characterization influenced the work of the group of teachers who taught in the School Grouping.

In what concerns the curricular departments, we must single out the Mathematics and Experimental Sciences Departments, which are composed by 2nd and 3rd Cycle Mathematics, Nature Sciences, Natural Sciences and Physic-Chemistry Science teachers, as well as the 1st Cycle Curricular Department. These departments were responsible for the curricular development based on a collaborative culture, and together were responsible for the standardization of the work to be undertaken in the future, shared and crossed ideas and experiences, and searched for adequate activities for their students’ needs, as stated a 3rd Cycle teacher: “This is the opportunity for us to act in a more or less uniform fashion, with mutual help and sharing collaborative work.” The 1st Cycle Math teacher emphasized that the Curricular Department meetings, held in a mandatory monthly basis, were useful to outline new challenges and new projects. However, she expressed the number of participants was too high and the meeting duration too short. She also referred to the legislation changes, which altered the Department’s composition, namely resultant of the association of more Subject Areas, which revealed to be less productive. However, it was unanimously recognized that this is the only formal moment of group work, in what concerns the model of curricular management developed on a collaborative culture basis.

After analyzing the School Grouping Education Project, it has emerged the curricular articulation as an element to improve, as referred by all the Curricular Departments. In that Project a point was made about not attributing a single school level to each teacher. This measure was submitted to the Curricular Departments and is also included in other school documents, namely the Internal Regulation document and School Grouping Curricular Project. In the latter, the school defines the pedagogic organization guidelines, assuring the continuity between school levels and years, appealing to a participation of all teachers.

In what concerns the 2nd and 3rd Cycles, the Math teachers benefit from the School Project – Mathematics Plan. This sub-group of teachers held 90 minutes weekly meetings (these 90 minutes were included in the school timetable, in accordance to the deliberation of the Pedagogic Council) to develop their work, promoting horizontal and vertical articulations, intra and inter-years and school cycles. According to the general opinion, that Project brought many positive aspects for the teaching and learning of Math. These teachers underlined, on one hand:

- the possibility to work as a team and to obtain new (and more) materials, namely, computer and technological resources, and, in particular, interactive boards;
• the better teaching articulation and equity in the curricular development and in the evaluation moments;
• the assignment of more teaching time for the Math subject, making the most of curricular areas of non-related Math subjects, such as Guided Study and, in the 6th Grade, the School offer also oriented for its teaching.

None of the interviewed teachers mentioned any negative sides associated to the Mathematics Plan. They only denounced the lack of work among peers in the classrooms and, also, that the implementation of the project justified an increase of funding, as well as more physical resources, since they considered them to be scarce. As far as the 1st Cycle is concerned, the time destined for non-related teaching activities were all used with study support activities, supervision and meetings. Nonetheless, the teachers held regular meetings, although isolated from the other cycles, as it’s stressed by a 3rd cycle teacher: “In this school, the 3rd cycle teachers work in articulation with the 2nd and 3rd cycles, whereas the 1st cycle is a bit distant. Nevertheless, it’s possible that next year we will be able to improve the articulation between the cycles. We are thinking about it”.

In what concerns factors which make vertical curricular articulation more difficult, the interviewed teachers underlined the incompatibility of schedules and the lack of culture for this kind of work, to which the great workload, beyond the scheduled school timetable, is no stranger. They also stressed that the number of teachers participating in the workgroup influenced the outcome of their work. Additional difficulties come from the lack of physical spaces, which has negative implications in the teachers’ timetables, if they want to hold their group meetings beyond the weekly 90 minutes determined by their Management.

The system hiatus are starting to be resolved since the creation of weekly or daily periods and the appreciation for collaborative work praised by the interviewed teachers, as it’s also perceived the Official Authority intends to implement a mechanism at an exo level, by conceding greater autonomy to School Groupings.

About the perception of what it means to be a mathematics teacher today, the interviewees admitted that it is a challenge, a difficult task, sometimes discouraging. In opposition, they understand it to be enriching when it comes to sharing the knowledge of science. These opinions are related to the students’ attitudes towards the subject and their motivation; with the level of knowledge they are able to acquire throughout their school path; with the belief mathematics will influence their professional future. On the other hand, there have been new information emerging and new challenges introduced by the Official Authorities, namely concerning innovative methodologies to be implemented and assessment tests. With this regard, the 1st Cycle Curricular Department Coordinator stated: “I believe the first change happened with the assessment tests. This shook the class and teachers started to realize they had to change methods and teaching material and even their own training. I can add that, in our School Grouping, all teachers are currently in training”. Even so, they recognized the importance of their role in the society, associated to an increase tendency for the subject. They argue that being a Math teacher today demands continuing training, a constant exchange of professional experiences gathered through many years of work, and value collective practices in opposition to individual and hallow actions in what concerns learning and final outcomes.

All interviewed teachers underlined the work developed by their math colleagues and placed the link between cycles at the level of curricular articulation and collaborative work. They admitted that the taste and motivation for mathematics is “born” in the 1st cycle and used terms such as “this is how we build a house” and “it’s a snow ball” to justify the connection between cycles, in a perspective of continuity and sequential progress. Even though they understand the importance of their role as links between cycles, the teachers referred to the
existence of some obstacles in that articulation, namely between the 1st and 2nd cycles, starting from the fact of their physical separation.

In short, from the several collected statements, it has stood out a feeling of hope in a greater student involvement with mathematics. The teachers recognized unanimously that the Mathematics Plan opens new horizons for teaching, but also new and increased responsibilities in its interpretation and application. The changes introduced in the education system, mainly through the Mathematics Plan, were greatly emphasized by the teachers, now integrated in a new concept of school, where the involvement of parents, students and teachers is faced as increasingly important and decisive, now and in the future - in other words, an open and modern school, open to the community, free of barriers and obstacles of all sorts.

**Conclusion**

The study allowed us to understand better a certain reality and obtain several significant conclusions about the constraints faced by the mathematics teachers of the basic education while developing their work, in particular, in the creation of links inter-cycles and assess which measures should be taken to surpass the obstacles, and on the other hand, to identify which conditions and factors promote the desirable vertical articulation.

The work of teachers as a link between cycles is founded in the curricular articulation. Such articulation is obtained horizontally. However, vertical articulation is much more evident in the 2nd and 3rd cycles of basic education, being promoted by a collaborative culture.

The mathematics teachers of these cycles benefit from the Mathematics Plan proposed by the Official Authorities in 2005 and report positive outcomes from this project: the collaborative culture and the collegiality; the work among pears; equipped schools, namely, with computer technologies (pc and interactive boards); equity in the assessments; increased teaching time schedules for the subject; continuity between school years and cycles; a more ample and effective articulation of efforts and better outcomes. In what concerns the work dynamics of the mathematics teachers, it was applauded the 90 minutes weekly meetings. The teachers, thus, saw an old wish come to light: the setting of a weekly period for collaborative work, aiming at the sharing of acquired experiences, at the definition of methods and at the continuing group learning. All these aspects promote facilitating conditions and the settlement of some of the constrains many authors (Thurler, 2001; Little, 1990; Hargreaves, 1998; Fullan and Hargreaves, 2001) have been highlighting in what concerns the implementation of more regular practices of collaborative work, also revealed in a study by Pereira (2002). This Project meets another study “Mathematics 2001 – Diagnostic and Recommendations for the Teaching and Learning of Mathematics” undertaken by APM. “These collaborative activities may be related to the diagnosis of learning problems of students, to the definition of projects and intervention strategies or to the preparation of materials and class plans, with the correspondent reflection on the classroom activities and its outcomes” (APM, 1998).

The 1st cycle teachers, even though not included in this project, also promoted regular work meetings for each school year.

Unanimously, the teachers who participated in this study admit that collaborative work promotes the creation of group methodologies, allowing in a more objective and secure way to analyze in a concerted fashion the objectives of teaching Mathematics, the study of the general objectives outlined for the school year or basic education cycle and the observation and discussion of the learning results of students from the previous year or cycle. In conclusion, the teachers admit, just like us, being the step to close the link between cycles. One may also conclude that the factor pointed out by Brites (2002), which represents an obstacle to vertical curricular articulation (schedule incompatibility and a lack of culture for this work), has started to be resolved, by creating a weekly or daily period and by valuing the collabora-
tive work, as stated by the interviewed teacher in this School Grouping. It’s also perceived
the Official Authority intends to implement a mechanism at an exo level, by conceding great-
er autonomy to School Groupings.

In this final footnote, we can infer by this study that, in the 2\textsuperscript{nd} and 3\textsuperscript{rd} cycles, the imple-
mentation of the Mathematics Action Plan was, next to the creation of Vertical School
Groupings, the most important element, well succeeded and necessary to the mathematics
teaching, creating conditions to promote continuity and support for the transition between
school years and/or cycles, in a logic of sequential progress. All it remains is to improve cur-
ricular articulation between the 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} basic education cycles.

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6. Mathematical Tasks in Digital Image Processing

C.M.R. Caridade
Department of Mathematics and Physics, Coimbra Institute of Engineering

Abstract
Sometimes it is necessary to developed different methodological strategies to motivate the students in the learning process. In Linear Algebra Electromechanical and Mechanical Engineering courses in Coimbra Institute of Engineering, I apply a different methodology strategy to improve teaching and learning. The use of technology and examples of application of Linear Algebra facilitates and encourage the learning of students. The combination of learning with more practical activities enables students to acquire concepts, and terminology while developing self confidence in using mathematics. The experience was very enriching for me as a teacher, as well as for the students, because let them motivated to learn and interested for Linear Algebra.

Introduction
The computer networks and information technology are being developed quickly. Today they have became an important part of life, and are widely used to improve teaching and learning. Linear Algebra is the one of the main mathematical field taught in universities. Matrix operations are covered in Linear Algebra courses. The students in Linear Algebra courses are confronted with definitions and properties. Some of these definitions and properties are straightforward to them. In order to enrich student’s learning and motivation processes it is possible to use some teaching strategies (Aydin, 2009; Day, 1999; Karam 2000).

Investigations on methodologies for teaching strategies focus on identifying different types of learning and motivation of students associated with this learning (Bulut, 2011; Habash, 2010; Meece, 2006). The Digital Image Processing is a highly relevant field, extremely rich in mathematical ideas that allows learning of Linear Algebra in a different way from the standard and expositive one (Hill, 2011; Tanimoto, 1994). The combination of Digital Image Processing with Linear Algebra enables students to acquire concepts and terminology while developing self confidence in using mathematics (Silverman, 2010). Some experiences have been made, for example the work of Professor John R. Anderson (Department of Psychology at Carnegie Mellon University) that uses artificial intelligence software in the development of Algebra and Geometry to better use by students of mathematics, in these specific topics. The results are surprising because, according to reports of Professor Anderson's research, there are great improvements on the part of students in these math topics (Ritter, 2007).

The purpose of this paper is to present a different form to teach and learn Linear Algebra in high school (Berriochoa, 2009; Dorier, 2000). With appropriate visualizations, the students can discover many of the definitions and properties of matrices in easier and motivated way (Roberts, 1996; Rosen, 2005).

Teaching linear algebra with digital image processing

Digital Image Processing, an interesting pedagogical tool, extremely rich in mathematical ideas is introduced in Linear Algebra classes to augment and enrich the traditional courses. The Digital Image Processing allows an appropriate use of technology in Linear Algebra and
provides a visual component for the Algebra linear concepts (Gonzalez, 2002). It helps to develop visual and intuitive understanding of the concepts, which are usually abstract and entirely new for the students. So, Digital Image Processing can improve the teaching of Linear Algebra in a way completely different from the standard one by increase the motivation and participation of the students. In this context, Digital Image Processing is an interesting tool to be incorporated in Linear Algebra courses, because images are very effective in human communication, and is an exciting way to understand the Linear Algebra concepts (Allali, 2010; Waldock, 2002).

The experience describe in this article was based in the interdisciplinary between Linear Algebra and Digital Image Processing with the purpose to improve student achievement in mathematics and observed the possible changes in students’ attitude in relation to Linear Algebra. This experience was developed in October 2011, at the first Linear Algebra lectures with 40 students of Electromechanical Engineering and 73 students of Mechanical Engineering in Coimbra Institute of Engineering. The theoretical concepts have been explained using examples of many Digital Image Processing applications. The use of different types of digital images to illustrate the matrix properties was used. In the practical classes, the students using the application developed to Linear Algebra courses (supporting by Matlab program), where they can experiment the theoretical concepts with their images (Mathworks, 2002). This study is based on the following objectives: enable the acquisition of Linear Algebra knowledge; develop reasoning and critical thinking of the students; encourage the self-learning and increase student motivation in Linear Algebra. It was also a research goal to identify which was the student interest in Linear Algebra classes in which a Digital Image Processing application was used as a motivator tool to the process of teaching and learning.

**Experience of digital image processing applied to linear algebra**

During Linear Algebra classes, several concepts are presented by Digital Image Processing (Pratt, 2001). The first concepts in Linear Algebra courses are the basic matrix operations and properties. The addition of two matrices $A$ and $B$ with the same dimension $m \times n$ represented by $A+B$ can be show by the addition of two images. This operation was made by addition the corresponding entries of matrix $A$ and $B$ together. In Figure 1, the image $A$ is illuminated on the left, the image $B$ is illuminated on the right and the sum of the two images $A+B$ is illuminated on the left and right.

![Figure 1. Addition of two images.](image)

The scalar multiplication of $k \in \mathbb{R}$ by a matrix $A$, represented by $kA$, consist in the multiplication of all the matrix elements by $k$. The scalar multiplication of an image can
change the image brightness. For example, in Figure 2, the original image $A$ was darker when apply a scalar multiplication $k = 2$, and clearer when $k = 2$.

Figure 2. Scalar multiplication of an image.

Another example was represented in Figure 3. The first image $A$ is gradually transformed in the last image $B$ by a linear approximation $c(k) = (1 - k)A + kB$ where $0 \leq k \leq 1$. In this transformation the use of scalar multiplication of a matrix and the addition of two matrices are presented. So, the Mona Lisa Lego representation ($A$) was transformed in Mona Lisa of Leonardo da Vinci representation ($B$) applying successive linear approximations (Pesco, 2009).

Figure 3. Scalar multiplication and addition operations of matrices.
The subtraction of two matrices $A$ and $B$ with the same dimensions $m \times n$ represented by $A-B$ is an operation very useful to eliminate the background of one grayscale image or to produce the negative image of a binary image. In Figure 4 and Figure 5 it is possible to see these operations. In Figure 4, the subtraction of the background allows to identify more accurately the grains of rice. In Figure 5 the subtraction of the Camões’ poem image by a white image allows the negative of the original image.

![Figure 4](image1.png)

**Figure 4.** Subtraction the background $B$ to the image $A$.

![Figure 5](image2.png)

**Figure 5.** Subtraction of white image $255I$ to image $A$.

The properties of matrix operations can be taught by using of Digital Image Processing too. In Figure 6, it is possible to see the commutative $A + B = B + A$ and associative $A + (B + C) = (A + B) + C$ properties of additions matrices represented by images. The smile face is an example of addition properties.
Figure 6. Commutative and associative of addition matrices.

The multiplication element by element operation is very useful in Digital Image Processing, because allows identify parts of the image. The operation is represented by \( A \times B \) where the matrices \( A \) and \( B \) have the same dimension for example \( m \times n \). In Digital Image Processing is common use the extraction of some important part of the image to analyse only. If the second image is black with the interested area represented by white, when applied to the original image, can extract only the interested area, as it is possible to see in Figure 7. The interested area of this figure is the Caley face. So, when applied a black image with a white square in a special position, the result image is the Caley face.

![Multiplication element by element](image)

Figure 7. Multiplication element by element.

Edge detection is an important tool used in many Image Processing applications. An edge in the image represents a region where there is a sharp contrast, i.e. a rapid change of intensity [Pratt (2001)]. The edge may, for example, represent the boundary of a skin lesion or a brain tumor. The detection edge techniques are based in the gradient of the image. The amplitude of the gradient defined by \( |\nabla f| = \sqrt{G_x^2 + G_y^2} \) can be used to extract an edge from an image \( f \), where \( G_x, G_y \) represented the horizontal and vertical approximations of the \( f \) derivative. Often the magnitude of the gradient vector is approximated by the absolute value, i.e. \( |\nabla f| = |G_x| + |G_y| \). A rapid change in intensity corresponds to a large value of the magnitude of the gradient, so the gradient of an image will have a high value on the edges of the image. A change of the intensity values corresponding to the amplitude of the low gradient. Thus, the gradient of an image contains information on the edges in the image, and therefore can be used to detect edges in an image (Caridade, 2011). The Figure 8 represents the edge detection of the signal traffic stop (a). The image (b) is the horizontal edge detection, (c) is the vertical edge detection and (d) the both detection by using the operator gradient apply to the original image (a).
Figure 8. Edge detection.

The geometric transformation is a task that can be visualized in a creative way by the use of Digital Image Processing. In Linear Algebra, a geometric transformation \( f: \mathbb{R}^3 \rightarrow \mathbb{R}^3 \) is defined by \( f(u) = A \times u \), where \( A \) is a matrix of dimension \( 3 \times 3 \) and \( u \) a column matrix of dimension \( 3 \times 1 \). If the matrix \( A \) represent a scaling, translation or rotation matrix, it is possible to explore geometric transformation to Digital Image Processing. The matrix \( A \) is a special matrix of geometric transformation that can be applied to all the image pixels to transform the image. In Figure 9, it is represented some geometric transforms applied to different images. The top images represent the translation of Coimbra Tower by a vector \( t_x = 10, t_y = 30 \). This geometric operation does not deform objects, only changes its position in the image. The middle images represent a scaling of the Eiffel Tower by scale factor \( s_x = 1, s_y = 0.25 \). This operation deforms the original image. The bottom images represent the rotation of the Pizza Tower by \( \theta = \frac{\pi}{10} \) around the arbitrary point \((428,176)\). In these examples the matrix \( A \) is applied at all the pixels on the image.
Figure 9. Geometric transformations applied to images.

Survey questions and results

I performed the experiment described here, during my class on 10 October 2011, with the aim of analysing if using this new methodology in classroom enhances student learning. The class took place without major difficulties for the organization and performance. The main objective in class is to captivate the interest of students throughout the lesson and to provide an environment of teaching and learning in a enjoyable and motivating way. Students cooperated and responded to the questionnaire which I proposed, showing great interest and curiosity, mainly by reference to Digital Image Processing. The Linear Algebra contexts learned, in most students by the first time, were facilitated by using the relationship between matrix and image. It was evident that the experience was very enriching for the students, because it led them to think more consciously about matrices and their properties. At the end of the lesson, students completed a survey about their interest in the new methodology. Some of the responses are presented below:

**This activity was interesting?**
Yes, it was a funny and interesting way to understand the operations between matrices.
I found it very enlightening and appealing.
It was interesting, motivating and easier to understand.

**What is your assessment of the activity performed with the Image Processing?**
An activity that arouses a great interest in the subject and in matter itself.
Conclusions

A natural link between Linear Algebra and Digital Image Processing can be explored in Linear Algebra classes. The concepts to be learned by the student must have meaning for the students, so that they can assimilate it. The Digital Image Processing can enrich teaching practice and improving student learning. The students overcome the difficulties presented and teaching and learning process of Linear Algebra is more stimulating and motivating.

The methodology presented in this article wants to modify the negative perceptions about mathematics of the students and to improve their course performance by developing their visual and intuitive understanding of Linear Algebra using accessible and attractive Digital Image Processing tools. However, it should be in mind that this approach does not replace the traditional way of teaching Linear Algebra. It is necessary to teach Linear Algebra correctly and accurately through the definitions and properties of concepts. Therefore no traditional concept should be eliminated. The approach used in Linear Algebra courses is a part of some larger context that provides motivation and meaning.

With this experience, I think that teachers are able to transmit the contents of Linear Algebra to students and teaching/learning process of Linear Algebra using Digital Image Processing. I intend to continue to apply these ideas in the next year to my students of Electromechanical and Mechanical Engineering in Coimbra Institute of Engineering. During the laboratory classes will be explored image processing applications on the topics learned in the lectures. It will also be made some working groups where students can discuss and interact on Linear Algebra in a creative and interesting way. The students' evaluation will be made by analyzing their interest in these types of examples as well as their learning of theoretical concepts of Linear Algebra.

References


7. Teaching and Learning in Calculus: Is Learning Really Useful?

C.M.R. Caridade, M. Céu Faulhaber and P.M. Rosa
Department of Mathematics and Physics, Coimbra Institute of Engineering

Abstract
This paper intends to describe a study case in the new technology in teaching mathematics, developed on the degree of Electrical Engineering at the Instituto Superior de Engenharia de Coimbra. The main objective of this work focuses on the study of the primitives with the use of e-learning and Moodle technologies in order to enrich the traditional teaching methodology, facilitating and encouraging the development of skills and improvement of student learning. The results of this study contribute to a process of teaching and learning, richer, motivating and challenging, where students work at their own pace anytime, anywhere, giving this rise to a larger and more active involvement on the student’s path.

Introduction
Can teaching and learning using virtual environments be an interesting solution, able to complement traditional teaching and increase students’ motivation and participation? Nowadays, in superior education, it’s quite common to use e-learning support tools, in order to enhance the interaction between students and teachers, thus allowing a more flexible apprenticeship (Marçal, 2009; Wagner, 2008; Woodill, 2004).

Because not all students have the same learning pace or the same form of internalization of the learned material, the use of different methodologies, can help make content more attractive and thus motivate some students to carry out, with interest, the various proposed activities (Cury, 2000; Zhang, 2006). The motivation is paramount in the academic performance of students (Lourenço, 2010). So why not use e-learning tool to motivate the teaching and learning of students? The use of Moodle allows students to study independently, but simultaneously driven and oriented, allowing a certain way, and without being aware that this gives you an incentive, sometimes just by using a small comment when he hits a question (Penny, 2011).

Students from the 1st year of any Engineering Course taught at the Instituto Superior de Engenharia de Coimbra have several mathematics subjects. In general, students have big difficulties in those subjects, mainly because of the lack of background from Secondary school. In order to overcome some of those difficulties, we are building an online support tool for these students, so that they can participate and get involved during the learning & teaching process. Students can access those tools during classes or at home, anytime, so that they can train the lectured subjects.

The study case
In this sense, a study is being developed with the purpose of evaluating the impact of a virtual environment in learning & teaching mathematics to Engineering students (Machado, 2011; Machado, 2010). The described study-case has been applied to the Course of Electrical Engineering of the Instituto Superior de Engenharia de Coimbra (ISEC), during the second semester of 2011/12, for Calculus I. This group of 70 students already studied this subject on the first semester, but obtained no success, being derivation and primitivation their main problems.
What needs to be learned by the students? What does the student need to know before he can start? In the theoretical-practical course contents are exposed in a book using the standard primitives developed on the Moodle access platform, practical and laboratory classes students explore the exercises and tests that are available on this platform (Dias, 2010; Siragusa, 2007).

Using the Moodle platform, several modules have been developed. In this platform, students have activities and training exercises organized by increasing order of difficulty. The solution of every exercise is available, and a final mock test for the entire module is then proposed. This way, students can train by themselves any particular module, having, of course, the possibility to contact (by email or personally) the teacher.

**The activities developed**

The platform is a virtual teaching space that can complement the Calculus classes in engineering degree at ISEC (see Figure 1). In this space, the student can learn and practice the theoretical subjects by make specific activities. The virtual environment is composed by three items:

1. Derivatives tests
2. Primitive book, with theoretical results, examples and exercises
3. Multiple choice tests with different levels of difficulties.

![Figure 1](image.png)

*Figure 1. The e-learning platform.*

Students can access this platform during classes, at home or at any other place at any time of day, therefore allowing its work to be made at its own rhythm with very flexibility. The theoretical results are presented in a simple and concise form, with loads of examples being solved so that the student can familiarise itself with the resolute process. Several examples of questions with multiple choices are also available with different degrees of difficulty, for students when they feel ready and want to test their knowledge, to do so.

At first, in this study, students were subjected to a test to gauge their knowledge of derivatives. This test was developed in order to allow analyzing their capacity to use this content in the techniques of primitives. The test was performed in a traditional way for
solving exercises of derivation on a sheet of paper. For the analysis of the results the
derivation rules in which they have failed over and also some typical errors committed in
some calculations and simplifications, and that somehow are fatal to the resolution of a
certain primitive. These leaks have been worked out and corrected in class by solving
repeated exercises involving such errors. To finish this process, all students made in a
Moodle oriented environment, and during the laboratory classes, a multiple choice test, where
the three possible answers appear in a random order, to test whether the detected faults in the
derivation had been exceeded. In Figure 2, it can be seen that test. Students had one hour to
resolve it and they were initially proposed to solve the test on a sheet and then they marked
the correct answer. Thus it was possible to judge whether the choices made by students were
meaningless or were made in accordance with its resolutions and also if they really missed
the resolution, or simply passed to the computer the wrong answer.

Figure 2. Derivatives test.

Now, that the derivation part is solidified, and on a second moment of the study, students
accessed the e-learning primitivation book. In Figure 3 we present part of the developed
book. This is composed by two main chapters: primitivation (chapter 1) and integration
(chapter 2). Students have on their behalf, in a resumed way, all the contents of the discipline
regarding primitivation.
**Figure 3.** Primitives book.

All the contents of the book can be browsed, iteratively, or may directly access content through the content of the book is on the left. The book has several examples to facilitate understanding by the student, as well as access to a set of exercises for training. The exercises are grouped into solved exercises that students can download and exercises to solve (see Figure 4). The solved exercises allow students to help in his study while solving exercises to test the acquired knowledge. All these exercises can be used by the teacher in class practices, such as homework or tests, or by students as study elements.

![Figure 3: Primitives book](image)

**Figure 4.** Exercises: solved (left); to solve (right).

In a third and final time of this study students can test all the knowledge acquired about primitives for developing multiple-choice tests (with three options to choose from). These tests were developed for different levels of difficulty. In Figure 5 we show a question of one of the tests.

![Figure 4: Exercises](image)
Figure 5. Multiple choice question.

It is possible to verify in this example that we use images that allow a proper visualization of the problem to be solved. This is one of the advantages of the e-learning process.

Results

All the exercises and tests available at the Moodle platform can be visualised by the teacher. It is therefore possible to know how many students have performed a given test, at what time, and how long they have taken to realise it and which results they have. In figure 6, we present the analysis of one of these tests (the derivation one). For example in the first question which is presented in the first line of the table, there were 3 admissible answers (the 3 following lines), but of the 64 students that realised this test, all of them chose option 3 (line 4 of the table), making it a 100% correct answer. As far as the second answer is concerned (line 5 of the table), 58 students opted for the first answer (91%), 2 for the second answer (3%) and 4 for the third answer (6%). In this case, the correct answer was the first. The test had 10 questions of 2 marks each, and we obtained the following global average classification (check Figure 6): 2, 1.81, 1.72, 1.94, 1.69, 1.59, 1.28, 1.94, 1.75, corresponding to a final average of 17.16. Question 8 was the more wrong one (1.28), while the first question was the only one all students took right.

Figure 6. Analysis by questions.

In a more detailed analysis (Figure 7), it can be observed that the choice made by each student during the test and it is possible for the teacher to identify students who failed (answers in dark shaded area), and where. Thus the teacher's teaching can be tailored to students' most important faults and may even be an individual teaching, by the analysis of failures of each individual student.
Another representation of the detailed analysis is shown in Figure 8. The detail is made by the question. The correct answer is identified in shaded area and shows the percentages of students who chose each response options for each question.

**Figure 8.** Detailed analysis by question.

**Conclusions**

The purpose of this platform is to support engineering students in their study of the discipline of Calculus, giving them various materials and tools to aid up. The goal of the case study presented here is to analyze and evaluate the advantages of using one methodology that combine the aspects of classroom teaching with online learning (using the platform Moodle) for teaching and learning of engineering students from the Instituto Superior de Engenharia de Coimbra. The initial study was performed to a set of 70 Electrical Engineering students during the second half of 2011/2012, in theoretical, theoretical-practical and practical classes of Calculus.

This study has been an enriching experience for the teacher and students. For the teacher, it allows to obtain different forms of assessment of students with different details. For the teacher, is a big challenge, he has to have, among others, motivation to innovate, to make a major investment in skills acquisition and e-learning methodologies and investment of time available to prepare these new teaching practices. With this type of education, it is possible for the teacher to obtain different forms of assessment of students with different details and
he can individualize instruction for different students and identify the most common mistakes. For students, it allows a study of interest in different content at any time in any place and at the pace of work of each student. With this platform the student may have a lot of material and support tools that will facilitate the study.

In the course of the activities was evident the interest that the students demonstrated the use of the platform and access to resources available through it. Students can learn the mathematical content where they have many difficulties, actively and responsibly, with the introduction of the platform. No doubt the availability of the Moodle platform for access to these free-form students have been important in the motivation and student learning. Recent experiences showed that students are, globally, satisfied with this approach as a working tool. Generally, this virtual environment provides not only spatial but also temporal flexibility, and allows students to interact differently with the proposed subjects, in order to motivate them for the learning & teaching of mathematics.

In a near future, we would wish to introduce this virtual environment to all ISEC students with mathematics subjects, in order to evaluate not only their performance using this tool, but also to reflect and, possibly, conclude, that learning & teaching with e-learning is an additional advantage for students.

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II Myths and Fairy Tales
8. Animals in the Fábulas of
El Pensador Mexicano

Robert K. Fritz
Dept. Modern Languages and Classics, Ball State University

El Pensador Mexicano, “The Mexican Thinker”, is the early 19th century author, José Joaquín Fernández de Lizardi. He began as a pamphleteer writing about Nueva España, an area that includes modern Mexico. Nueva España was trying to acquire self rule. When Spanish censorship became more severe, he turned to the novel to disguise his liberal thinking. As a result he wrote the first Spanish – American novel, El Periquillo Sarniento, “The Itchy Parrot” or “The Mangy Parrot”. Lizardi also wrote Fábulas (Fables), a volume of which was published in 1817. Another eleven had appeared previously in three of his “newspapers.” “Newspapers” constituted a series of publications looking much like pamphlets but published on a regular basis whereas his other pamphlets were published as he felt the need. In 1886, his Fábulas, were adopted to serve as a text in the municipal schools in Mexico City and in the majority of the Mexican states. (Luis González Obregón, Novelistas mexicanos: José Joaquín Fernández de Lizardi [El Pensador Mexicano], Talleres Gráficos Linomex, S. A., México, 1938 and http://books.google.com/books?id=yZfPP2WAeWwC&pg=PA62&lpg=PA62&dq=las+fábulas+del+pensador+mexicano&source=bl&ots=KvdrR5rURN&sig=XqMqBV7zS5mzMRceGTuelr4t5nc&hl=en&sa=X&ei=Yi1T7qZeLCgAeurfEO&ved=0CEIQ6AEwADgK#v=onepage&q=las%20fábulas%20del%20pensador%20mexicano&o&f=false

Fables, as educational tools, have been known for centuries. The use of animals as actors in these stories is also not new. Lizardi recognizes his debt to Aesop in his Fábula V. It’s called Esopo y los animales (Aesop and the animals). It’s from from his book Fábulas del Pensador Mexicano. He calls Aesop “that excellent and ingenious fabulist…. In this fable, according to Lizardi, Aesop understood the native language of any animal. After listening to them wishing for the life of another, Aesop whispers in the ear of each of the complainers explaining what will happen to them if their desire should be fulfilled. He then offers to grant their wishes. They all refuse the offer, subsequently living “free of fear and envy.” The fable ends with Lizardi’s moral: “Thus would man live if he would realize what envy would bring.”

This presentation proposes to explore the the meaning, role and function of animals in Lizardi’s fables along with illustrations that have accompanied them and an appreciation of the consonantal rhyme of many of the morals. In his Prologue to the 40 fables published in Fábula del Pensador Mexicano, Lizardi states: “The object of the fable, as those who know them know, is none other than correcting customs with morality, entertaining the reader with the pleasanties of fiction, in this way causing that the bitter of the correction be drunk in the gilded cup of the humorous story. This is what the fable has to recommend itself”. (Obras I, 285) He complains that “…it’s not as easy as it looks” therefore there are so few who stand out in this genre. (Ibid.) He then gives us a list of the qualities needed “…to write these works with masterfulness”. (Ibid.)

As much as he might have been influenced by Aesop, he also acknowledges a debt to Félix Maria Samaniego (October 12, 1745 – August 11, 1801), an eighteenth – century Spanish fabulist who in turn had been influenced by his contemporary Tomás de Iriarte y Oropesa (18 September 1750 - 17 September 1791). Lizardi cites Samaniego in his Prologue from the latter’s Fábulas stating that he had little confidence in his skill (Ibid.) So, if this is
how Samaniego felt, Lizardi feels he also can’t speak positively about his own fabulist efforts
knowing the pitfalls awaiting those attempting the genre. (Ibid.) At the end of his fortieth
fable, The palace of cards, he states: “When I read my fables slowly / I fear they will run the
risk of the palace” (He rhymes despacio [“slowly”] with palacio [“palace”]) which like a
house of cards was destroyed by a wayward wind. (Op. cit., 375)

In his Foreword to the book, he explains that subscriptions to his “little effort” are being
accepted in don Mariano Ontiveros’ bookstore. He promotes some of his other forthcoming
works and then states that these “little fables” will come out one by one so that the whole
work can be acquired little by little. Readers will not have to pay full price up front but, in the
end, paying that way will cost more then those with subscriptions will pay. Finally, those
who subscribed to the fourth volume of the Periquillo, as his novel El periquillo sarniento
was known, will get the Fables as a part of a package deal.

In order to facilitate this study, I kept the fables preceding the forty published as a book
in chronological order. I’ll give a short summary of each one through the forty which refer to
animals and an appreciation of the qualities I esteem or do not esteem in them.

This fable was his first.: La abeja y el zángano (The [worker] bee and the drone), Friday
14 February 1812 in El Diario de México (Mexico’s Daily): The first daily publication in
Mexico as a country. (Diccionario Porrúa, 497 - 498) I have not seen it. (Obras I, 283 - 284)
The next eleven were published either in Lizardi’s newspaper El Pensador Mexicano (PM),
from which he derived his nickname or in the supplements to El Pensador Mexicano (SPM).
The first 5:

1. El ratón y el gato muerto (The mouse and the dead cat), PM, Vol. II, 27 Monday
September 1813 (Obras III, 291- 292) In this fable, the first six lines are stated by the mouse:

Blesséd be the Creator of mortals
and exalted his name through the centuries,
who took you from our midst,
cruel, disloyal and vengeful animal!
Then Lizardi chimes in:
(In view of an already dead cat,
thusly was exclaiming a little bitty mouse.)
Then the mouse declaims a list of the cat’s actions, philosophy and preparations to “cause mice to pe-

rish…” In other words, the cat had no loyalty to more than his blood lust.
Personified by the two types of people in the last four lines of this poetic fable, Lizardi’s attitude toward
the Spanish domination is demonstrated:
Expect not other ‘honors’
from oppressed wretches,
Neither the judge who may not be just
nor the indolent rich men.

2. El cacomixtle y la gallina (The cacomixtle [A small feline predator] and the hen), SPM,
The hen asks to be let go. The predator refuses, explaining that the peril the hen’s subsequent
calling out would put him in. His “hennicide” [gallinicidio] would be discovered and the
mastiffs would fiercely devour him.

Lizardi opines that this is exactly what the powerful do to the wretched and that therefore
the latter’s complaints don’t get heard. This has to be a veiled reference to Spain’s dominance
and what Lizardi considered to be unfair treatment of the non – Spaniard’s.

3. No title, first line: Cuentan que cierta vez unos conejos... (They say that once upon a time
some rabbits...), PM, Vol. II, Thursday 4 November 1813 (Op. cit., 213) In his Índice de lo
contenido en los números principales (Index of that which is contained in the primary issues),
he titles it Fábula de los conejos (Fable of the rabbits), (Op. cit., 373) It continues with the
story that these rabbits lost a fight with some greyhounds. Some escaped being chopped into a thousand pieces. They found themselves in the company of a grave and grey–bearded rabbit who gave them the advice that it’s not prudent to match weak force with the advantages of the foe because everything is risked in the process. Lizardi exclaims:

> How many poor rabbits have we seen
> perish because of being incautious in the world,
> who wouldn’t experience that evil if they knew
> that wise rabbit’s warning!

This is wise – rabbit Lizardi’s warning to his readers to proceed cautiously in pursuing justice. The rest of the article consists of a story of a wronged woman whose locuacious husband was able to bamboozle a judge by means of his libelous and articulate falsifications. On the other hand, the wife confirms the truth of his claim that her lack of cleanliness caused her to suffer from piles and flatus so strong that it would “banish” him from the bed. She claims that she couldn’t defend herself in front of so many people and that her explanation would be worse than her illness. Lizardi responds to the wife’s pleas for help by citing how abuses in society, amongst the police and in the economy need to be rectified.

4. *El oso, la mona y el cerdo* (*The bear, the [female] monkey and the hog*), SPM, Vol. III, Monday 21 March 1814 (Op. cit., 533) The bear tried dancing. He was terrible. He asked the monkey’s opinion. The monkey told him his dancing was terrible. The bear is disappointed. The hog interposed with a “Bravo” and further flattery. The bear reacts with: “When the monkey disapproved [of my dancing] / I began to doubt / but since the hog praised me / I must dance very badly.” Lizardi sums it up with: “If the wise person doesn’t approve, too bad / and if the fool appaluds, it’s worse.

Does the choice of a female monkey represent Lizardi’s belief that women are smarter? He certainly shows that attitude in other writings.

5. No title, first line: *Pisará el león al sapo la cabeza* (*The lion will stomp on the toad’s head*), PM, Vol. III, Thursday 12 May 1814 (461 - 462) I wanted this to be a fable because I liked the first line and although it mentions several animals; the lion, the toad, the fish, the eagle, the flock (of sheep), the lizard, the birds, the dolphin, it’s actually a satirical prophecy stating that we’ll never have peace in the world and the lion undoubtedly refers to Spain again.

The next four were published in Alacena de frioleras (Cupboard of trifles), very specifically identified as fables with three of them treating of animals.

Fábula I: *El mono y el perico* (*The monkey and the parrot*), No. XI, Tuesday 13 June 1815 (*Obras IV*, 67 - 71) There was a monkey who could imitate humans to such an extent that he decided to seek his fortune doing so. When he got to an appropriate place and time, he felt the need to dress as a human. After choosing a soldier’s outfit, looking in a stream, liking what he saw and thinking himself alone, he mediated out loud about how great he looked. Unbeknownst to the monkey, a parrot had been listening. The parrot tells him how well he imitates humans in both dress and gesture but that after all, “…what will we do with your tail? …since it’s long and hairy it will leave no doubt […] that you’re a well dressed little monkey”. The parrot basically says to leave such accoutrements to those who normally wear them. The parrot flies off without waiting for the monkey’s response. The monkey looks at his tail, rips off all the accoutrements and shouts out that the parrot taught him a good lesson. Lizardi then ends the fable with two lines which in English come out more or less as:

> How many haughty men wouldn’t be so
> if their tail would not be lost to sight!
Fábula II: La niña y su perrita (The girl and her little [female] dog), No. XII, Friday 16 June 1815 (Op. cit., 77 – 78) One day Clarita was abusing her little female dog. The dog was not happy. An old cockroach told her to stop. Clarita protested that no harm to her could accrue. When least expected, the dog bit Clarita’s mouth. Clarita cried. The cockroach told her not to cry so much since such an occurrence is not strange. It’s not smart to make fun of your enemy [enemigo, a stretch?]. No matter how despicable, making fun of him is not good sense because who assures us of good fortune? The last two lines this time use two synonyms of the verb “understand” entender, and, which in this context, the second, comprender has another meaning:

The lesson of this oldster, if it’s understood [entiende],
seems to me that it applies [comprende] to many.

Fábula IV: La rata moribunda (The dying rat), No. XXVIII, Friday 29 March 1816 (Op. cit., 167 – 170) Mama rat is dying and has nothing for her progeny to inherit but her good advice. She warns them about the tricks and traps of the humans but saves her strongest warnings for them regarding the cat. As much as he seems docile, he is ferociously dedicated to eradicating rats. The last four lines explain the meaning of this fable:

The hypocrite harms greatly
even more than the declared enemy.
Therefore the sane person tries
to adhere to the rat’s advice.

The next two were published in Cajoncitos de la alacena [Little bins in the cupboard]).

5th little bin: No es señor el que nace, sino el que lo sabe ser o fábula de los monos (You aren’t born a master, you have to learn how to be one or the monkeys’ fable), Tuesday 26 September 1815 (Op. cit., 195 – 198) An old monkey advises a rich, presumptuous monkey to shape up. The presumptuous one tells the old monkey that he’s not interested. The old monkey says he’s sorry to have wasted his saliva on this oaf. He pledges to give his advice instead to man but then realizes that most humans act like monkeys.

9th little bin: El viejo y las pulgas (The old man and the fleas), Wednesday 6 December 1815 (Op. cit., 215 – 216) An old man found himself so accosted by fleas one night that he could not sleep. He judged them as accused of “oldstericide” (viejicidio). This is a Lizardian version of a specific type of homicide as he did with “hennicide” in El cacomixtle y la gallina (The cacomixtle and the hen), SPM, Vol. II, 11 Monday October 1813 (Obras III., 297)]

He searched for them, the female fleas and the male fleas, everywhere. He managed to kill a female one and he thought that would allow him to sleep serenely but he was accosted by even more fleas than before. He attacked them ferociously but to no avail. The only way he was able to achieve peace was to simply ignore the flea attacks. Lizardi’s las two lines state:

I’d like that this disillusioned oldster,
would teach patience in one’s work.

From Fábulas del Pensador Mexicano, collected in Obras I (281 – 375) UNAM: Not all these fables are about animals but in the engraving on the cover, it’s obvious that there is an emphasis on them and, in fact, of the 40 published in this book, 28 have animal characters. I’ve simply assessed them in sequential order since I’ve found no way to determine the order in which they were created if, indeed, they were not created in this order.
III La tortuga y la hormiga (The turtle and the ant) (293 – 294) Very similar to the well-known ant and the grasshopper: It’s winter. The turtle wants to know what the ant eats. The ant, of course, eats what she puts away during the rest of the year. The turtle wishes she was the ant. The ant wants to know what the turtle does all year. The turtle confesses that she sleeps all day in this stinky marsh except to come out and warm her belly in the sun (upside down?). The ant, of course, has no pity. The moral:

he who doesn’t work
is pursued by necessity.

IV La araña y el gusano de la seda (The spider and the silkworm) (295 – 296) A spider addresses herself to a silkworm telling him what great weaving she does. The worm discounts the spider’s boasts because of the short duration of her creations and because he works on style. The spider admits her creations don’t last but she avers that she lives a good life because her creations provide her with food whereas the worm has no future but death and styles don’t last.

this crazy world
appreciates style but it doesn’t last.

V Esopo y los animales (Aesop and the animals) (297 – 299) This fable was mentioned at the beginning.

VIII El gato y el ratón (The cat and the mouse) (305 – 306) The cat tries to lure the mouse out of his hole. The mouse doesn’t fall for the cat’s blandishments. Lizardi’s consonantal rhyming form of a moral is:

This is what a prudent mouse said. (prudente)
Oh, if only would everyone else think that way! (gente)

IX La polilla con alas (The moth with wings) (307 – 309) In its chrysalis stage, a moth wants to fly. She implores Jupiter (Why him?) to give her her wish. He replies that it’s a bad idea. She insists. He gives in. She escapes her bonds but falls into the clutches of some kids who catch her, play with her and kill her.

Lizardi’s non-consonantal moral:
Oh, how often men
sweat, go deeply into debt and toil
to leave their sphere,
and in doing look for their misfortune!

X Celia y la mariposa (Celia and the butterfly) (310 – 311) Celia was reading one night when a butterfly (not a moth?) came in, saw the light (of a candle according to the engraving) and inadvertently burned her wings. Celia advises her to be more cautious. She conflates fire and love and claims at a distance they both conceal their poison; close up they no longer flatter.

Lizardi says:
Oh, how many rational butterflies
ought to take advantage of such advice!
Butterflies no doubt meaning humans in general or more specifically women?
XI El perro grande y el chico (The big dog and the little dog) (312) A story of don’t mess with the big guys: The little one took too many liberties and the big guy shook him in anger and killed him. Really nothing more to say about this one beyond mere conjecture of Spain lording it over Nueva España.

XIV El zopilote y el falderillo (The turkey vulture and the little lap dog) (318 – 320) The lapdog sees a turkey vulture eating from a dead horse. The lapdog out loud despises everything about the vulture. As much as the vulture tries to ignore the dog, the latter won’t let up so the vulture asks the dog what the latter is good for. The dog reels off a list of what he thinks he is valued for. The vulture responds with his own list which includes saving humankind from pestilences by “cleaning up”. The dog can’t dispute the “fact” and confesses through clenched teeth in four consonantily – rhymed lines:

The vulture speaks well, it makes no sense [cordura]  
to judge someone by appearances, [figura]  
since beneath the coarseness that I despise, [desprecio]  
merit is hidden. I’m a fool. [necio]

As we shall see, the rhyme scheme, a, a, b, b, is atypical for these morals in this book.

XV El pastor, el chivo y los carneros (The shepherd, the billy goat and the sheep [plural]) (321 – 322) A shepherd, herding his sheep to market comes to a river needing to be crossed. Logically, using the bridge at his disposal, he crosses it with his billy goat guide. But, the silly sheep decide to swim it and the all die, swept away by the current. No consonantal rhyme but Lizardi’s take is:

He who crazily despises  
a prudent suggestion  
by following his whim,  
most often perishes.

XVII La vaca, el becerrillo y los ordeñadores (The cow, the little calf and the milkers) (325 – 326) A little calf, hungry to death, went to nurse his mother. She chased him away but when the milkers showed up she gave them all she had. The calf scolds her and she has no response. No consonantal rhyme but the last four lines declaim:

Well, what is there as a response  
from the cruel parent who toils  
and whose child perishes,  
squandering his material goods on behalf of others?

XVIII La araña y el chichicuilote (The spider and the chichicuilote [small aquatic bird.]) (327 – 328) Some spider was wrapping up a fly for a night time visit from a little lady spider. He was working hard when the chichicuilo showed up. He scolded the spider for mistreating the fly. After his tirade the spider counterattacked stating he only grabbed one fly while the bird eats ‘em by the dozens. The bird has no response but to frown and say consonantily:

Nothing to be done about that: he who finds himself  
plagued by criminal offenses [criminales]  
shouldn’t scold sins of omission. [venales]

XIX Celia, su hijo y las gallinas (Celia, her son and the hens) (329 – 330) Celia goes on vacation leaving her hens to Marcia’s care. The latter is totally faithless leaving, devestation in her wake. Celia’s son consoles her with an asonantal rhyme:
That’s what executors are like so when you’re about to die, be careful about to whom you entrust your inheritance.
I’m tempted to think that Lizardi is thinking about a specific incident but so far I have not found any evidence for it.

**XX La paloma celosa** ([zelosa in the engraving](The jealous pigeon)) (331 – 332) A male pigeon was drinking from a chystalline stream. His mate saw him and believed he was kissing another in the stream. He couldn’t convince her otherwise. She flew off and died of a broken heart. The postscript is somewhat unusual for Lizardi since in so much of his prose he is a staunch advocate for women. It is, however in consonantal rhyme as is the majority of the fable:

Unhappy women [desdichadas]
who allow yourselves to be dominated by a foolish jealousy [necio]
be more cautious [consideradas]
don’t make such a big thing of suspicions [aprecio]
for jealousy that’s not tempered by prudence [prudencia]
paints reality from appearance. [aparencia].

Here the rhyme scheme is the atypical a, b, a, b, c, c.

**XXI La gata y la mona** ([female] cat and the [female] monkey) (333 – 334) In the process of trying to catch a rat, a cat broke a glass. A monkey was watching and she taunts the cat with suggestions of the latter’s fate and who could believe the cat would break a glass in the process of catching a mouse! The cat replies that someone who can criticize so much should be readibly able to hunt mice. The cat declares that the rat got away and it should be easy to catch since it’s wounded, terrified and can’t find its way home. The monkey, dazed and clumsy, smacks her head in the process of chasing the rat and ends up failing. The cat says, Who’d’a thunk it? … that you’d be so vain and dare to criticize me!

Lizardi says, in consonantal rhyme:
Oh sarcastic cat [socarrona]!
I praise your brazenness [descoco]
Criticizing is easy [poco]
but doing? That, yeah, like the monkey [mona]

The rhyme scheme is the typical a, b, a, a. I wonder if that’s why the monkey is feminine in this fable: to be able to rhyme *mona* with *socarrona*. Is the cat feminine because this is a type of *cat fight?* Sarcastic! He should have put an exclamation mark here!

**XXIII El novillo y el toro viejo** (The young bull and the old bull) (337 – 338) The old bull and the young bull get used in “bull fights”. The young bull wants to know why he always gets riddled with holes. The old bull says he sees the lance and avoids it whereas the inexperienced young bull charges everything and ends up with his hide: hecho un ~(h)arnero = Tener muchas heridas [To have a lot of wounds.]. This fable just seems to be in praise of older, wiser beings.

**XXIV El mono y su amo** (The monkey and his master) The monkey saw the cook killing chickens. He thought he’d get on her good side and help her out so he killed the pet parrot. When his master found out, he killed the monkey. Lizardi’s moral consonantily:

That the monkey erred, I don’t dispute [disputo]
and one’s always gonna do it, namely, [a saber]
everything one tries to do [hacer]
that which isn’t in his realm [instituto]

In addition to the consonantal, we see the common a, b, b, a rhyme scheme.

**XXV** *La paloma, el cuervo y el cazador (The pigeon, the crow and the hunter)* (341 – 342) A pigeon got friendly with a crow to the extent that she learned all the crow’s tricks. She destroyed so much wheat that the farmers decided she needed to be trapped. A hunter did the job. She begged for her life but he told her that she shouldn’t have gotten mixed up with the crow and that he was gonna cook her for supper as payback for the wheat she had eaten. The last two lines say:

because this is always the end of the fool
who runs around with another evildoer.

**XXVI** *El perro en barrio ajeno [ageno in the engraving] (The dog far from home)* (343 -344) He’s attacked by the locals. An old local dog saves him and lectures the others:

“It’s no crime to come into the ‘hood.” It’s hard to conjecture about what deeper meaning this fable has.

**XXVII** *El gallo vano y pelado (The vain and bald rooster)* (345 – 346) A rooster shows up badly beaten but brags about his supposed past glories. Another rooster takes him to task for his vanities. Lizardi guilds the lily:

To he who sees himself in misery declared [declarada],
and because once he saw himself fortunate [dichoso]
boasts of this in a vain and prideful way [orgulloso]
needs to take this fable to heart. [ni pintada]
Again the more common a, b, b, a rhyme scheme.

**XXVIII** *La mula y el macho de tiro (The she – mule and the he – mule team)* (347 – 348) The she – mule complains about pulling the coach. The he – mule tells her to stop trying to back up or go side to side and she’ll see how easy it is. She does. It is. 8 lines of consonantal rhyme which is pretty preachy:

There are married couples who curse [demonio]
like the lady mule [dan]
and continually are [están]
cursing the marriage [matrimonio].
If in their pain and suffering [quebranto]
they would join their efforts [unieran]
they’d have an easier job [tuvieran]
that wouldn’t weigh on them so much [tanto].
but the more common rhyme scheme.

**XXIX** *El mono y el cazador (The monkey and the hunter)* (349 – 350) The monkey puts his hand into the gourd and finds a piece of dry bread. He gets excited and then sees a hunter coming. He tries to flee but won’t let go of the bread. The hunter grabs him. The monkey admits he deserves it. Lizardi sez:

Although not so serenely [sereno]
will not say the same thing [vocablo]
he who is prey to the devil [diablo]
only because of not wanting to let go of something [ajeno]?

The common rhyme scheme: a, b, b, a.
La hormiga y el elefante (The ant and the elephant) (353 – 355) Somehow an elephant stomped on an ant who complained of such treatment. The elephant was entirely disrespectful. The ant swore he’d get his revenge. The elephant laughed and went on his way. The ant followed. The elephant laid down to sleep and the ant crawled up his trunk and started biting. The elephant went crazy and killed himself banging into trees. The bloody ant came out and seeing himself avenged

told him (the elephant): No one [ninguno]
should you aggrieve in any way [alguno]
and to mankind through you I clearly show [enseño]
that no enemy is so small [pequeño]
like a crippled ant [coja]
to take revenge if he gets mad [enoja].

Here we have an atypical rhyme scheme: a, a, b, b, c, c.

El coyote y su hijo (The coyote and his son) (358 – 359) Dad coyote tells his son to behave so that he’ll be well loved. Then the dad goes out and raids a chicken coop. The son sees it and does likewise. The dad scolds his son. The son defends himself by saying that Dad “wolfed” down six hens so the son ate six chicks. So, Dad realizes that

…advice
without example is very cold,
and so in order to take advantage of
the most salutary warning,
through one’s eyes should come in
before through the ears.
The opposite of “do as I say, not as I do”.

Los dos lobos amigos (The two wolf friends) (360 – 361) An old wolf was a dear friend of a somewhat dwarfish wolf to such an extent that the other wolves were jealous. The short wolf got a fever and for two days he couldn’t get out to hunt. When he was able, he was happy to see his buddy coming at him with a sheep but the old guy wouldn’t share it with him. The moral:

Thus like this two times vile wolf, [ratero]
there are in the world deceitful friends [engañosos]
high quality and affectionate [cariñosos]
as long as they’re not talked to about money [dinero].

The more usual rhyme scheme: a, b, b, a.s

El viejo y las pulgas (The old man and the fleas) This is the one fable published before 1817 and then re-published in this book. We examined it earlier and now we have an engraving for it. Furthermore, this moral is different from the first version. This one is:

From this old guy should
take advice
all those who in their troubles
don’t find consolation. (363)
The earlier one was:
I’d like that this disillusioned oldster,
would teach patience in one’s work.
XXXVI El loro en la tertulia (The parrot at the gathering) (365 – 367) He showed up, constantly said stupid things till the lady fox outfoxed him. Lizardi says:

But I the fable apply [aplico]  
to the fool to whom understands it [comprende],  
who talks about everything and doesn’t understand [entiende]  
what he talks about, like the parrot [perico].

Two things to note here include that it’s the typical a, b, b, a rhyme scheme and that this time comprende and entiende truly are synonyms.

XXXVII El tigre hipócrita y el leopardo (The hypocrital tiger and the leopard) (368 – 369) One tiger claims feelings of compassion for another tiger who is sick. A leopard accuses the first tiger of being a hypocrite because his talk is not backed up by his actions. Lizardi condemns all who act that way; otherwise not an outstanding fable.

XXXVIII El mono vano (The vain monkey) (370 – 371) Like the monkey who couldn’t change the fact that he had a tail this guy is dressed up also. The other monkeys at first were fearful but then approached him. He claimed he was a gentleman but he pranced about and his tail popped out. Lizardi puts a note five lines from the bottom explaining the moral. The last four lines are in the common consonantal rhyme which really sum up the fable better than his note:

From one father we descend [descendemos];  
a thousand passions we feel [sentimos];  
we get sick, we die [morimos]  
all of us and to be equal we don’t want to [queremos].

XXXIX Los consejos de la rata (The rat’s advice) (372 – 373) The rat advises a mouse about the dangerous cat in the house and then dies. Lizardi says:

I venerate his [the rat’s] warning.  
The enemy is fearsome;  
and a whole lot more if he feigns  
friendship that he doesn’t know  
or virtue that he despises.  
I’m tempted to conjecture a reference to Spain again.

This is the last Lizardi fable that I know of that uses animals as actors. Much as many fabulists have done, he used animals to promote his moralistic message. As he declaimed in the prologue to his book: “The object of the fables, as those who know them know, is none other than correcting customs with morality, entertaining the reader with the pleasantries of fiction, in this way causing that the bitter of the correction be drunk in the gilded cup of the humorous story. This is what the fable has to recommend itself”. (Obras I, 285) This prologue also serves to sum up Lizardi’s reasons for writing these fables. Beyond that expressed rationale, one would be tempted to conjecture further that the use of consonantal rhyme in the morals has an appeal to the juvenile reader as a more accessible appreciation of poetry. This is not to say it wouldn’t appeal to a more mature reader. It may also facilitate inculcating a moral outlook in both categories of readers.

To the best of my knowledge, this essay is the only attempt to bring these fables to an English – reading audience. Although several fables obviously share an inspiration owed to previous fabulists, the Mexican flavor comes through in the style and vocabulary of the author. As a future project, an attempt to translate them all to English might be a worthy goal.
Works consulted


Fernández de Lizardi, José Joaquín, *Obras I* (1963); *Obras III* (1968) and *Obras IV* (1970), UNAM (Universidad Nacional Autónoma de México), México, D. F.

Additionally, the fables can be seen at http://cdigital.dgb.uanl.mx/la/1020006124/1020006124.html
Abstract
“Australia is home to many unique and fascinating animals, many of which are present in the Aboriginal Dreaming Stories. For the Aboriginal people of Australia the Dreaming is the origin of all their traditional beliefs: the Great Spirit Ancestors came out of the earth and created the land and all its features. Concepts and beliefs, specific cultural practices and histories have been passed on from generation to generation through the oral tradition. The aim of this article is to enhance the importance of stories in the students’ education and openness to other cultures, in this case the Australian Aborigines’ beliefs and way of life.”

Introduction
One of the primary goals of any teacher who is determined to make a difference in his/her students is to prepare them to be responsible and unprejudiced citizens, to make them understand the world around them. Students need to study the cultures of other countries, not only to learn about those cultures, but also to learn more about themselves through comparisons and contrasts. And what a better way is there to know a culture than to read its literature, its stories? This presentation focuses on Aboriginal stories, a literature which is often unknown and produced by the probably least understood people in the world.

Much of the most important knowledge of Aboriginal society was conveyed through different kinds of storytelling—including narratives that were spoken, performed as dances or songs, and those that were painted. The best place to start learning about Aboriginal storytelling is with the concept of Dreamtime. Dreamtime is the beginning of all things, and there are numerous Aboriginal stories that connect the creation of Australia's geography to the actions of animals, spirits, and people in the Dreamtime. It is important that the Dreaming stories are not misinterpreted as common fairy stories or myths. Aboriginal Dreaming stories are the binding force of a continuum between the past, present and the future for Aboriginal people.

What is then the Dreaming? The Dreaming is a term used by Aboriginal people to describe relations between the spiritual, natural and moral elements of the world. It relates to a period before living memory or experience - a time of creator ancestors and supernatural beings. This period is called the Dreamtime. The expression 'Dreamtime' is therefore often used to refer to the 'time before time', or the time of the creation of all things, while 'Dreaming' is often used to refer to an individual's or group's beliefs but most of the times they are used interchangeably.

Dreamtime refers to the time when the 'Ancestor Spirits' came to Earth and created the landforms (rivers, lakes and mountains), the sky, the animals and plants. Once their work was done, the Ancestor Spirits changed again: into animals, stars or hills... For Indigenous Australians, the past is still alive and vital today and will remain so into the future. The Ancestor Spirits and their powers have not gone, they are present in the forms into which they changed at the end of the 'Dreamtime' or 'Dreaming', as the stories tell.

The stories have been handed down through the ages and are an integral part of an Indigenous person's 'Dreaming'. They are not made up stories; they are factual events from long ago. The Dreaming means their identity as people. It forms the body of knowledge that
guides all Aboriginal societies. It is the Law. It is the history. It is expressed in the Lore. The Dreaming sets out the structures of society, the rules for social behaviour and the ceremonies performed in order to maintain the life of the land, governing the way people lived and how they should behave. The Dreaming did not end with the arrival of Europeans but simply entered a new phase. It is a powerful living force that must be maintained and cared for.

**Storytelling in Aboriginal art**

Aboriginal oral communication is valued greatly and storytelling is an integral part of life. The Aboriginal traditional way to educate about their History, Culture and Laws was and is storytelling, using a combination of Art forms such as painting, singing, music and dancing to illustrate the ancient "Dreaming Stories". Contrarily to Europe, Aboriginal Australian arts are not viewed separately but as an interrelated aspect of Aboriginal peoples’ lives.

Telling stories out loud is only one way for Aboriginal people to convey narratives. Traditionally, people telling a story would use the haunting sound of the didgeridoo with songs and dances, but also symbolic drawing was created. Australian Aboriginal art is one of the oldest continuing art traditions in the world having assumed various styles.

**Rock art**

- the *Aboriginal x-ray style*, developed around 2000 B.C., was found in shallow caves or rock shelters particularly in Western and Northern Australia, but contemporary artists continue to paint in X-Ray tradition. Many of the animals are painted showing some anatomical features, that is, are painted in x-ray. The delicate presentation of bone structures (ribs, back bone) and internal organs gives the picture a three-dimensional effect.¹
- *stencil art* - stencil images are found widely in rock art, usually of hands or arms, animal tracks, boomerangs, etc.Stencil images are some of the oldest painted images known from the Australian continent.²

Not much of Aboriginal material art was done to last for long periods of time. It was the act of painting itself which is important, not the finished product, and sand painting brings us evidence of this.

**Sand painting**

It refers to ground paintings that were created by clans as they moved from place to place in the desert. The clan gathered around a central site in the desert sands, which was cleared so that "paintings" could be created using seeds, flowers, sand, stones, sticks, feathers and natural pigments. The clan elders sang their way through the painting process, imparting tribal knowledge to younger members of the clan. The various symbols were explained and interpreted as lessons in the clan's history and heritage. A story in sand was definitely a very interesting way of sharing oral histories, but there were other forms to illustrate stories, for instance.

**Bark painting** – Similar style to rock paintings³

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¹ For examples of paintings in this style, access The Metropolitan Museum - X-ray style in Arnhem Land Rock Art available at [http://www.metmuseum.org/toah/hd/xray/hd_xray.htm](http://www.metmuseum.org/toah/hd/xray/hd_xray.htm)


³ Several examples of bark painting are on display at the National Museum Australia and available at [http://australianmuseum.net.au/image/Aboriginal-bark-painting-Arnhem-Land/](http://australianmuseum.net.au/image/Aboriginal-bark-painting-Arnhem-Land/)
*Dot painting*

Aboriginal dot painting should also be looked at as a storytelling medium. The art of Aboriginal Dot Painting is an intricate art form in itself, which can vary in style greatly. Dot paintings today are recognised globally as unique and integral to Australian Aboriginal art. Traditional dot paintings were made in sand; contemporary dot paintings use other surfaces. The canvas, wood, bark or even the skin of participants in ceremonies is covered in small dots of paint which create patterns and symbols.

On the surface the dot is simply a style of Aboriginal painting, like the use of cross-hatching (line art). Exploring deeper into the history of the Aboriginal dot painting a world of camouflage, secrecy and ritual is discovered. The dots can be used to obscure the meaning of the Dreamtime paintings. The secrets of the Dreamtime are only meant for the initiated, so traditionally they have been closely guarded. The dot technique, whether as a concealer or a signifier offers a sense of movement and rhythm causing the flat canvas to sing, jump and dance with energy and life, much like the rituals which inspired them.

The Aboriginal heritage is immersed with mythology, tradition, the dreamtime, ceremonies and a very strong connection to the land. Nearly all Aboriginal art can be related to landscape and some paintings and designs do represent explicitly the physical relationship between different features of the landscape. However, Aboriginal paintings should be seen primarily as maps of conceptual relationships that influence the way the landscape is seen and understood. When Aboriginal paintings do represent specific features of landscape, they show them in their mythical rather than their physical relationship to one another.

Depicting sacred practices and ritual objects in a representational style is dangerous because certain rituals, songs and religious objects are strictly off limits to women and uninitiated boys. To avoid explicit renderings in paintings, Aboriginal artists began to or conceal forbidden images under dotting, stippling and cross-hatching.

*Contemporary Aboriginal art*

Today the symbols used in contemporary Aboriginal paintings are the same as those found on cave paintings and rock Art. Symbols used within paintings include concentric circles, curved and straight lines. Concentric circles usually represent camp sites, waterholes or places of significance. Curved lines generally represent rain or water travelling underground. Straight lines may be indicative of travelling and when these lines join concentric circles it may show the pathway travelled by the ancestors.

![Figure 1. Symbol for camp sites/waterholes](http://www.nma.gov.au/collections-search/atsiaa/display.php?irn=145844)

A small "U" shaped figure may represent a person.

![Figure 2. Symbol for a person](http://www.nma.gov.au/collections-search/atsiaa/display.php?irn=145844)

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Tracks, whether human or animal, are often shown as they appear on the ground. Lizards and snakes are frequently seen from a topographical view - as one would see them from above.

Figure 3. Symbol for animal tracks

While the most commonly used symbols are relatively simple, they can be used in elaborate combinations to tell more complex stories. For example, a Water Dreaming painting might show a U shaped symbol for a man, sitting next to a circle or concentric circles representing a waterhole, and spiral lines showing running water. The painter is telling the story of the power of the waterman to invoke rain. Further symbols may add to the depth of meaning. Today artists often refer to the 'outside' story which they provide for the general public while the painting retains an 'inside' story accessible only to those with the appropriate level of knowledge.

The viewer's ability to interpret the images depends upon their knowledge of Aboriginal mythology and the particular dreaming depicted. Westerners will interpret a Dreaming painting in a very different perspective from that of the people who are the owners of that Dreaming.

An important aspect of Aboriginal storytelling that students must be aware of is that the stories are a kind of intellectual property, and only some people—the ones who "own" the story—are allowed to tell the story. But because the "Stories of the Dreaming" have been handed down through the generations, they are not owned by individuals. They belong to a group; the storytellers are chosen by the Elders and they are charged with the custodianship of it: they are responsible for taking care of the story, and for conveying it to the next generation. Some stories are men’s only, some are women’s only and some are public. Also, there are certain stories that one should not hear unless they belong to the community who owns it. This is an aspect of storytelling that is very different from other traditional cultures, and which is an important part of Aboriginal culture.

The Aborigines and land

Everything about aboriginal society is inextricably woven with, and connected to, land. Culture is the land, the spirituality of aboriginal people is linked with the land; their reason for existence is the land. They dance, sing, tell and paint the land. Before the arrival of people from Europe on the First Fleet, Australia was a largely unspoilt country where people respected the environment around them and made sure animals and plants were never over hunted or over collected. People only took enough to feed the number of people there at the time and nothing was wasted. This ensured there would be food next time they or someone else needed it.

To maintain the fragile environment and because of seasonal variations people would only stay in an area for a certain time. This helped make sure they didn't hunt, fish or harvest an area too much so there would be food for the next season. Every part of the animal and

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5 One of the first artists to use dot painting on canvas was Johnny Warangkula with his Water Dreaming at Kalipinypa available at the website of the National Gallery of Victoria: [http://www.ngv.vic.gov.au/tjukurtjana/tjukurpa/water-dreaming](http://www.ngv.vic.gov.au/tjukurtjana/tjukurpa/water-dreaming)
plant was eaten or used to make things such as clothing, baskets, tools and weapons. The Aborigines were completely at home in their surroundings and had no trouble "living off the land." This was mainly because of their intimate knowledge of the topography and natural resources of their tribal territories, and their complete understanding of the habits of the animals they hunted.

It is sometimes said that Indigenous people did not own land and just wandered around. This myth has come about because Indigenous people did not mark out their lands in ways that were obvious to Europeans. There were no fences or barriers as in the traditional European way of marking land ownership and so the Europeans concluded that no one owned the land. The fact that the traditional Aborigines were nomadic people does not mean that they did not have a sense of territorial boundaries. In fact, Aborigines traditionally divided up the land using geographic markers and natural boundaries, such as rivers, lakes, and mountains. The names of these geographic markers, as well as the knowledge of which territory belonged to which person or group, was information that was passed down from parent to child, and from the group of elders to the younger generation, as in so many other traditional cultures, through songs, painting, dancing, and storytelling.

In Aboriginal society people did not own the land - it was part of them and it was part of their duty to respect and look after mother earth. For Indigenous Australians the land is the core of all spirituality and this relationship has been deeply misunderstood over the past 200 years or so. This relationship is central to all issues that are important to Indigenous people today. Aboriginal descendants of particular Ancestral Beings have a very special relationship with the features of the countryside associated with the Ancestor. Aborigines are then inseparably related to the land. The spiritual link between the person and his/her Ancestor through the land and animal species means that his/her link with a particular area of land cannot be taken away or transferred to somewhere else. Compared with non-Aboriginal Australian attitudes, land is for Aboriginal people something which cannot be bought or sold; land is a source of his or her identity. This is the religious significance of land.

**Dreaming stories**

Dreaming stories vary throughout Australia and there are different versions on the same theme. Stories cover many themes and topics. Aboriginal stories and characters fulfil different functions:

1. to convey information about the landscape
2. to explain natural phenomena
3. to teach lessons about morality, ethics, and right behaviour

So that students become fully aware of these different functions, three stories may be used to illustrate them.

1. The story entitled “**Gulaga**” gives explanatory background to geographical formations. Gulaga⁶ is the spectacular forested mountain that dominates the Tilba region's skyline in New South Wales. This mountain is a site of great spiritual significance to the local Yuin people. Najanuga is the smaller rock outcrop just to the east of Gulaga. Barranguba is Montague Island in front of Gulaga.

   This story is about Gulaga, which is our mother mountain, our sacred mountain. It's about her two sons Najanuga and Barranguba.

Barranguba is the oldest son of Gulaga. Just like the older son or older brother who gets sick of living near their mother, Barranguba asked his Mum if he could move away from her side for a bit and he went out into the sea to watch the actions of all the fishes and whales. The little brother saw the big brother going out and he said to Gulaga 'Mum, mum, can I go out too? I'm big. I'm grown up, can I go out and watch the fish and the whales?' She said, 'No, son. You are too little. If I let you go out there, you'd get swallowed up by Gadu, the sea. I'll put you down near the foot of me, so I can watch you and you can watch your brother out in the ocean.' She put him down where he is now and that's where he stayed, to watch the actions of his brother while under the eye of his mother. We call that little mountain 'mummy's little boy', because he's always with his mum.

2. The story "Kangaroo gets a pouch" explains the origin of this animal's characteristic (http://www.planetozkids.com/oban/kanpouch.htmhttp://www.planetozkids.com/oban/kanpouch.htm)

"Joey! Where are you?" called Mother Kangaroo, searching for her son. "Come here now." Mother Kangaroo looked around, under all the bushes, but couldn't see her Joey. "That boy has too much energy," she mumbled to herself. "He's always hopping off." Using her paw, she shaded her eyes from the bright sun and looked around for her Joey again. "Here I am!" an excited voice yelled behind her. "Aaah!" screamed Mother Kangaroo, hopping six feet in the air and landing with a thud. "Joey, you frightened me!" she said. "Sorry Mother," said Joey. "That's alright," she answered, rubbing his head fondly. "But you shouldn't hop off by yourself. It can be dangerous." "But Mother, there are so many exciting things to see. I get bored standing here eating grass." "Grass is good for you," said Mother Kangaroo. "Now be a good Joey, and don't go hopping off again." She put her head down and munched the sweet grass. When she looked up, Joey had disappeared again. She gave a big sigh and started looking for him again. Up ahead she saw the leaves on a bush shaking. "Ah! That's my Joey," she said. She hopped over quickly, and bumped into a fat old wombat. "Ouch! Watch where you're going," yelled Wombat. "I'm very sorry" said Mother Kangaroo "I didn't mean to bump into you." "You big animals never think about us with our short legs, closer to the ground," grumbled Wombat. "Now you're here, you can help me find some good grass to eat." "I'd like to, but I'm looking for my Joey at the moment," said Mother Kangaroo. "That's right! nearly knock me over, a half blind poor old Wombat, and now you won't even help me find food," complained Wombat. "Of course I'll help you," said kind Mother Kangaroo. "Grab onto my tail and we'll look for good grass." As Mother Kangaroo hopped along with Wombat holding her tail, Joey came bounding by and hopped right over old wombat. "What was that?" yelled Wombat. "That was my Joey," said Mother Kangaroo. "Come back Joey." "Kids! No respect," grumbled Wombat. Joey kept going. Wombat stumbled into a hole. "Stop, you're going too fast. I need to rest," he complained. While Wombat rested, Mother Kangaroo kept looking around. She was worried about her Joey but wouldn't leave poor old Wombat. It was too dangerous for someone who couldn't see properly to be alone. "Now I'm thirsty," complained Wombat. "Take me to some water." "All right," said Mother Kangaroo. "I hope nothing has happened to my Joey," she thought to herself. They headed towards the waterhole with Wombat holding onto Mother Kangaroo's tail and grumbling all the way. When they reached the waterhole there was Joey asleep under a shady gum tree. Mother Kangaroo bounded over to him. "That's right. Just leave me standing here all alone not able to see," yelled Wombat. Mother Kangaroo nudged Joey to wake him and crouched down so he could climb onto her back. Then she saw men coming towards the waterhole carrying spears. They were hunting something for their dinner.

"Quickly, we have to hide! Hunters are coming. Grab my tail," Mother Kangaroo called to Wombat. They rushed towards the bushes with Wombat complaining as he hung onto the tail and bounced up and down. Hiding in the bushes, Joey dug his little paws into his mother's fur, holding on as tightly as he could.

"I'm scared," said frightened Joey.

"Shh, it will be all right dear," said his mother softly.

When the hunters had passed Mother Kangaroo looked around for grouchy old Wombat, but he wasn't there. He had turned into Father of all Creatures. He explained to Mother Kangaroo that he had disguised himself as a wombat and come down from his sky world to find the kindest animal in this land.

"And the kindest animal is you Mother Kangaroo. Even when you were worried about your Joey you were still kind to a grumpy complaining old wombat."

He took some bark from a tree and handed it to Mother Kangaroo. "Now, I am going to give you a special present. Tie this bark around your waist."

Mother Kangaroo tied the bark around her waist, and it turned into the pouch that all female kangaroos have today.

"Now you have somewhere to keep Joey from wandering off, and when he gets frightened he has some place to hide."

Joey climbed into his mother's pouch "This is really cool. Can I have friends over to visit?" asked Joey.

Mother Kangaroo thanked the Father of all Creatures. "This is a very special present, but I feel sad for all the other animals who don't have a pouch for their children."

"You are definitely the kindest animal," said the Father of all Creatures.

Because of Mother Kangaroo's kindness, all female marsupials have a pouch to carry their babies and young children.

3. Many Aboriginal stories are designed to teach lessons about morality, ethics, and right behaviour. "Thukeri" contains a clear lesson in moral behaviour, but students should be made aware that stories may combine more than one purpose.

This is a story about two men who lived on the shores of what we now call Lake Alexandrina in South Australia. They belonged to the Ngarrindjeri people.

The two men set off in their bark canoe to go fishing on the lake. They travelled along on the calm, cool waters until they came to their favourite fishing place, called Loveday Bay, where they always caught the best and most delicious bream fish. In our language, this fish is called Thukeri.

They found a good sheltered spot among some high reeds. They had made their own fishing lines, called nungi, from cords they had made from the reeds. They used very sharp bird bones for hooks.

Back on shore, the women were collecting vegetable plants to eat with the fish when they got home. As the day went on the two men sat there catching more and more fat, juicy Thukeri. They were having such a wonderful day catching so many fish and wanted to keep catching more and more, but the canoe was almost full and looked like it would sink.

As they paddled in closer to shore, they could see a stranger in the distance. He seemed to be walking straight towards them. The two men looked at each other; what if this stranger wanted some of their beautiful, juicy Thukeri? They were greedy and decided not to share with the stranger. They decided to keep all the fat, lovely Silver Bream for themselves and quickly covered the fish up with their woven mats so that the stranger would not see them. When the stranger came up to the two men he said, 'Hello, brothers. I haven't eaten anything at all today. Could you spare me a couple of fish?'

The two men looked at each other and at the mats hiding the Thukeri. They turned to the stranger and one of them said, 'I'm sorry, friend, but we caught only a few fish today and we have to take them home for our wives and children and the old people, because they are depending on us. So, you see, we can't give you any.'

The stranger stood there for a long while and then started to walk away. He stopped, turned around and stared at them. 'You lied,' he said. 'I know that you have plenty of fish in your canoe. Because you are so greedy, you will never be able to enjoy those Thukeri ever again.'

The two men stood there, puzzled, as the stranger walked away into the sunset. They shrugged their shoulders, then quickly took off the mats and began to gut the fish. But as they did this, they found that these beautiful silver Thukeri were so full of sharp, thin bones that they couldn't eat them.

'What are we going to do? We can't take this home to our families, they'll choke on them.' So the two men had to return home in shame with only the bony fish. When they got home, they told their families

what had happened. The old people told them that the stranger was really the Great Spirit called Ngurunderi. Now all the Ngarrindjeri people would be punished for ever, because the two men were so greedy.

And so today, whenever people catch a bony bream, they are reminded of long ago, when Ngurunderi taught them a lesson.  

This story is very rich, approachable from a wide variety of angles and may be used to teach very different aspects. In this traditional story, students may identify and explore patterns, practices and present day lives of indigenous Australians insofar as it clearly teaches some rules for living, lessons on resources and the environment, and the Spirit Ancestors.

As far as rules for living are concerned, students learn some ways of behaviour, namely:
- Care and respect for others and the environment: the men should only have taken enough fish to feed their families.
- There are consequences for bad behaviour: the men are punished for their greediness and for lying.
- Men and women have different roles: the men go fishing while the women gather vegetables.
- The acts of individuals affect the group: the Ngarrindjeri people could no longer eat that fish because it's too bony.

Thukeri also teaches us about the natural environment:
- the environment in the Lake Alexandrina area - major landmarks, local plants and the best fishing spots
- how the Ngarrindjeri people use the natural resources
- characteristics of the bony bream

Concerning the spiritual world, we learn that Ngurunderi is always watching the people to make sure they are obeying the law; and that the Spirit Ancestors enforce the law by punishing the two men. Most of the characters that appear in Aboriginal stories take the form of animals that are particular to Australia. Australia is actually home to many unique and fascinating animals. Most of these are marsupials: the kangaroo, the bandicoot, the numbat, the wallaby, the wombat and the iconic koala.

Teachers may use the several stories to provide students, in a very motivating way, with knowledge about these not so well-known animals, for instance that the name koala comes from the Aboriginal language meaning "no drink". The Koala actually obtains enough moisture from the eucalypt leaves that it lives on. And why did the koala have to learn to live without water? A fantastic story – “Koobor the Koala and Water” – provides the answer.  

Australia has some 700 species of birds. Some of these include the kookaburra - a large, noisy bird whose loud, distinctive call sounds like human laughter. The story “Goo-Goor-Gaga the Kookaburra” tells us about these laughing calls which usually occur at dawn and dusk.

Another animal which is very often present in Aboriginal Dreaming stories is the brolga (also known as the "Native Companion"). Brolgas are most famous for their mating dance - with wings spread and facing each other the two brolgas jump, dance, pirouette, prance about and perform also a lot of head shaking. The dance is very smooth looking and graceful. The Aborigines have copied the brolgas' dance and do it themselves in some of their traditional ceremonies. To learn about these animals, teachers may use the story “Brolga - the beautiful

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10 Available at [http://www.planetozkids.com/oban/koala.htm](http://www.planetozkids.com/oban/koala.htm)
dancing bird” Other animals that call Australia home is the large flightless emu, the platypus, the echidna and a large variety of reptiles – the blue tongue lizard and the frilled neck lizard.

Animals are universal symbols that are key to human efforts to represent reality with language. All cultures have different perspectives concerning the importance of animals, but Aboriginals unquestionably have looked at animals as a source of survival, art, teachings… Animals for the Aboriginal culture are literally and metaphorically indispensable in the same way stories are literally and metaphorically invaluable in education.

As conclusion, a poem which tells about the essence of being Aborigine…

I Am – Aborigine

I am born of the land, my soul is the sun
Nature is my mother, I am, mother nature's own son
The wind is my spirit, running wild, running free
The water is my mirror, reflecting visions of me
I am like a great river that slowly runs dry
Polluted and abused I am the river, slowly - I die
I am a child of the earth, created from dust
I live for the land, taking only what I must
I am a hunter of animals, imitating their stance
I am what I hunt, I am its spirit in the dance
I am a painter of walls, I am an artist of dreams
Depicting mythological creatures, and spirits in my scenes
I am from the never never, a long time gone by
The Dreaming is my creation, I am at home when I die
I own no land, for the land owns me
That's the way it has been, how it always will be
For I am what I am - I am - Aborigine

Stephen Clayton

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14 Read the story “Gaya-dari the Platypus”, available at http://www.dreamtime.auz.net/default.asp?PageID=49
10. The Canis-lupus Duality: A Narrative History of the Wolf

Dawn Bessee
Arkansas State University, Jonesboro, United States of America

Abstract
A society’s depiction of the wolf in myths and stories is a direct reflection of that society’s regard for the animal known as Canis Lupus. Cultural perspectives around the world have been found to either embrace the creature or move to eradicate it from the land. Negative tales of the wolf date back to times well before the medieval period. The wolf was often used to characterize the unsavory qualities of greediness, rapaciousness, gluttony, and deviousness and thus could be correlated to death and punishment. Several religious references to the wolf have been documented as words of warning, as well. The cunning viciousness of the wolf in such tales played an enormous role in demonstrating how humans should behave themselves, as well as how to recognize and avoid such characters to prevent falling victim or suffering dire consequences. Asian, Russian, and Native American narratives of the wolf, however, portray the wolf as a noble creature that is wise and dignified. Tales from these locations positively portray the wolf as nurturing, protective, and instructive, with stories articulating the reverence for nature, family, and a higher power.

The fascination with the wolf, both as a positive and negative character, has continued to flourish and permeate modern narratives. Well-known fairy tales have undergone various twists in recent publications, and qualities of the wolf are embedded in characters of popular literature series including Harry Potter and Twilight. The duality of the wolf in stories has been, and continues to be, a means to illuminate the internal struggle between good and evil.

The gift of oral narration has been a means of both representing and preserving a society’s culture throughout time. Stories epitomize the beliefs and values of a particular population during a particular time, and story-tellers are careful to select the most appropriate characters to reflect the qualities and moralities necessary to prove a point. No character has been quite as useful to that end as the wolf. The wolf, also known as canis lupus, represents both good and evil, depending upon the moral or lesson the narrator desires to teach.

As early as 600 B.C., Aesopic fables and other short stories that teach a moral at the conclusion render the wolf as a character to be wary of and avoided. Unlike mythological tales or well-known fairy tales, the fabled wolves are not necessarily atrocious. However, the fables do use the wolf to symbolize less desirable behaviors. Time and again the wolf is outwitted or injured or destroyed. He practices deceitful measures to lure his prey into his heinous plots, however he is always outwitted or undone and is never able to achieve his goal. The morals typically refer to being aware of charlatans, advice to never try to take the easy way out, there are compromises to be made when choosing between security and freedom, and devious deeds often backfire in a painful way (Ashliman, 2003).

In examining the wolf’s use in narratives, it becomes clear that the history of the wolf and the history of the world are intertwined. Many nations claim to have been brought into existence due to the phenomena of she-wolves nursing and nurturing future rulers and heroes. The mere act of suckling the she-wolves milk embodied young men with advantageous and propitious endemic qualities of the wolf. Initial rules of Persia, Rome, Turkey, and Chechnya were regarded as intelligent, resolute, intrepid, and tenacious. With the essence of the wolf coursing through their veins, Cyrus, Romulus, Ashina, and Turpalo-Noxchou each gave foundation to their respective countries and went on to expand their borders in a dynamic display of courage and cunning (Bingly, 2003; Chechen mythology, 2012; Strauss, 1993; The
Turkish Legend of Derivation, 2004; & Wolfchild, n.d.). In this respect, it would appear that the people of these countries both recognize and revere certain qualities of the wolf.

Mythology has characterized and stigmatized the wolf in a negative manner by way of using Canis lupus as a means to mete out punishment. Greek lore includes the story of King Lycaon, who attempted to trick Zeus into revealing himself while partaking in a feast. Lycaon had deceptively intermingled human bones and flesh with the meat offered to Zeus. In a paroxysm of rage, Zeus transformed King Lycaon and condemned him to take the form of a wolf (Lupus the wolf, n.d.). Greek sentiment would suggest Lycaon’s insidiousness, coupled with the implicit references to cannibalism, conjure up an image that is commensurate with that of the wolf.

Norse mythology has also used the wolf in stories of castigation. The father of two beautiful children, Sol and Mani, was subjected to the worst possible torture a parent can suffer. His children were taken from him by the Asagods, for he had angered the Asagods with his constant boasting of his children’s beauty. The children were dispatched to the sky and commanded to drive the chariots pulling the sun and moon. The hag of death, Gulvieg, set loose two wolves to pursue the children across the sky (Strauss, 2003). The premise of the story may be initially founded in a desideratum to explain the passing if the day into the night. However, the notion of being dogged by a rapacious beast for all eternity would intimate the Norse narrators were inclined to hold the wolf in less-than-positive light when it suited their purpose.

Wolves have long held a prominent place in folklore with regards to eternity, purgatory, death, and religion. Greek mythology describe Charon, the ferryman charged with transporting souls of the dead across the river Styx, as wearing a pair of wolf ears. In Egyptian culture, the wolf has been regarded as both the god of death and guardian of the underworld. Hecate, the goddess of death, has been depicted wearing three wolf heads (Greek wolf myth, n.d.; Wallner, 1988). Whether directly involved with death or used in an ancillary capacity, the wolf has been connected to the cessation of human life in a way that propagated a deep-seated fear in the minds of an impressionable society.

Some cultures assert the wolf epitomizes pure evil and is a creature actualized by the devil himself; the anti-Christ. A wolf pays no heed to restraint or self-control, giving in to every whim without conscious thought of right or wrong. The wolf is the perfect example of a creature that must be tamed, feared, destroyed, and avoided. He represents all abominations that moral and religious people should strive to quell within their own hearts and minds.

Perhaps one of the most prominent stories that exemplifies the power of God over evil is entitled “Saint Francis and the Wolf.” Set in the Italian city of Gubbio during the 12th century, a ferocious wolf wreaked havoc on the town. It devoured animals and humans alike and had terrified the townspeople to the point that they were incapable of venturing past the city walls. St. Francis volunteered to go out into the woods to meet the creature. Upon seeing it, he made the sign of the cross and spoke to the wolf in the name of Christ. Instantly, the wolf became meek and docile. It followed St. Francis back into the city where he was cared for, fed, and remained until he died of old age (Egielski, 2005). The lesson to be learned here suggests to readers that persons who humble themselves and endeavor to refrain from yielding to sinful compulsions will be embraced and cared for by good, moral people.

Even the most innocuous of fairy tales can be laden with religious motifs and connotations. Seventeenth century Europe was dominated by the question “what is the truth of the human heart?” It was a time when writers and storytellers strove to illuminate the exigency of decrying human passions over human reasoning (Literature, the 17th Century, n.d.). It was a time when the immoral enemy had to be named, and a simple story could condemn that enemy.
For instance, “The Three Little Pigs” is a tale that pointed out the vilest of creatures as that enemy—the wolf. Each pig built his own house, choosing different building materials that reflected their different levels of good judgment and preparedness. The first two pigs were compelled to build quickly and use unstable items, and they promptly met their demise by means of the edacious wolf. The third pig made a wiser choice and survived the attempted incursion by the wolf. However, the lesson to be learned is not the importance of being assiduous. The lesson in this tale is that the wolf is our most ferocious enemy because of what it represents: “asocial, unconscious, devouring powers we must learn to protect ourselves against” (Bettleheim, 1976, p. 42). We must control our ego and refrain from giving in to the pleasure principle.

The European version of “Little Red Riding Hood” mimics similar religious warnings. Perrault’s French version of the fairy tale depicts the wolf’s voracious appetite as being synonymous with gluttony. The use of phrases such as “the greedy wolf consumes them” is testament to the deadly sin represented by the wolf. (Bettleheim, 1976, p.42 ). The German version, as recorded by the Grimm Brothers, also intimates the wolf is punished for his gluttonous behavior. The characters’ dialogue contains religious references such as referring to the wolf as an old sinner and speaking to sinful impulses (Cashdan, 1999). Not only do these renditions reflect the mores of the people, but they also explicate their opinions concerning the qualities of the wolf by using the creature to typify that which is most abhorrent. The consequences of giving in to such depravity are both a physical and a spiritual death.

Fenrir, a Norse deity, is connected to a prophesy closely symbolic of a religious Armageddon. Loki, a Norse god and the son of two giants, was the father of Fenrir, who was a monstrous wolf. Legend has it that Fenrir was so vicious and frightening to all the other gods that it was decided he must be shackled or imprisoned in order for all others to remain safe. Consequently, no chain or rope was strong enough to keep Fenrir restrained. At the request of the gods, dwarves provided a magical ribbon that was strong enough to bind Fenrir. At the time of Ragnarok, an egregious battle between the gods and the giants likened to modern day Armageddon, Fenrir will finally break free and join forces with the giants to bring about the end of the world. It should also be noted that when this epic battle ensues, the wolves that had been chasing Sol and Mani will swallow the moon and sun (Fenrir, 2012; Lupus the wolf, n.d.). Only the most feared and diabolical creature could be used in this myth.

Japanese, Native American, and some Russian folklore have all but exonerated the wolf as the degenerate creature other cultures have made it out to be. These particular countries and cultures regard the wolf as a noble, intelligent, and courageous creature that deserves to be respected and revered. Their tales and folklore portray the wolf to be one that is protective of its family, helpful to those who need it, and capable of recognizing people’s true nature as opposed to the façade behind which they may hide. That is not to say Japanese, Native American, and Russian people disregard the potentially dangerous side of the wolf. They recognize and acknowledge the inherent malevolence a wolf may possess, while still understanding the wolf’s rightful place in the world.

Ôkami, the Japanese word for wolf, has been the subject of many folktales. According to the stories, the ôkami resided in the mountains and hills, and did not approach humans unless there was a need. Nonetheless, when a person became lost or had been mistreated and turned away from society, ôkami appeared and lead the wondering souls to safety or offered refuge. The ôkami shared their gift of seeing humans in their true form by providing deserving people with wolf eyelashes or eyebrows. Such a gift made it possible for people to be a better judge of character when choosing friends or companions (Ôkami, 2010; Strauss, 1993).
The cultural norms of Japan center on the importance of achieving social harmony, and Japanese ōkami folklore is a mechanism for teaching that philosophy in that the ōkami may revert to violent behavior, but only in relation to how they are treated by humans. Even the Japanese version of “Little Red Riding Hood” has an alternate ending where the wolf survives and apologizes to Little Red for his wolfish behavior. She forgives him, and he promises to be good from that point forward. The lesson to learn in this version, and Japanese ōkami folklore as a whole, is that people are to be kind towards one another and forgiving (Cashdan, 1999).

Native Americans’ tales of the wolf demonstrate their reverence for the natural order of things, as well as their regard for the noble character of the wolf. As with Japanese and Russian culture, the wolf is a creature possessing potentially frightening qualities, but the wolf also has a plethora of powerful attributes that benefit those who respect the wolf for what it is. A Lakota tale speaks of an injured woman being nursed back to health and gaining gifts from the wolves that made her more powerful than her tribe’s medicine man. She was able to use the ways of the wolf to defeat him and become the tribe’s shaman (Strauss, 1993). Several tales from various tribes of Native Americans extol the same premise where the traits of the wolf can be taken in to gain strength and power to better help the people, as well as stories of wolves being helpful to the Native Americans by being intermediaries, nurturers, and protectors (Casey & Clark, 1996). The relationship between the Native Americans and the wolf is symbiotic in nature, and continually cultivated through the passing-down of ancient folklore.

Russia has fairy tales and stories that capture both the positive and negative mindset regarding the wolf. In shorter fable-esque tales, the wolf may be portrayed as gullible or deceitful, but numerous stories have been passed down from generation to generation where in the wolf is benevolent and valuable to the Russian people. One such tale is “Ivan, the Firebird, and the Grey Wolf.”

This story narrates a course of events in which Ivan constantly finds himself in a dilemma because he will not listen to counsel and gives in to the temptation to attain material riches. The grey wolf saves Ivan at every turn, and in the end, the self-sacrificing grey wolf ensures that Ivan gets everything he needs in order to have a fulfilled life. Granted, the wolf ate Ivan’s horse early on in the story, but that was a choice Ivan had made. And the wolf helped Ivan destroy his brothers in an unsavory manner, but the grey wolf was loyal to Ivan throughout the story (Strauss, 1993). The interesting twist in this tale is that it is Ivan the human, rather than grey wolf the wolf, who cannot control his impulses. The twist effectively illustrates how the wolf delineates the most desirable qualities a person can possess.

This saga of using the wolf to characterize both admirable and unsavoury characteristics continues to permeate modern literature, and the direction in which an author writes is contingent upon the morals and values the author wishes to illustrate. Many well-known fairy tales and stories have recently been adapted to reflect modern thought: Roald Dahl’s Revolting Rhymes (1982) finds the same greedy, gluttonous wolf fall victim to a modern-day, savvy Little Red Riding Hood who takes matters into her own hands. The same premise is found in James Thurber’s version of the tale where Little Red shoots the wolf with an automatic pistol (Cashdan, 1999). Religious veneration has been replaced with self-reliance, but the wolf is still used to characterize detestable qualities that need to be squelched.

Similar renditions of “The Three Little Pigs” have been published over the past few decades. In these, the wolf is continually demonstrating the desire to gobble up anything and everything in sight, but these contemporary piglets are armed with state-of-the-art artillery and have forged alliances with far craftier animals (Delessert, 2008; Osmond & Osmond, 1999). Children may be better able to relate to the more current settings and events while still understanding the lesson being offered.
The dichotomy continues as to the type of character a wolf should represent. On one hand, traditional tales are being rehashed to keep pace with the changing times, but a new genre of wolf tales has evolved in children’s literature. Humorous stories have been written or re-written from the wolf’s point of view that allows the reader to see into the mind of the wolf. The narratives give the wolf a human quality in that the wolf is able to express anguish over being misjudge or mistrusted because of prior events from its ancestors (Nickl, 1982; Taylor, 1996). The wolf struggles with the internal conflict of resisting the urge to behave instinctively like a wolf and behaving in a way that is socially acceptable, often resorting to defensive appeals (Scieszka, 1989; Shashkan, 2012). Finally, several children’s books now tell the wolf’s tale wherein the wolf makes peace with his own identity rather than being miserable trying to emulate the thoughts and behaviors of others (Krensky, 2007; Lee, 2000; & Lie, 2010). Old or new, these stories are still a valuable venue by which students can learn beneficial lessons necessary for everyday life.

Books for adolescents and adults continue to incorporate the wolf into the fabric of the story, often times infusing aforementioned suppositions about the wolf. Rudyard Kipling’s *Jungle Book*, first published in 1894, tells the story of Mowgli, the man-cub raised by wolves after he had been found in the jungle, which reflects directly back to both the nurturing instinct of the wolf and ancient myths, stories, and fairy tales that have communicated the same quality.

The Harry Potter series employs a unique treatment of two separate ancient mythologies. One of Harry’s professors happens to be a werewolf. His name is Remus Lupin, whose name harkened back to the Roman mythological story of Remus and Romulous. Professor Lupin tried desperately to refrain from becoming a vicious beast, and he sided with those fighting evil. His nemesis, on the other hand, joined forces with the evil side. A werewolf himself, Fenrir Greyback was a savage creature that willingly embraced his condition and made it a point to attack as many people as possible. His name and behaviors are aligned to that of Norse mythological creature Fenrir (Rowling, 2005).

The Twilight series by Stephanie Meyer is permeated with the Native American’s beliefs about the wolf, as one of the main characters, Jacob, is a Native American shape-shifter who transforms into a wolf in times of danger. The character of Jacob embodies the agility, strength, and protectiveness of a wolf who dedicates himself to protecting Belle, the female main character in the series. He struggles with taking his rightful place within the pack, but eventually resigns himself to the idea that he is destined to be a leader in his own right (Meyer, 2005, 2008). It is this acceptance of his destiny that helps him evolve.

The canis lupus is possessed with a duality like no other animal .The wolf has imbedded stories and tales across the world for thousands of years. Many cultures can be identified by their regard for the wolf and their subsequent use of the wolf to perpetuate the beliefs and values of the group. The literary conundrum occurs when deciding whether or not the wolf is to be adored or despised. At this point in the narrative medium, it may very well depend upon the purpose for calling upon the wolf in a story, for it can represent both good and evil and symbolizes the internal struggle between the two.

**Works Cited**


11. Who Is the Beast?  
The Portrayal of Animals in Multicultural Folklore

Anne Drolett Creany  
Indiana University of Pennsylvania, Indiana, Pennsylvania, USA

Abstract
Humans have had complex and varied relationships with the animal world since ancient times. They inhabited our living spaces as helpmate, sustenance, enemy, or companion. Animals dwelled in our unconscious in dreams, as symbols, or as our reflected selves (Smith, 2011). In some cultures, certain animals were glorified, while others were vilified. Human-kind’s complex relationship with animals is reflected and projected in folk literature where animal characters exhibit human strengths and frailties and teach lessons about how best to live our lives. This paper will examine the multi-faceted relationship between humans and animals as reflected in the folklore of various cultures.

Child development perspective and the human-animal bond

Animals play a variety of roles in human lives; they may be helpmates, family members, or objects of the hunt. Melson (2010) explored this contradictory relationship between humans and animals, noting that some animals are tended and cared for and then slaughtered for consumption, while other animals are cosseted and pampered during their lives, then mourned when they die. For children, animals may be objects of fascination or best friends. According to Melson, the field of child development has been humanocentric, focusing on children’s relationships with other humans, parents, siblings, and friends. She argues that a biocentric developmental perspective is needed, and there is a need for research about children’s relationships with animals since the existing research is limited and dated. Melson points out that it is not only real animals that are such a prominent part of children’s lives. Children are also drawn to stories of animals in literature and folklore. In stories, animals play various symbolic roles. Sometimes they represent the beast within—a reminder of humanity’s kinship with animals and our animal nature.

Psychoanalytic perspective and symbolism of animals in folklore

Betelheim (1975) also examined the symbolic nature of animals in folk and fairy tales. He argued that the critical responsibility in raising children is helping them find meaning in life. Betelheim noted that if children learn to understand themselves as they develop, they become more able to understand others and form satisfying relationships. The fairy tale fosters this development because it helps children to make sense of their feelings. Betelheim states that fairy tales “carry important messages to the conscious, preconscious, and unconscious mind on whatever level each is functioning at the time” (p.6). Betelheim notes the significance of animals in fairytales, in the way creatures great and small help children understand themselves and their world. To the child, an animal may represent freedom since animals are able to roam freely in the world and behave in ways that society would disapprove for the child, such as public excrement or sexual acts. In some stories, these animals are able to serve noble purposes, such as a guide to the folktale hero with whom the child identifies. As the child begins to explore her own world, the notion of an amiable guide makes the world seem a more benevolent place. Betelheim also notes that the fairy tale gives dignity to small achievements,
such as befriending an animal, which implies that remarkable rewards will follow, as in the tale of Puss ‘n Boots (Perrault, 1990).

Franz (1996) notes young children consider animal stories particularly appealing, and claims that they represent the “basic material, the deepest and most ancient form of tale” (p. 36). She uses a Jungian lens to interpret fairy tales and believes that animal stories represent archetypal human tendencies, so that a greedy tiger in a story actually represents our own tigerish greed. Melson concurs, noting that humans have long endowed animals with emotional power (2010). Animal symbols project our deepest fears, wishes and conflicts, so that our own image is mirrored in them. Even modern metaphors reflect that projection, according to Melson. Therefore, we use expressions such as “hogging the road,” “wolfing food,” or “chickening out” (p. 145). These metaphors persist because animals played such a dominant role in the environment of human evolution that humans are hardwired to animals as a category of thought and emotion (Bowerman, cited in Melson, 2010).

Native North American’s perspectives on animals

Deloria, a member of the Standing Rock Sioux, argues that, in contrast to many of the world’s cultures, Native North Americans have traditionally perceived themselves as fundamentally related to all other living species, committed to treating animals and the natural world with respect, and carefully observing and learning from that world (Deloria, 1992). Bruchac, whose heritage is Abenaki, explained this relationship by describing spiritual beliefs of American Indians and contrasting them with Western cultures. According to Bruchac, the creator deity often referred to as the Great Spirit or Great Mystery is all-present, and is part of all things. Since the Great Spirit cares equally for all aspects of creation, no hierarchy exists among living things that would place humans above animals and the natural world. Instead, humans have a responsibility to show respect to animals, even those that humans hunt in order to live. Some plants and animals are considered ancestors, and stories of animals becoming human and humans becoming animal are a significant part of Native American folklore. (Bruchac, 1992). Parents and elders frequently told children stories that taught them to respect the animal and plant world. They also told stories with animal characters whose behaviors showed children how the world came to be and how they should behave in the world. These teaching stories emphasized the virtues of the animals, and children were encouraged to be wise, gentle, or brave in a similar fashion to certain animals and birds (Deloria, 1992).

Since Native North Americans observe their environment and the creatures within it and model their behavior after them, the social systems of some tribes were patterned after the animal behaviors they observed, and the people organized themselves in clans identified with that animal (Deloria, 1992). In the northeastern United States, home of the Seneca Nation, clans are a traditional social unit. Groups of families in the mother’s lineage form the clans, which are named after animals that provide special assistance to the Seneca. They are divided into two categories, birds and animals (Seneca Nation of Indians, 2012).

Folktales that feature animal characters

Whether a culture holds great respect for animals and considers them relatives as do the native North Americans or view animals as subservient to humans, most cultures include animal stories in their body of folk literature. A listing of stories featuring animal characters can be found in catalogues of folktales that are classified by tale type. The Index of Types of the Folktale is the classic catalogue devised by Finnish folklorist Aarne Antti (1910) and revised by American folklorist Thompson (1961) that is commonly known as the Aarne Thompson (AT) tale type index. This index was further edited by Uther in 2004 (ATU) to include more
international tales. Both catalogues assign numbers 1-299 to animal tales. The ATU list includes subcategories for wild animals, the clever fox (other animal), wild and domestic animals, wild animals and humans, domestic animals, and other animals and objects. Listed under the category of tales of magic is the category of supernatural husband or wife that assumes the shape of an animal before transforming to human. Perusing these tales reveals the similarities of stories told in countries around the world.

**Literary forms**

Animal tales take a variety of literary forms, including fables, pourquoi tales, beast tales, and transformation tales, such as the animal bride stories. Fables, such as the story of the tortoise and the hare, are characterized by their focus on a moral. The objective of the fable is to teach a lesson, so they are, by their nature, didactic (Lukens, 2005). The characters are usually personified animals who display traits of human behavior. Their characters are not well developed because the point is to highlight how certain behaviors lead to consequences, as in the case of the greedy dog who wanted the bone he saw in the mouth of a dog that appeared in the water when he looked down. When the dog opened his mouth to snatch the bone of the dog in the water, he lost his own bone. The moral of the story is that greediness doesn’t pay.

Pourquoi tales explain how something in nature came to be, and these tales carry a strong lesson about behavior, even if they lack a stated moral (Keifer, 2010). In a story from the Muskogee people, the animals and the birds organized a game of lacrosse to settle the question of which group was superior. After the animals formed sides, bat flew to the animals to play on their side, but the animals pointed out that he had wings, so he should play on the birds’ team. However, when he flew to the birds, they mocked him and told him that his fur and teeth disqualified him for their team, so bat returned to the animal team. The animals allowed him to sit on their sideline and wait to play if they needed him. Although the birds and animals battled all day, no team scored, but at dusk, the animals had difficulty seeing to defend their goal, and birds were about make the winning goal. That is when bat entered the game. Able to see well in the dark, he stole the ball from the birds and scored for the animals. As a member of the winning team, bat was chosen to determine what the losing team’s punishment would be. He decided that birds must leave the land for six months every year. As the story goes, since that time bats come out at dusk to see if anyone needs them to play ball.

In beast tales, such as the European tale of The three pigs, or the Brer Rabbit stories from the American south, animals play a variety of roles. At times a clear message is conveyed—you must take precautions to avoid danger, such as the wolf; you must not give in to foolish rumors, as did Chicken Little’s friends; if you won’t help do the work, don’t expect any of the Little Red Hen’s freshly baked bread. African folktales often feature the wise creature/foolish creature motif in which one animal, often a small one, outwits a larger animal (Keifer, 2010). An example of such a story is *Who lives in Rabbit’s House?* (Aardema, 1977). In this story, a frog solves the problem that the larger animals could not.

The Brer Rabbit tales (Harris, 1986) actually served as a narrative code in which animal tales would sound like amusing beast tales to slave owners who heard them, but had a different meaning for the slaves telling the stories. In many of these stories the clever trickster, Brer Rabbit who represented the powerless slaves was able to outwit and humiliate the wicked fox and foolish bear who represented their owners and overseers.

**Transformation tales**

Perhaps the most powerful of the folk tales featuring animals are transformation tales. Such transformations are evident in the French and German tales of Beauty and the Beast or The
Frog King. Betelheim (1975) suggests that the animals in these stories represent human’s bestial nature, and reflect a conflict that accompanies the integration and acceptance of sexual desires and behavior into the personality. 

Von Franz (1996) analyzed the Russian tale of the Frog Princess, but this tale does not include an acceptance of the animal bride/groom’s nature. In this story, the tsar’s youngest son must marry a frog, much to his dismay. However, when his bride is asked to weave fabric or bake bread to impress the tsar, she sends her husband to bed, sheds her frog skin, calls her handmaidens to assist her, and astounds everyone with the beauty of her work. Her most amazing accomplishments come at a formal dinner when she appears as a beautiful princess who dances beautifully and creates a picturesque lake on the dance floor-complete with swans- by waving her arms and loosing some wine and food she has hidden in her sleeves. Her husband is so delighted with her human form that he burns her frog skin so that she cannot resume her frog persona. Unfortunately, this act means that she must leave him because she is under a spell cast by her father, but she tells Ivan where he might be able to find her. After a long journey during which he is helped by an old man and by three animals to which he shows mercy, the young tsar destroys her father and wins back his bride in her human state. Von Franz comments on the female anima represented by the frog figure and her creative force and the conflict between the “upper father,” the tsar, and the “lower father,” the princess’ father (p. 110). The nature of the animals that assisted the prince’s rescue efforts are worth consideration. They included a bear, a falcon, and a pike, representatives of land, air, and sea. The prince’s kindness to the animals is repaid by their role in helping her to be reunited with the prince, in her human form.

In stories where there is a transformation from person to animal or vice versa, the change makes sense to children or to members of a culture who recognize that all beings are inhabited by the same spirit. In Native American tales, transformation tales do not typically represent being cursed or under a spell, most likely because there is not the sense of hierarchy between humans and animals. Norton (2009) describes transformation stories as threshold tales in which characters move in and out of the animal world and typically show the bonds between humans and animals. For example, a tale from the Haida people of the Pacific Northwest titled Salmon Boy, a boy who ignores his parents’ teachings that he show respect to the salmon they caught and ate drowned one day and became one of the Salmon people. The Salmon people taught him how to be respectful, and eventually he returned to his own family as a healer who showed the people how to respect the gift the Salmon people give them. When he died, the people placed his body in the river as he had taught them, then he circled four times-a sacred number- and returned to the Salmon people.

Conclusion

Animals have played and continue to play important roles in the lives of humans, and this significance is reflected in the folk literature of the world. In fables, pourquoi tales, beast tales, and transformation stories, the fascination with and interconnections among humans and animals is given creative expression. How the relationship is portrayed is heavily influenced by the culture in which the tale originated. Readers and listeners of stories that feature animals can learn much about humanity and its place alongside its animal kin.

References


III Reflective Practice
12. Fostering Reflective Practices in Childcare for Children Under Three: The Project Crescer na Creche (Growing in childcare)

Ana Maria Sarmento Coelho and Vera Maria Silvério do Vale
Centro de Estudos Interdisciplinares do Século XX da Universidade de Coimbra - CEIS 20
Escola Superior de Educação de Coimbra

Abstract
Although childcare professionals deny that they deliver a mere custodial assistance, they often show difficulty in explaining their intentions and formulating the guiding principles of their practices, i.e., their educational aims. These difficulties, which are recognized internationally, are increased in Portugal because education and care of children under three years are excluded from the education system. The lack of national guidelines for work in childcare also hinders practitioners’ reflective activity and willingness to generate new meanings to their experiences and thereby new practices. In this paper the authors present the outlines of a project designed to build a reflective training program to be used in the training (postgraduate and continuing) of childcare teachers working with small children.

Introduction
In recent years it has been acknowledged that effective early childhood professionals engage in reflective practice and in critical reflective practice, which are recognized as key features of high quality early childhood education and care settings (O’Connor & Diggins, 2002). Reflective early childhood teachers have been described as those that are open to new ideas, willing to challenge their own “routine action patterns” or “scripts-for-action” (Wien, 1995), and to extend and expand their learning.

The reflective approach to early childhood education is framed within teacher education and teacher professional development. It is grounded on the recognition that teachers, in general, as other “professionals of the human” (Formosinho, 2009), work in uncertain, complex and unique contexts (Clandinin & Connelly, 1987), that being a teacher is more than applying a set of technical tools, and that their expertise can be developed by challenging their “current way of doing things”. As Marbina, Church and Tayler (2011) stated “In the early childhood development context, reflective practice is best described as a continuous process that involves professionals analyzing their practice in order to identify what drives children’s learning and development; as well as the impact of their own values on understanding children’s learning and development” (p.4).

In Portugal there is a growing recognition of the educational value of early childhood experiences and of encouraging early childhood teachers to develop reflective practices as a way to enhance children’s learning, development and well-being. However, it is still a widespread perception that the practice in childcare settings for children under three entails mainly a particular set of routine actions that requires little reflection. This socially constructed way of looking at the education of small children has social and historical roots, which relate to the fact that the care and education of children under three has been seen for long as a private subject and mainly a responsibility of families (OECD, 2000). This has strengthened the idea that those who work in those settings have solely to have personal attributes (especially of affection) and this often leaves practitioners in early childhood with
feelings of worthlessness and exclusion, which undermine their ability to reflectively think about what they do and why they do it.

In fact, although they deny that they deliver a mere custodial assistance, childcare teachers often show difficulty in explaining their intentions and formulating the guiding principles of their practices, i.e., their educational and pedagogical aims. These difficulties, which have also been acknowledged internationally (Moss, 2000; Brannen & Moss, 2003), are reinforced in Portugal because education and care of children under three are excluded from the education system. This brings additional difficulties for teachers working in childcare centers, since their training and professional development tend to put a major emphasis on the education of children between three and five (preschool education). In fact, previous research (Coelho, 2005) showed that it is not easy for Portuguese childcare teachers working with children under three to explain the meaning of the experiences they develop with the children and the corresponding decision-making processes. This problematic dimension of their work seems to be linked with difficulties in clarifying the processes by which everyday actions can be connected and set up in a coherent curriculum. It is also strengthened by the lack of national guidelines for work with children under three, which hinders their reflective activity and willingness to generate new meanings to their experiences and thereby new practices.

Based on this knowledge the authors have recently initiated a project to build a reflective training program to be used in the training (postgraduate and continuing) of childcare teachers working with the youngest children. Since the project has started recently, this paper focuses on the outlines of the program and of its construction process.

**Project “Crescer na Creche” (Growing in Childcare)**

This project is being conducted as an action research project with two major aims: The construction of a reflective program to be used in the training (postgraduate and continuing) of childcare teachers working with the youngest children; and the construction of a reflective self-assessment tool (which we named *reflexive-folio*), to be used by childcare teachers themselves in their daily practices.

Our major intention is to foster reflective practice in childcare for children under three. Accordingly the training program is being built in order to: 1. elicit practitioners’ current beliefs and values (about the care and education of children, about early learning and about children themselves); 2. foster their empowerment to be aware and to critically examine their practices; 3. encourage these processes using guided reflection (Ash & Clayton, 2004).
While focusing on strengthening the capacity of practitioners to clarify and gain insight on how they care for, relate and react to very young children, we also want to focus on how to translate research into teacher practice to improve program quality for infants and toddlers. So the project is based on two main approaches: training experiences and associated research projects (as summarized in figure 1).

**Training actions**

Three in-service courses have been planned so far, which we see as a preliminary and exploratory stage of the overall project. In this stage our aim is to collect data about “what is going on” in the field, in order to gain a deep understanding of what are the main constraints and challenges that are faced by childcare teachers working under threes, and how these encourage or undermine their will and ability to rethink their current practices.

A training course for novice childcare teachers (1) is already under development. It is attended by 25 childcare teachers who recently graduated from our College. They are all in their first or second year of professional activity and they are working in “Creches”, that is: childcare centers for children under three. This is a 25 hour course organized in five sessions. Our main objective is to explore the way the novice childcare teachers face the dilemmas and problematic aspects of their current practice, and to ascertain their biggest concerns and difficulties while working with the under threes. Since we know that their education process has been developed within the framework of a reflective perspective, we want to investigate what are the facilitators and obstacles to a reflective approach of professional activity in the beginning of their careers as early childhood teachers. We also want to give them some support in that initial phase of their professional careers.

A training course for experienced childcare teachers (2) will be held in our College in the beginning of next school year (from September till December 2012). It will be addressing experienced childcare teachers with ten or more years of experience with children under three. The main objective is similar to the course described above, but in this case we want to gather data from experienced teachers, which we hope will not be as busy “struggling for
surviving” as the novice teachers, and therefore will be able to engage more in exposing, reviewing and deconstructing their current practices. It will be a training course of a total of 50 hours, divided into 25 hours in our College and 25 hours in the workplace.

An in-service training extended course (3) will also be unfolded during 2013. A preliminary draft of the Reflective Program will be under validation. A first draft of the self-assessment tool will also be used and explored with this group. Participants will be mentored in their practices in order to assist childcare teachers in using the self-assessment tool and in describing how it impacts on their practices.

Research projects

Two research projects are being developed in connection with the overall Project “Growing in childcare”. The first one focuses on “children’s perspectives” (4). The assumption that children are passive beneficiaries of early education is still present in our society, sometimes even among childhood teachers. Their participation in the evaluation of early settings quality has been increasingly argued, despite the limited documentation of how they might successfully be involved in this process (Brownlie, 2006, in Smyth, Catts & Allan, 2007).

This research project on the “children’s perspectives about their early experiences in childcare settings” is under development with the participation of the students of the master program in Preschool Education. At the moment data is being collected with children from three to six, but we are now starting to address the question: How can we “hear the voices” of children under three? How can we include them in research and in evaluation of practice? Our major aim is to explore the links between children’s perspectives and reflective and emancipatory practices (Sommer, Pramling-Samuelsson & Hundeide, 2010), especially in childcare settings for children under three.

Another research project under development focuses on the “conceptions about early learning” (5). It is framed within the research of epistemological beliefs. Its sample consists of students of early childhood education master programs and of novice and experienced teachers working in childcare. It draws on the assumption that the conceptions about how young children learn inform the pedagogical approach of childhood teachers and their ability to engage in innovative and reflective practices (Boulton-Lewis, Bronwlee, Berthesen & Dunbar, 2008).

What have we learnt so far?

Since this project is still in its first stage of development we only have data from the first course with novice teachers. The data collected at the beginning of this course focuses on two major themes related to working with the under threes (constraints and opportunities) and also on the expectations regarding the course itself.

The constraints identified by the participants focus mainly on society (lack of social recognition of the value of their work). But they also focus on themselves as professionals (lack of knowledge base and lack of experience). The opportunities, however, are focused on the children, based especially on the idea that the teachers positively affect the life of children (they make a difference), and also that they learn through children as they observe how children appreciate and react to their actions as teachers. Expectations concerning the course are closely linked with these ideas. In fact, the novice childcare teachers clearly focus their expectations on getting support (including peer support) and developing practical knowledge and skills, expressed mainly as the idea of “practical solutions that work”.

So, at the beginning of this course it was obvious that our former students were mainly focusing on surviving. Although they showed engagement with their practice and with the
children (even showing a particular awareness about the quality experiences they provide for the children), their main implicit belief was that “Only experienced teachers can be reflective, we are busy trying to handle situations and get the job done”. Other data from this in-service course in now under analyses since the subsequent sessions (after drawing up this paper) have also provided relevant information for our overall project.

As a preliminary conclusion it can be stated that the shared dialogue and inquiry within the course have facilitated the recognition and deconstruction of the beliefs mentioned above. This proved to be very important, since as Moore and Ash (2002) have urged, despite an appreciation on the part of beginning teachers of the potential value of reflective practice” their predispositional perspectives and beliefs to valorise experience ‘in itself’ may lead them to resist re-examining existing beliefs and approaching experience reflexively.

References

13. The Analytical Tools to Work
Gender-equality Issues at
the Pedagogical Practices and Formative Level

Maria João Cardona, Marta Uva and Isabel Piscalho
Escola Superior de Educação do Instituto Politécnico de Santarém/Portugal; Polytechnic Institute of Santarém, Higher School of Education; CIEC – University of Minho

Abstract

We will present a project developed with the support of the Comissão para a Cidadania e Igualdade de Género (CIG) - Committee for Citizenship and Gender Equality which intends to study the way teachers (in the preschool and elementary school) work on gender questions with the children and the difficulties they have and feel in that work. We will also present some results from the data analysis we gathered, directly from the classes, about the children’s gender representations (what is it to be a man, woman, boy and girl); the teachers and children’s “good student” representations and also their implications in the boys’ and girls’ school performances. Based on this work we intend to build resources and analytical tools to improve gender-equality issues in pedagogical practices and in teacher training. In the workshop, we also presented how this material can help teachers’ reflection about their own educative and pedagogical work.

Introduction

“Men work and women do the dishes.” (Girl, 5 years old)

This is one of the differences observed in children’s testimonials in the classroom and in our work in training teachers, almost always, remains without an answer because the teacher doesn’t do anything about it. To learn more about this situation we started collecting data in preschool classes and in primary school classes. Children reproduce social prejudices at a very early stage, as soon as preschool. We observe that the teachers identify this problem but they do not know what to do: to select pedagogical materials; to organize the space in the classroom; to work with the group; to work with the families.

The teachers tell us that they need more training, materials and guidelines to develop education for citizenship and gender issues with children. To answer these difficulties, we organized training courses for teachers and built materials and scripts to encourage the development of gender and citizenship awareness in the pre-school and elementary school education context. In this presentation, we present the work already realized, presenting some theoretical assumptions and some data from our work. After we are going to reflect on the implications of this work for the educational practices and for the training of teachers, analysing how we can promote reflective practices concerning gender-equality in preschool and in the first years of elementary school.

Background work

Since 1997 we have been working with some colleagues of the CIG - Comissão para a Cidadania e Igualdade de Género - a state agency concerned with gender equality promotion. We started with participation in the CO-Education Project [Projecto Co-educação] a transnational project aiming to build resources for promoting gender-equality for kindergarten teachers (Coord. CIG –1997/2001). In this project we organized a publication to
analyze the role of narratives in promoting gender equality in preschool education (Silva, Ana et al./Projecto Co-educação, 2001). More recently (2009/2012), CIG asked our cooperation to write textbooks to work Gender and Citizenship issues in preschool and in the elementary school to support educational practices: http://www.cig.gov.pt/guiaoeducacao/

Our work has both a research dimension and a formative dimension, concerned with the creation of pedagogical materials to promote reflective practices concerning gender questions.

We are researching preschool teachers’ and elementary school teachers’ representations of good and bad students and the way they approach gender questions in the classroom; as well as preschool children and elementary school children’s representations about men’s/women’s and girls’/boys’ gender roles; and we are studying the impact of gender-equality issues on school performances.

To promote gender equality as early as preschool (3-6 years old) and elementary school (6-10 years old): the formative actions with teachers and the building of materials and guidelines (for the teachers). We can summarize our work as follows:
- Characterization of educational practices (observations; analysis during the stages; questionnaires and interviews).
- Analysis of the teachers’ representations (analysis during the stages; questionnaires and interviews; meetings and workshops).
- Analysis of the children’s representations (analysis during the stages; questionnaires and interviews; the results of the children’s work (drawings, narratives...)

At the basis of all this work we intend to promote reflective practices to develop gender-equality in preschool and in the first years of the elementary school.

Some theoretical assumptions

Political discourse addresses the need to promote greater equality of outcomes, implying that the educational system must learn to integrate diversity. This is one of the major difficulties and challenges that schools face today: integrating diversity and promoting equality for all children. The way this diversity is taken into account in educational practices may condition children’s social performance starting from preschool. However, any type of socio-cultural diversity has an underlying gender differentiation. The studies concerned with diversity mainly focus on socio-economic issues, but, they also need to consider research on gender and education, to research gender stereotypes from early childhood and the impact of gender on achievement (Eurydice, 2010).

Children begin to learn social roles traditionally assigned to men and women very early. In kindergarten and in the first years of school, children have already developed some prejudices about male and female behaviors, but these ideas are often ignored or devalued by the teachers. This attitude can strengthen these prejudices of children, despite a pedagogical discourse favorable to greater equality between girls and boys. These differences have an impact - for boys and girls - on social and educational performances.

Statistical data - that indicate a better student performance from girls - reinforce the stereotypical idea that girls adapt better to school. Nowadays, in most European countries, the majority of students attending higher education are girls, but, outside of school, the leadership in politics and in business continues to be mostly taken up by men. Boys are allegedly rebellious and unstructured. More than girls they are exposed to inconsequent behavior, they are unhappier at school, they don’t do their homework and skip classes twice as much as girls
do (Macmillan, 2005). Besides manifesting a bigger tendency to behavior problems, boys score badly in all levels of study and in almost every course theme.

**Some data from our work**

In our study (50 classes of preschool; 50 classes of elementary school) we observe:
- children present different ideas about the social role of men and women or boys and girls, about the role of the mother and of the father inside and outside the household.
- the difficulty of teachers to work on these questions.

In each class, girls and boys answered the following questions:
- Which are mother’s tasks inside the house?
- Which are mother’s tasks outside the house?
- Which are father’s tasks inside the house?
- Which are father’s tasks outside the house?
- Which are the differences between men’s tasks and women’s tasks?
- Which are the differences between boys’ tasks and girls’ tasks - in school and outside the school?

In the children’s testimonials in preschool, we observe, that gender-role stereotyping is obvious from a very early age, and is stronger in little girls. The gender-role stereotyping is stronger in rural children than in urban children. We also observe that gender-role stereotyping is stronger when children mention: Mother and Father’s occupation and schedules; the world of grownups. For a better understanding let's look at some examples of what some children say.

About the activities inside the house, we present some of the more significant testimonies:

“Dad only sleeps but mum irons, cooks, does the dishes...” (Boy, 5 years old)
“Dad gets angry with me, has lunch and watches TV, mummy does lunch and cleans the house.” (Girl, 5 years old)
“Dad sleeps and sometimes he makes dinner, mum does everything...” (Boy, 4 years old)

About the activities outside the house, we present some of the more significant testimonies:

“Dad works! He’s in a truck putting traffic signs on roads” (Girl, 5 years old)
“When she leaves the house she puts the trash in the trash bin, goes to the coffee bar and goes to work. “ (Boy, 5 years old)
“Mum goes shopping with me, works in Santarem and walks me to the swimming pool” (Girl, 5 years old)

In the elementary school gender-role stereotypes are stronger when children mention the role of men and women in society and also when they mention the performance of boys and girls in school. Now let's look at some of the most significant testimonies (Cardona et all, 2011).

“The men speak differently. Women are more educated” (Girl, second year)
“Men work every day, and the women make dinner” (Boy, first year)
“Women may never be Presidents of the Republic because they have no authority nor can they stand the pressure” (Boy, fourth year)
“Women don’t want to work and men work much, much more” (Boy, second year)
“Boys like cars and girls like makeup” (Boy, third year)
“The girls work more at school” (Girl, third year)
"Boys are more disobedient with the teacher (...) The girls worry more about school than the boys"
(Girl, third year)

Listening to the teachers shows that gender issues are clearly present in the daily life of the class. In general, the teachers identify the problem, but don't know how to intervene. The collected data corroborates other studies that reveal a conception of girls as more in keeping with the "ideal student": more driving stability; more attention; more self-control; more autonomy – more study and greater effort; more focus on work. The educational intentionality to work on gender questions begins with the organization of the educational environment. Some gender stereotypes are visible within the walls of the classroom, in the books and in the games one chooses.

In kindergarten and in elementary school, teachers recognize the importance of gender equality but don’t feel able to deal with issues concerning it: didactic resource selection; space activities; activities development; group leadership; conflict mediation. We observe that, behind the difficulties in working on gender issues, in many cases, is the fear to work with conflicts - to face conflicts.

We have to avoid conflict!
Cannot go against what they learn at home
But this may create conflicts with the families

The recognition of the impact of these difficulties in the teacher’s practice, led us to the study of conflict concept, in its multidimensionality and scope. As Xesus Jares said (2002), in our society and in school, there continues to dominate a very traditional perspective of conflict, not as a factor that naturally arises in our daily lives. The conflict approach is part of the educational practices and the way conflicts are experienced (or avoided) is relevant in personal and professional development. Conflicts are essential to promote development and learning and they can have different understandings but, above all, they have to be positively taken in a pedagogical approach in teaching and learning processes. Taking these perspectives is the basis for the development of a greater reflective capacity.

Implications for educational practices and teacher training

How can we promote reflective practices to develop gender equality in preschool and in the first years of the elementary school? To answer this question, we build and use analysis grids to support the questioning of teaching practices (Cardona et al, 2010/2011). To promote a pedagogy of diversity to counter the prejudices of gender requires a more critical and careful approach by teachers. Their interactions with children are often marked by differentiation with regard to expectations of boys and girls. Training must include a greater awareness of their attitudes and beliefs taking into account their educational practices. In working with teachers we analysed:

- situations that appear in the daily life of the class.
- situations previously planned by the teacher with the intention of working on gender issues with children.
- the organization of the educational environment: selection of educational materials, games and books; standards defined regarding the group at the level of working with families
- the analysis grids also provide questions concerning the direct observation of children’s interactions, the organization of small groups and
- forms of leadership to work within the group.
there was also a proposition to listen to the children - listen more carefully to what the child says has been a vital aspect throughout the training

Dialogue and discussion activities seem to be a privileged media for the approach of gender questions in the school context. The discussion as a strategy based on active oral interaction between the teacher and the child and/or among children between themselves, about a problematic situation. The development of activities that lead children to ask themselves is a fundamental strategy for working on dilemmas and preconceived ideas about gender and citizenship.

We also work with teachers regarding the philosophy for children as a possible direction for their educational practices, for the development of an attitude of questioning and to support the approach of cognitive conflict situations that naturally arise in the classroom. (UNESCO, 2007) We found in the philosophical process a path that goes from the imagination and questioning up to action, where the debate and dialogue have essential functions. The citizenship aspect in school should culminate in a change of action and participation in social life, not only at the level of "good" speech. It is a work that we continue to develop in the training of teachers, building materials and with the development of research.

But underlying this work there is a need to develop a new line of research on the different dimensions of conflict in education and how this can be worked on from initial teacher training on. Conflict as a way of analysis is a key resource for the work on gender and citizenship from pre-school education.

“The dilemmas concerning discipline in the classroom may bring into conflict the concept of the teacher's authority associated with traditional forms of maintenance of discipline with 'punitive' rules and the concept of a democratic authority associated with the values of citizenship.

(...) Intervene or pretend that it is not seen (?)”
Maria Teresa Estrela (2010)

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IV Special Educational Needs
14. Differentiated Classroom Observation Scale - Short Form

Cheryll M. Adams and Rebecca L. Pierce
Ball State University, Muncie, IN, USA

Introduction

A vastly diverse group of children are found in today’s typical classroom. Students vary in the areas of cultural background, academic readiness, learning styles, and social maturity (Cassady, Speirs Neumeister, Adams, Cross, Dixon, & Pierce, 2004). Teachers can no longer teach the same lesson to the entire class and effectively meet the needs of all students in such mixed-ability classrooms (Tieso, 2004). Differentiated instruction is a philosophy that enables teachers to better meet the needs of all students in their classroom. Differentiation involves finding multiple ways to structure a lesson so that each student has an opportunity to work at a moderately challenging level. It is an organized, yet flexible way of proactively adjusting teaching and learning to meet students where they are, while helping all students achieve maximum growth as learners (Tomlinson, 1999). The concept seems simple enough, but when simultaneously managing lesson plans for their mandated curriculum and preparing all students for standardized testing, teachers can become easily overwhelmed and drawn towards teaching the same lesson to all, which leaves many students behind (Tieso, 2004). Unfortunately, very little differentiation is occurring in classrooms (Westberg & Dauost, 2003). In an era of educational accountability, there is a need for the assessment of teachers’ use of differentiation within their classrooms. Direct observation is a viable method for such an assessment (Cassady et al., 2004).

The differentiated classroom observation scale-short form (DCOS-SF)

Originally developed as a solution to a need to simultaneously observe the experiences of children identified as gifted and their non-identified classmates in a standard "cluster" classroom, the Differentiated Classroom Observation Scale (DCOS) (Cassady et al., 2004) allows researchers, evaluators, and teachers to observe a classroom setting and explore the instructional styles and opportunities available to two distinct groups of students. This scale can be used to track gifted versus non-identified, children with and without LD, children with and without ADHD, or any other classification that could reasonably lead to differential classroom experiences for identifiable groups of children. It can also be used in homogeneous classrooms. To streamline data gathering and reporting, the DCOS was modified to its current form, the DCOS-SF.

The DCOS-SF is comprised of three components: the pre-observation interview, the observation period, and the post-observation debrief and reflection. The pre-observation interview includes the scheduling of an observation time and sharing of lesson plans for the observation. The observation involves a standard collection of data regarding the physical aspects of the room. Throughout the observation, the observer documents information from five categories: instructional activities, student engagement, cognitive activity, learning director (teacher or student), and holistic ratings. At the close of the observation, a two to five minute period of coding is allotted. Finally, at the close of the coding, the observer and teacher debrief in order to ask questions, gain clarity, and relieve any anxiety felt by the teacher. Once the observer is outside of the classroom, a moment is taken to reflect and note any final thoughts about the lesson.
The DCOS-SF provides two documents to assist with data collection and analysis: DCOS-SF Protocol and DCOS-SF Scoring Form. The Protocol includes instructions and questions for the pre-observation interview, the observation period, and the post-observation debrief and reflection. The Scoring Form is the data-tracking sheet used during the observation. See Appendix A for the DCOS-SF.

**Pre-observation interview**
The pre-observation interview allows direct contact with the teacher at a mutually acceptable time. The teacher provides a copy of the lesson plan which includes a detailed description of the plan for differentiation during the lesson and within the classroom. Data are also gathered about the formation and implementation from the teacher’s perspective, such as who created the lesson, how closely the lesson plan will be followed, and the goals and objectives of the lesson.

**Class observation phase**
Basic information is recorded on the form. In the first set of blocks, the observer is asked to identify in his/her own words the three dominate forms of instruction for the observed classroom, marking this for the identified and non-identified groups separately. For example, “teacher guided students as they solved problems on a worksheet”. Once the activities have been listed, the observer may now or later use the code list to code the classroom activities. For example, “teacher interacting with small group” is coded as “TIG”. Next the engagement rating is based on the percentage of students in the group who are engaged in the learning activity. The observer should make sure that students are engaged in the actual activity not busily working on a non-related activity, that is, the students are actively working on the content required by the lesson. The next section involves coding the students’ cognitive activity level that is represented in the classroom activities. The cognitive taxonomy is based on a revision of Bloom’s Taxonomy (Anderson and Krathwohl, 2001). The section following directs the observer to identify from his/her observation who is directing the learning in which the students are engaged. This ranges on a continuum from teacher directing all learning to students directing all learning. Now the observer should describe how grouping, if any, occurred in the classroom. For example, “identified students were group for math, non-identified students worked on anchoring activities”. The observer also makes a differentiation decision based on the totality of the observation. In other words, were students engaged in differentiated learning? The last set of ratings is based on each group separately even if the groups are working on the same content. The observer rates each group in separate columns on a scale of 1 “strongly disagree” to 5 “strongly agree”. A score of neutral (3) is discouraged, and a response must be included for each statement.

**Post-observation, debrief, and reflection phase**
Immediately following the observation and coding period, the observer should debrief with teacher as well as, ask him or her if there is anything he or she would like to add regarding the observation. After leaving the classroom, the observer should write a final reflection, taking a few minutes to make any other comments that are relevant or make the observation contextually-based or comprehensive. Please note this should be completed before the observer performs another observation or a significant time lapse occurs.

**Implementation**
To demonstrate the usefulness of the DCOS-SF, we offer two examples where data were gathered, analyzed, and reported as part of two projects.
Example 1: Rocky Creek District Program Evaluation

Three observers with backgrounds in gifted education visited 12 classrooms and completed the DCOS-SF for teachers in grades 3, 4, 5, 6, 8, and three high school teachers in the following classes: English Honors, AP Calculus, and World History/Civic Honors. Each classroom observation was approximately 60 minutes in length. All teachers indicated all students were identified as gifted or there was no differentiation of tasks among the students.

Additional overall perceptions were tallied for the 12 teachers and are presented in the next table. Each perception was rated on a five-item Likert scale ranging from strongly disagree to strongly agree. To facilitate the interpretation of the data, the five-item scale was collapsed to a three category scale. “Strongly agree” was combined with “agree” and “strongly disagree” with “disagree.” “Neutral” remained the same. The table contains, for each perception, the categories receiving the most tallies.

From the table, notice that there are six perceptions with a majority of agree responses. These are numbers 2, 3, 4, 5, 6, 7, and 10. All of these reflect positive aspects of the program. Perceptions 1, 9, 11, and 12 received a majority of disagree responses. These are aspects of the program which needed attention. For example, we would have expected a higher score of agree in 11 and a high score of disagree in 12. What is appropriate in gifted classes is for the teacher to act as a guide or facilitator and not the “sage on the stage.”

Table 1. Holistic observation ratings for 12 teachers

<table>
<thead>
<tr>
<th>Perception</th>
<th>Identified Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) This lesson encouraged students to seek and value multiple modes of investigation or problem solving.</td>
<td>Disagreed (6)</td>
</tr>
<tr>
<td>2) Students were reflective about their learning.</td>
<td>Agreed (7)</td>
</tr>
<tr>
<td>3) The instructional strategies and activities respected and accounted for students’ prior knowledge.</td>
<td>Agreed (7)</td>
</tr>
<tr>
<td>4) Interactions among students demonstrated collaborative learning environment.</td>
<td>Agreed (6)</td>
</tr>
<tr>
<td>5) The teacher clearly enjoyed working with this group.</td>
<td>Agreed (10)</td>
</tr>
<tr>
<td>6) Teacher demonstrated high level of content knowledge for lesson topic.</td>
<td>Agreed (10)</td>
</tr>
<tr>
<td>7) Transitions between activities were smooth and well coordinated.</td>
<td>Agreed (9)</td>
</tr>
<tr>
<td>8) Group procedures were clear, established, and understood by the students (automaticity was evident).</td>
<td>Agreed (5) &amp; Neutral (5)</td>
</tr>
<tr>
<td>9) Anchoring activities were readily available and appropriate.</td>
<td>Disagreed (9)</td>
</tr>
<tr>
<td>10) The classroom management plan was clear and effective.</td>
<td>Agreed (8)</td>
</tr>
<tr>
<td>11) Learning activities were primarily student-directed.</td>
<td>Disagreed (6)</td>
</tr>
<tr>
<td>12) Teacher served primarily as a “Sage on the Stage” to this group.</td>
<td>Disagreed (6)</td>
</tr>
</tbody>
</table>

Analysis of the instructional activities coded indicated that questioning by the teacher, students responding, and individual seat work were the dominating activities. In the area of “student engagement,” students were highly engaged meaning 80% or more students were engaged in learning. Only two classrooms had low engagement indicating 20% or fewer of students engaged in learning. The data also indicated that the teachers were directing learning for a majority of the time. The data indicate that the primary instructional activities (teaching strategies) were questioning by the teacher, students responding, and individual seat work. Typical differentiated strategies like cubing, compacting, and tiering, as well as other strategies based on student readiness were not evident. However, it was noted that the
teachers enjoyed working with the students and demonstrated a high level of content knowledge for the lesson topic. In the area of “cognitive activity,” ratings were made in each observation on the scale “not present”, “evident”, and “well-represented”. There was a high level of evidence for remember, understand, and apply but low levels of the higher end of Bloom’s taxonomy, namely analyze, evaluate, and create. Figure 1 illustrates the collective number of minutes the 12 teachers spent in activities that were coded in each of the six cognitive areas of Bloom’s taxonomy. Evident in the figure is the sharp decrease for the higher levels of Bloom’s taxonomy.

![Cognitive Activity](image)

**Figure 1. Observations at Rocky Creek**

Data gathered via the DCOS-SF indicate that there was very little differentiation in the classrooms at the time of the observations. Given that teachers were aware that they would be observed and had seen the DCOS-SF prior to observation, this is an unexpected and surprising finding. The levels of Bloom’s that were consistently being used to a high degree were remember, understand, and apply. Conversely there were fewer incidences of teachers using the higher levels of Bloom’s taxonomy, namely analyze, evaluate, and create.

Recommendations to the school district included the following:
- Develop and provide a clearly articulated professional development program to address differentiated instruction at all grade levels - elementary, middle, and high school.
- After the professional development, hold teachers accountable for differentiating in their classroom on a daily basis by submitting lesson plans, for example.
- Consciously address the higher levels of Bloom’s Taxonomy in all lessons.

**Example 2: Moosehead District Project**
The Moosehead District wanted to determine the current level at which their teachers practice differentiation before deciding how to focus the professional development for the following year. The school selected eight teachers as a sample. In this case, we used the scale to observe all children during the observations because their teachers indicated either all children were gifted or non-gifted. The eight observations were conducted in two elementary schools, four observations of self-contained gifted (GT) classrooms at Wilson Elementary and four heterogeneous classrooms at Washington Elementary.

Table 2 indicates the occurrences of various instructional activities for each of the eight teachers. With the exception of teacher A, there is little difference among the remaining teachers as to the number of activities utilized by the teachers in the GT classrooms versus those in the heterogeneous classrooms. Teacher A used 12 activities while the other teachers used between four and seven. Also, with the exception of teacher A, who used four activities not used by any of the other teachers, the GT teachers as a group did not use an activity that was not also used by the other teachers.

### Table 2. Occurrence of instructional activities in eight classrooms

<table>
<thead>
<tr>
<th>Instructional Activity</th>
<th>Number by Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Lecture</td>
<td>1</td>
</tr>
<tr>
<td>Lecture with Discussion</td>
<td></td>
</tr>
<tr>
<td>Class Discussion</td>
<td></td>
</tr>
<tr>
<td>Small Group Discussion</td>
<td></td>
</tr>
<tr>
<td>Problem Modeling by Teacher</td>
<td>2</td>
</tr>
<tr>
<td>Student Presentation</td>
<td>2</td>
</tr>
<tr>
<td>Demonstration by Teacher</td>
<td>1</td>
</tr>
<tr>
<td>Questioning by Teacher</td>
<td>5</td>
</tr>
<tr>
<td>Student Responding</td>
<td>5</td>
</tr>
<tr>
<td>Manipulatives</td>
<td>5</td>
</tr>
<tr>
<td>Cubing</td>
<td></td>
</tr>
<tr>
<td>Learning Center(s)</td>
<td></td>
</tr>
<tr>
<td>Anchoring activity before lesson</td>
<td></td>
</tr>
<tr>
<td>Anchoring activity during lesson</td>
<td>6</td>
</tr>
<tr>
<td>Anchoring activity after lesson</td>
<td></td>
</tr>
<tr>
<td>Seat work-Individual</td>
<td></td>
</tr>
<tr>
<td>Seat work-Group based</td>
<td>4</td>
</tr>
<tr>
<td>Cooperative learning</td>
<td></td>
</tr>
<tr>
<td>Role Playing</td>
<td></td>
</tr>
<tr>
<td>Teacher interacting with individual student</td>
<td>7</td>
</tr>
<tr>
<td>Teacher interacting with small group</td>
<td>3</td>
</tr>
<tr>
<td>Technology use</td>
<td>4</td>
</tr>
<tr>
<td>Assessment activity</td>
<td></td>
</tr>
<tr>
<td>Pull-out activity, individual or group</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Shaded columns indicate GT classrooms.

Figure 2 indicates the percent of time spent by each teacher at the higher cognitive levels, apply or above. Percentages were calculated by combining the number of times “well-represented” and “evident” were marked and dividing by the total number of occurrences. The results show that teachers in the heterogeneous classrooms are generally doing a better job of providing activities that allow students to work at higher cognitive levels. However, these few observations of each teacher are a small snapshot of what may actually be
happening in each teacher’s classroom. More observations over a longer period of time would give a better picture as to whether this is typical or not.

**Figure 2.** Observations at Moosehead

**Conclusion**

Due to the limitations imposed for this article, it is impossible to showcase the entire range of information that can be gathered using the DCOS-SF as well as the variety of situations in which it can be used. We have provided two examples that demonstrate the value of using the scale to identify both the quantity and the quality of differentiated instruction that occurs in different types of classrooms. In the first example, the data gathered through the use of the DCOS-SF were used to evaluate a gifted program and to provide recommendations to address programmatic shortcomings. In the second example, the DCOS-SF was used to obtain a baseline of the frequency and duration of time each teacher spent in providing activities that address the higher level of Bloom’s taxonomy. We hope these two examples demonstrate the versatility of the DCOS-SF in determining various aspects of differentiation in the classroom.

**References**


Appendix A

Differentiated Classroom Observation Scale (Short Form) Protocol

Observer: ___________________ Observation Date: ________________

Pre-Observation Phase

The observer needs to complete the following:
- Obtain permission to observe
- Identify a convenient time
- Obtain a copy of lesson plan
- Provide the teacher with a copy of the DCOS-SF

The teacher needs to identify targeted group of students in classroom (with color-coded name tags or teacher’s chosen strategy).

Pre-Observation Interview

Before beginning the interview, please arrange to have the following questions answered. Some of this will be facilitated with prior contact with the teacher. In particular, having a copy of the lesson plan in advance would make the following questions less laborious for the teacher to answer prior to the observation period. This is an informal interview that is merely to gain essential descriptive information.

Who developed this lesson?  
___ This teacher
___ Other: ______________________________

Have you used this lesson before? What success have you noted with this lesson regarding this identified population?

What are the goals/objectives of this lesson?

Anything else the teacher wants to add before the observation:
Classroom Observation Phase

<table>
<thead>
<tr>
<th>Identified Gifted Students</th>
<th>Non Identified Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom Activities</strong> (list out what you see in your own short hand to be coded later).</td>
<td></td>
</tr>
</tbody>
</table>

For each group, mark three most common activities (based on overall time use in classroom observation period)

<table>
<thead>
<tr>
<th>Activity Codes (see codebook) for three most common activities</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Engagement Rating</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Taxonomy Level represented in classroom activities</td>
<td>Remember</td>
<td>1 2 3</td>
<td>Remember</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1- not evident</td>
<td>Understand</td>
<td>1 2 3</td>
<td>Understand</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2- evident</td>
<td>Apply</td>
<td>1 2 3</td>
<td>Apply</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3- well represented</td>
<td>Analyze</td>
<td>1 2 3</td>
<td>Analyze</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluate</td>
<td>1 2 3</td>
<td>Evaluate</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Create</td>
<td>1 2 3</td>
<td>Create</td>
<td>1 2 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Comments/Notes

Coding Guidelines

<table>
<thead>
<tr>
<th>Engagement Rating</th>
<th>Learning Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low = 20% or fewer</td>
<td>1- Teacher directs all learning</td>
</tr>
<tr>
<td>Moderate = 20 - 79%</td>
<td>2- Teacher directs most learning.</td>
</tr>
<tr>
<td>High= 80% or more</td>
<td>3- Teacher and student share learning decisions.</td>
</tr>
<tr>
<td></td>
<td>4- Student directs most learning</td>
</tr>
<tr>
<td></td>
<td>5- Students direct all learning</td>
</tr>
</tbody>
</table>
Please describe how grouping (if any) occurred in this classroom:

Were differentiated practices clearly used in the classroom for Identified and Not-Identified students?  
Yes or No  
*Code data for each group separately, even if the groups are working on the same content.*

Please rate each group separately for each of the following items based on your OVERALL perception:  
1 – Strongly Disagree; 2 – Disagree; 3 – Neutral; 4 – Agree; 5 – Strongly Agree

<table>
<thead>
<tr>
<th>Item</th>
<th>Identified Group</th>
<th>Not Identified Group</th>
<th>Supporting Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content was well matched to the students’ needs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students had ample opportunities for choice in activities available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All students were working on the same activity at the same pace.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students were able to receive individual assistance from the teacher.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students were able to receive individual assistance from peers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesson encouraged students to seek and value multiple modes of investigation or problem solving.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students were reflective about their learning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The instructional strategies and activities respected and accounted for students’ prior knowledge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactions among students demonstrated collaborative learning environment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning activities were primarily student-directed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher served primarily as a “Sage on the Stage” to this group.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group procedures were clear, established, and understood by the students (automaticity evident).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transitions between activities were smooth and well coordinated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchoring activities were readily available and appropriate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The classroom management plan was clear and effective.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students had a clear understanding of what they were supposed to be doing.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students demonstrated appropriate levels of respect in the classroom.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher was able to manage the activity of this group effectively.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Post-Observation Debrief & Reflection

Debrief with Teacher
Thank the teacher for the observation period, and use this last segment of approximately 5 minutes to clarify anything observed. Then, ask the teacher:

*Is there anything you wanted to add regarding the observation before I leave?* (Take detailed notes)

Final reflection
After leaving the classroom, take a couple of minutes to make any other written comments that are relevant or make the observation more contextually-based or comprehensive. Such issues may include the tone, demeanor, or attitude of the teacher and/or students.
<table>
<thead>
<tr>
<th>Instructional Activity</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Teacher lecturing to group of student</td>
<td>L</td>
</tr>
<tr>
<td>Lecture with Discussion</td>
<td>Teacher-led lecture, with periodic student discussion (recitation)</td>
<td>LD</td>
</tr>
<tr>
<td>Class Discussion</td>
<td>Discussion in class, students are primary discussants</td>
<td>CD</td>
</tr>
<tr>
<td>Small Group Discussion</td>
<td>Discussion in class, but in small groups, not whole group</td>
<td>GD</td>
</tr>
<tr>
<td>Problem Modeling by Teacher</td>
<td>Teacher demonstrating how to execute a task (e.g., working a math problem on board)</td>
<td>PM</td>
</tr>
<tr>
<td>Student Presentation</td>
<td>Student(s) presenting information to the class (either planned presentation or on-demand task)</td>
<td>SP</td>
</tr>
<tr>
<td>Demonstration by Teacher</td>
<td>Teacher demonstrating a procedure to the class (e.g., how to safely use lab equipment)</td>
<td>D</td>
</tr>
<tr>
<td>Questioning by Teacher</td>
<td>Teacher asking question of student(s) in group setting</td>
<td>Q</td>
</tr>
<tr>
<td>Student Responding</td>
<td>Student(s) answering questions posed by teacher (choral response included in this category)</td>
<td>SR</td>
</tr>
<tr>
<td>Manipulatives</td>
<td>Student(s) working with concrete materials to illustrate abstract concepts (e.g., math blocks)</td>
<td>M</td>
</tr>
<tr>
<td>Cubing</td>
<td>Student(s) working with cubing curriculum materials (differentiated, see Adams &amp; Pierce for details)</td>
<td>C</td>
</tr>
<tr>
<td>Learning Center(s)</td>
<td>Student(s) working at planned learning center(s) individually or in small groups (computer stations can be included if they are planned activities)</td>
<td>LC</td>
</tr>
<tr>
<td>Anchoring activity before lesson</td>
<td>Use of lesson-anchoring materials prior to teacher presentation of content (see Adams &amp; Pierce for details)</td>
<td>AB</td>
</tr>
<tr>
<td>Anchoring activity during lesson</td>
<td>Use of lesson-anchoring materials during teacher presentation of content</td>
<td>AD</td>
</tr>
<tr>
<td>Anchoring activity after lesson</td>
<td>Use of lesson-anchoring materials after teacher presentation of content</td>
<td>AA</td>
</tr>
<tr>
<td>Seat work-Individual</td>
<td>Student(s) working at desk on academic materials (independently)</td>
<td>SWI</td>
</tr>
<tr>
<td>Seat work-Group based</td>
<td>Student(s) working at desk on academic materials (groups)</td>
<td>SWG</td>
</tr>
<tr>
<td>Cooperative learning</td>
<td>Students working in a planned cooperative structure to complete a task.</td>
<td>CL</td>
</tr>
<tr>
<td>Role Playing</td>
<td>Student(s) engaged in role play exercises (e.g., &quot;playing store&quot; to practice counting change)</td>
<td>RP</td>
</tr>
<tr>
<td>Teacher interacting with individual student</td>
<td>Teacher working with/talking to/helping individual student</td>
<td>TIS</td>
</tr>
<tr>
<td>Teacher interacting with small group</td>
<td>Teacher working with/talking to/helping small group of students.</td>
<td>TIG</td>
</tr>
<tr>
<td>Technology use-Students</td>
<td>Technology being used by students for related learning activities.</td>
<td>TS</td>
</tr>
<tr>
<td>Technology use-Teacher</td>
<td>Technology being used by the teacher for presenting instructional content</td>
<td>TT</td>
</tr>
<tr>
<td>Assessment activity</td>
<td>Student(s) engaged in a formalized assessment activity (e.g., test; performance)</td>
<td>A</td>
</tr>
<tr>
<td>Pull-out activity, individual or group</td>
<td>Student(s) removed from the room-no observation of these students possible.</td>
<td>PO</td>
</tr>
<tr>
<td>Other</td>
<td>List &quot;other&quot; activities</td>
<td>O</td>
</tr>
</tbody>
</table>
15. Special Education and Inclusion in Teacher Training in Portugal

Cláudia Maia and João Sampaio Maia
Escola Superior de Educação do Porto

Abstract
The Salamanca Statement, signed in 1994 by Portugal, sought to promote inclusive school. A key factor for the success of the inclusive school would be the adequate training of teachers to provide pupils a differentiated education. We realize how important is special education and inclusion within teacher training programs by weight units of credits of courses in this area of study plans required for professional qualification of teachers not specialized in special education. We found out that less than 1% of all credits correspond to training in special education or inclusion. A questionnaire answered by 45 teachers seems to confirm the inadequacy of current teacher training relatively to this area, in Portugal.

Introduction
Education policies that promote the inclusion of children with permanent special educational needs (SEN) who previously attended special education institutions, acknowledge the need for a faculty position to provide a differentiated teaching and pedagogical support, custom covered in Decreto-Lei Nr. 3/2008. The result of the 2001 national census (From 2011 census there is not yet information about this matter), where 10,356,117 people living in Portugal were inquired, reveals the existence of 2.2% of people with disabilities up to the age of 15. We can observe in the chart of Figure 1 incidence rates of impairment hearing, visual (blindness and low vision), motor, mental deficiency, cerebral palsy and other. In this age group, visual deficiency had the highest rate with values ranging between 0.4% (Região Autónoma dos Açores) and 0.8% (Centro).

![Figure 1. Rates of incidence (%) of disability by type in 0-15 years and by NUTS II 2001.](image)
All these children with SEN, according to Rodrigues (2001, p. 20), require a learning process-centred, with pedagogical differentiation and in concomitance with the curriculum in construction, proper of this inclusive education.

The Salamanca Statement, of United Nations Educational, Scientific and Cultural Organization (UNESCO), signed by Portugal in 1994, reinforces the need for inclusion of pupils with permanent SEN in regular education classes in order to minimize differences and equal opportunities, two characteristics inherent in the democratic system. Nevertheless, as refer Stainback and Stainback (2001, p. 187), the physical proximity between pupils with SEN and others, is a necessary but not sufficient condition for an Inclusive School. The teachers’ way of acting may compromise the success of this inclusion. Only a qualified professional, an expert about appropriate pedagogies in what concerns the areas of Special Education (SE) can provide a quality education and learning, making clear that there is a strong positive correlation between the quality of teaching and the quality of learning. This assertion can be found in several documents, particularly in the Salamanc Statement and in Decreto-Lei Nr. 43/2007 (document that sets out the conditions required for obtaining professional qualification for teaching), as it can be read in the following excerpts:

> Pre-service training programmes should provide to all student teachers, primary and secondary alike, positive orientation toward disability, thereby developing an understanding of what can be achieved in schools with locally available support services. (…) In teacher-training practice schools, specific attention should be given to preparing all teachers to exercise their autonomy and apply their skills in adapting curricula and instruction to meet pupils needs as well as to collaborate with specialists and cooperate with parents.

> The skills required to respond to special educational needs should be taken into account during assessment of studies and teacher certification. (…) Training must be based on a continuous process that ensures all teachers the knowledge and skills needed to educate all students in the most efficient manner (Salamanca Statement, UNESCO, 1994, pp. 27-28).

> The challenge of the qualification of the Portuguese requires a quality faculty, increasingly qualified and with guarantees of stability, being the quality of teaching and of learning closely linked to the quality of the qualifications of teachers and educators (Decreto-Lei Nr. 43/2007, p. 1,320).

The Parecer Nr. 3/99 of the Conselho Nacional de Educação (National Board of Education) recognizes the importance of educational policies to respond effectively to the children with SEN. In order to achieve this purpose and quoting the Salamanca Statement, this document says it is essential the proper preparation of the entire school staff as key factor in promoting inclusive school. However, at the moment there seems to be a dichotomy between the goal of inclusive school and the reality in schools.

In 1999, the National Board of Education pointed out the need of a curricular reorganization in initial teacher training, by promoting a set of experiments among these children and future teachers. Later this need was reinforced when it called upon to comply with the provisions of Decreto-Lei Nr. 3/2008 in order to create the conditions for the adequacy of the educational process to the special educational needs of pupils.

**Pre-school and basic education teachers’ pre-service training related to special education**

Currently, with the Bologna process, the professional qualification for pre-school and basic education2 (1st and 2nd cycle) teachers is obtained with completion of a bachelor degree in basic education (180 ECTS) followed by: a) a master's degree in Pre-school Education (PS) with 60 units of credit (ECTS); b) a master's degree in Basic (1st cycle) Education (1C) with 60 ECTS; c) a master’s degree in Pre-school and Basic (1st cycle) Education (PS+1C) with
90 ECTS; or d) a master’s degree in Basic (1st and 2nd cycle) (1+2C) Education with 120 ECTS. (The Portuguese Education System comprises: a) pre-school education (for children from 3 to 6 years old); b) basic education, organised in three cycles (1st cycle – from 1st to 4th grade, 2nd cycle – 5th and 6th grade, and 3rd cycle – from 7th to 9th grade); secondary education (from 10th to 12th grade); higher education i.e. university and polytechnic education).

After what has been said in Introduction, it would be expected that the Decreto-Lei Nr. 43/2007, which establishes minimum credit units (ECTS) for each area in the bachelor degree in Basic Education, should provide a minimum number of ECTS for the Special Education. However the reality is clearly distinct and worrying.

The Decreto-Lei Nr. 43/2007 requires training in Pre-school and Basic Education has a minimum of 30 credits for each of the areas Portuguese, Mathematics, Social Studies and Expressions (Arts, Music, Drama, and Physical Education) and nothing is referred about special education. Thus, it is for institutions of higher education to grant or not the importance this area requires.

The table of Figure 2 shows the number of ECTS in SE, compulsory for the 31 public and private schools where bachelor in Basic Education is taught in Portugal.

<table>
<thead>
<tr>
<th>Nr. of compulsory ECTS assigned to SE</th>
<th>0</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nr. of higher institutions with basic education bachelor degree</td>
<td>20</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Figure 2.** Number of compulsory ECTS for Special Education assigned in Portuguese institutions of teacher training, in the basic education bachelor degree

We can verify that the teacher training institutions, on average, confer 1.08 ECTS devoted to SE, in which 65% there are not compulsory ECTS devoted to SE. Something similar happens in the professional master’s degrees. The graphs of Figure 3 and Figure 4 reveal the number of master programmes for pre-school and basic education teachers and the number of compulsory ECTS assigned to SE provided by the 29 Portuguese education institutions.

**Figure 3.** Institutions with the professional master's degree in several specializations.
ECTS related to SE are directed to a specific group of students, particularly those who are studying the Portuguese Sign Language (compulsory or optional). These ECTS are focused in a specific group of pupils who are not of the highest incidence of cases in Portugal.

To sum up, during the professional qualification (bachelor and master), a pre-school or basic education teacher has scarce training in special education; there are less than 1% of ECTS devoted to SE.

To analyse the meaning and the importance of SE throughout pre-service teachers’ training in effective work with children with SEN, it should be important to be aware of what the teachers themselves think about the subject. As we couldn’t do it with post-Bologna teachers seeing that they are not yet in schools, we did it with pre-Bologna teachers on the ground because their pre-service training was not very different from post-Bologna teachers. As an example, in Escola Superior de Educação do Porto, the old undergraduate training of pre-school and basic education teachers included 3 or 4 ECTS of SE while, currently for similar programmes, bachelor together with any master comprises a maximum of 2.2 ECTS. To test if the teachers consider their pre-service training in SE enough to work with children with SEN, it was requested to 45 pre-school and basic (1st and 2nd cycle) education teachers with pre-Bologna degrees working in schools of the city of Porto and surrounding areas to answer the following questions by email:

Q1: In initial training did you have subjects concerning Special Education?
Q2: Do you feel prepared to teach pupils with special educational needs?
Q3: Do you have or did you have pupils with special educational needs in your classroom?

Figure 5. Results in percentage values, of the survey applied to 45 teachers.
The chart of figure 5 shows that 64% of the teachers inquired had one or more courses related with SE in pre-service training. In spite of 62% of respondents still have or already had pupils with SEN, only one (3.4%) acknowledges having skills for teaching these children (but assigns this knowledge to the inservice training). Although this sample is not representative of the teachers working in schools in Portugal, we shouldn’t expect very different answers if we make a survey in a national level because it do not represent a group of teachers with special features in what concerns to training.

Considering that the ancient pre-service training teachers’ programmes and the new ones gave similar importance to Special Education, one should not expect that the new teachers feel more prepared to work with inclusion than the current ones.

Conclusion

We think that there is either an inconsistency within the government or its intentions are not clear: in 1994, it signed the Salamanca Statement that asserts the need of including pupils with permanent SEN in regular education classes; in 2008, it created the conditions for the adequacy of the educational process for the special educational needs of pupils and enhanced inclusion (Decreto-Lei Nr. 3/2008); but in 2007, the government established conditions in order to obtain professional qualification for teaching (Decreto-Lei Nr. 43/2007), forgetting SE and inclusion.

In fact the figures show that pre-school and basic education teachers starting to teach in public schools are hardly prepared to face and to work with the different children since throughout their academic education are almost guided to the so called healthy children.

The reduced number of ECTS in Special Education of the current curricula of bachelors and professional masters, do not seem to be suitable for future teachers, in order to develop a teaching-learning process with children with NEE, having their inclusion as the main purpose. If in the pre-Bologna programmes there weren’t enough preparation to provide differentiated teaching for children with NEE, the post-Bologna programmes are in the same situation and the future teachers will certainly have the same gaps.

Despite a growing educational offer of specialized courses in special education, this is not available to all teachers. A compulsory minimum of ECTS in special education in pre-service training programmes (which depends on legislation) could conceal this gap. In addition to sensitize the future teachers (not just about disabilities, but also about the pedagogical differentiation and inclusion), it would provide the tools and procedures to work in this field.

Without appropriate legislation, it is higher education institutions’ duty to reformulate their own curricula including enough ECTS devoted to SE to give to theirs students a good support to work with pupils with SEN and with Inclusion. Next curricula reformulations forced by financial restrictions it is a good opportunity for that.

The project "school for all" will only be possible when the teachers manage to promote learning for everyone and not only for some.

References


16. Dyslexia Over-diagnosed:
The Problem of Labelling

Pieter Van Biervliet
KATHO-RENO, Centre for Teacher Training, Torhout, Belgium

Introduction

While developing criterion-based and group-referenced norms for a 100 words spelling test at the end of the elementary school (in the Flemish part of Belgium) we analysed the scores of dyslexic pupils. Results of this analysis suggest an over-diagnosis of dyslexia. Almost 50% of the dyslexic pupils score higher than 67 (out of 100 words), corresponding to the 10th percentile (= group-referenced norm). Even 15% of dyslexic pupils is able to spell correctly a minimum of 80 of these words (80% = cut score of the criterion-based norm). The key questions to be asked and to be answered are: What are the reasons for this? And what is the solution? (Seys & Van Biervliet, 2012).

A 100 words spelling test

Flemish schools in the Dutch speaking part of Belgium themselves are obliged to measure up to the learning outcomes of their education. A learning outcome is a written statement of what the successful pupil is expected to be able to do after a learning period, for instance at the end of the elementary school (Adam, 2004). Measuring learning outcomes assists schools in making informed decisions about interventions to improve their educational quality.

For the assessment of learning outcomes standardized measurement instruments are required. But – and that is the main problem in Flanders – no standardized tests are available at this moment to measure the learning outcomes at the end of the elementary school (Rekenhof, 2011). Thus, according to my interests, I developed in cooperation with Jan Seys, head of a Flemish Centre for Pupils Coaching (CLB, Centrum voor Leerlingenbegeleiding) a test to measure the learning outcomes for spelling (Seys & Van Biervliet, 2012).

We developed a so-called “100 words spelling test”. The critical question to be asked and to be answered is: When have been met the goals and objectives of the spelling curriculum of the elementary school? To answer that question we distinguish two types of norms: a criterion-based norm and a group-referenced norm.

The criterion-based norm involves a cut score, where the examinee passes if the score exceeds the cut score and fails if it does not. The criterion for the 100 words spelling test is very clear: Pupils should be able to spell correctly all 100 words (during primary education they all have learned how to spell all 100 words). According to the assessment of elementary education learning outcomes, worldwide a cut score of 80% is usually accepted (Struiksma, 1997; Döbert, Klieme & Wendelin, 2004). So, students should correctly spell a minimum of 80% of these words to pass.

The group-referenced norm is based on the performance of a population of students. A random sample of 3743 Flemish 6th grade pupils (at the end of the elementary school, 12 years old) had to complete the 100 words spelling test. Then, according to each score we calculate how much pupils are rated below that score. That is what we call the percentile point. The percentile point tells the percentage of pupils with scores less than a particular score (Kline, 2000, 59). For instance, when a student completes the test and gets a score of 87 (out of 100 words), this score corresponds to a percentile point of 55 (see Annex: Conversion table scores to percentile points ‘normal population’). That means that this particular student
scores higher than 55% of the 3743 Flemish pupils who previously took the test. A percentile point over 75 is considered ‘excellent’, between 50-75 is considered ‘good’, between 25-50 is considered 'sufficient', between 15-25 is considered ‘poor’, between 0-15 is considered ‘very poor’.

Table 1. Meaning of percentile points

<table>
<thead>
<tr>
<th>GRADE</th>
<th>MEANING</th>
<th>% PUPILS</th>
<th>PERCENTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>25%</td>
<td>over 75</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>25%</td>
<td>50-75</td>
</tr>
<tr>
<td>C</td>
<td>Sufficient</td>
<td>25%</td>
<td>25-50</td>
</tr>
<tr>
<td>D</td>
<td>Poor</td>
<td>10%</td>
<td>15-25</td>
</tr>
<tr>
<td>E</td>
<td>Very poor</td>
<td>15%</td>
<td>0-15</td>
</tr>
</tbody>
</table>

Separate scores for dyslexics

Computation of the percentile points gave us also an opportunity to examine other topics. For instance, we calculated percentile points separately for pupils with dyslexia. Before testing the random sample of 3743 Flemish 6th grade pupils we had no idea of pupils with dyslexia. Only afterwards we got information about those students, by asking the teachers which pupils got a kind of “dyslexic label’. We repeat: ‘a kind of…’ because there are no official, legal rules to obtain such a label. Finally we identified exactly 200 pupils with dyslexia, this is about 5.3%. International research mentions a prevalence between 5 – 10% (Shaywitz, 1998). The number of pupils with dyslexia that we found, seems acceptable.

Regarding students with dyslexia it is interesting to compare their results to the scores of the normal population. But it also can be interesting to see how well or how poorly a student with dyslexia performed compared to other pupils with dyslexia. Thus we calculated percentile points separately for pupils with dyslexia.

For instance, Louis is a student with dyslexia and gets a score of 66 (out of 100 words). Compared to the normal population the score of Louis corresponds to the 7th percentile (see Annex: Conversion table scores to percentile points ‘normal population’). But, when compared to the other pupils with dyslexia Louis score corresponds to a percentile point of 50 (see Annex: Conversion table scores to percentile points ‘dyslexic population’). Whereas Louis – compared to the normal population – scores very poor, the result is reasonable compared to the sub-group of pupils with dyslexia. Therefore separate percentile points for pupils with dyslexia can be very stimulating.

Dyslexia over-diagnosed?

Computing the percentile points for the pupils with dyslexia we also discovered something remarkable. It is generally accepted that dyslexia can be diagnosed when reading and/or spelling scores range frequently below the 10th percentile (Verhoeven & Wentink, 2001). According to the 100 words spelling test, a pupil with dyslexia can get – at best - a score of 66 because 10% of all scores are below 67, out of 100 words (see Annex: Conversion table scores to percentile points ‘normal population’). But, analyzing the results of the conversion table for pupils with dyslexia, we notice that almost 50% of those pupils score higher than 67. Even 15% of the pupils with dyslexia is able to spell correctly a minimum of 80% of the words (= the cut score of the criterion-based norm), and thus meets the goals and objectives of the spelling curriculum of the elementary school successfully!

In other words, it seems to us that – probably - we are dealing with a serious problem of ‘over-diagnosis’. We repeat: ‘probably’, because it is possible that a vast group of pupils
never has been identified as such, for instance because screening tests and assessments are often very expensive... Many pupils from socio-economic deprived environments can be excluded from diagnosis. Nevertheless – according to our research findings – probably almost 50% pupils are wrongly diagnosed with dyslexia...

**What are the reasons for this?**

We think that many parents with children who find difficulty with reading and/or spelling push for them to be diagnosed with dyslexia so they can get the extra support they need. A whole system forces parents to use the dyslexic label in order to access additional resources: “If you are dyslexic, you get help!” In Flemish schools all kinds of additional resources are often called ‘STICORDI-measures’ (Staels & Van den Broeck, s.d.). STICORDI stands for Stimulation (STI), Compensation (CO), Remediation & Relativisation (R) and Dispense (DI). Teachers aim to stimulate self-confidence in pupils (STI), provide more time for exams and tests (CO), offer the possibility of using helpful resources such as software that corrects the spelling etc. (CO), give more proper remedial help (Remediation), help pupils and parents to put their worries about the dyslexic problem into perspective (Relativisation), try to evaluate pupils on what really matters (DI), etc.

To us it is a misconception that teachers have to start these STICORDI-measures - especially compensation and dispensation measures - at a very early stage. There is evidence provided by research, for instance from Francis, Shaywitz et al. (1996) (see also Van den Broeck, s.d.). They composed three groups of children: 1) Not reading impaired (NRI), 2) Reading disabled - below the 15th percentile - and IQ discrepant (RDD), and 3) Low achievers – below the 15th percentile – but not IQ discrepant (LA).

![Reading Score vs Age](image)

**Figure 1**: Growth curves of reading (Francis, Shaywitz et al., 1996)

As expected (see Figure 1), there is a serious gap in reading ability at all ages between both groups of poor readers (RDD & LA) on the one hand and the NRI group on the other hand. But there are no differences in reading ability between the two groups with reading problems. And above all: there are no differences between all groups – NRI, LA and RDD - in the course of the development. The same maximum chances for development apply for all groups – till the age of 14-15!
According to Staels & Van den Broeck (s.d.) the same conclusions can be extended to spelling. Effective, high-quality teaching from the beginning is more important than all kinds of STICORDI-measures. A lot of pupils are labelled "dyslexics" because they're confused by poor teaching methods. Teachers must believe in the maximum chances for growth. Compensation and dispensation measures often are introduced in a naive and misguided way. For instance, Staels & Van den Broeck (s.d.) show research evidence that text-to-speech software can be harmful to the process of learning to read, because the use of this software reduces to a considerable degree the opportunities for active reading. According to Staels & Van den Broeck (s.d.) the same conclusions can be extended to the use of spelling software.

Connecting STICORDI-measures to a dyslexic label may create adverse effects. For instance, a non-dyslexic pupil with reading problems gets no proper help (the label 'a little bit dyslexic' doesn't exist). Likewise, a pupil from socio-economic deprived environments can be excluded from remedial help. There is research evidence showing that socio-economic deprived students have less opportunity to be identified as ‘dyslexic’ (Staels & Van den Broeck, s.d.). Labelling discriminates and doesn’t reduce inequality. Any child with a reading difficulty, regardless the socio-economic situation or general level of cognitive abilities etc., should be helped!

What is the solution?

The answer is evident. The whole industry of diagnosis and therapy should be kept out of education. Of course, diagnosis creates advantages. Diagnosis facilitates communication, gives a response on the questions of parents, pupils and teachers; diagnosis facilitates the access to proper remedial help, etc. But labelling has its drawbacks. A label is developed from a medical (clinical) perspective of view, depends very much on the person who makes the diagnosis, is very black & white and pays little attention to variations, tells about the child but too little about the context, facilitates stigmatisation, etc.

Schools are no diagnostic or therapeutic centres (Staels & Van den Broeck, s.d.). Instead of spending time, energy and money on diagnosis and therapy, we believe that resources can be better spent on high-quality teaching methods, structured intervention programmes for poor readers etc. The best approach for struggling readers is to provide high-quality instruction in the first place. Teachers are more effective to do so than others (see Slavin et al., 2009). We would rather prefer effective teaching than parents fighting for dyslexia diagnoses.

References


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Annex: Conversion table scores to percentile points (Seys & Van Biervliet, 2012)

### Output 100 words spelling test

#### End of the elementary school (June 2011)

<table>
<thead>
<tr>
<th>Percentile points</th>
<th>Grade</th>
<th>Scores (out of 100) ‘normal population’</th>
<th>Scores (out of 100) ‘dyslexic population’</th>
<th>Grade</th>
<th>Percentile points</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>A</td>
<td>100-98</td>
<td>95-88</td>
<td>A</td>
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<tr>
<td>95</td>
<td>A</td>
<td>97-96</td>
<td>87-84</td>
<td>A</td>
<td>95</td>
</tr>
<tr>
<td>90</td>
<td>A</td>
<td>95</td>
<td>83-81</td>
<td>A</td>
<td>90</td>
</tr>
<tr>
<td>85</td>
<td>A</td>
<td>94</td>
<td>80-79</td>
<td>A</td>
<td>85</td>
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<tr>
<td>80</td>
<td>A</td>
<td>93</td>
<td>78-77</td>
<td>A</td>
<td>80</td>
</tr>
<tr>
<td>75</td>
<td>A</td>
<td>92-91</td>
<td>76-75</td>
<td>A</td>
<td>75</td>
</tr>
<tr>
<td>70</td>
<td>B</td>
<td>90</td>
<td>74-73</td>
<td>B</td>
<td>70</td>
</tr>
<tr>
<td>65</td>
<td>B</td>
<td>89</td>
<td>72-71</td>
<td>B</td>
<td>65</td>
</tr>
<tr>
<td>60</td>
<td>B</td>
<td>88</td>
<td>70-69</td>
<td>B</td>
<td>60</td>
</tr>
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<td>50</td>
<td>B</td>
<td>86-85</td>
<td>67-66</td>
<td>B</td>
<td>50</td>
</tr>
<tr>
<td>45</td>
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<td>84</td>
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<td>C</td>
<td>45</td>
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<td>C</td>
<td>78-77</td>
<td>56</td>
<td>C</td>
<td>25</td>
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<td>20</td>
<td>D</td>
<td>76-74</td>
<td>55-51</td>
<td>D</td>
<td>20</td>
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<td>15</td>
<td>D</td>
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<td>50-49</td>
<td>D</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>E</td>
<td>69-67</td>
<td>48-44</td>
<td>E</td>
<td>10</td>
</tr>
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<td>7</td>
<td>E</td>
<td>66-63</td>
<td>43</td>
<td>E</td>
<td>7</td>
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<td>5</td>
<td>E</td>
<td>62-58</td>
<td>42</td>
<td>E</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>57-50</td>
<td>41-27</td>
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<td>3</td>
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<td>26-0</td>
<td>E</td>
<td>1 – 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average score</td>
<td>83.49</td>
<td>65.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>8.39</td>
<td>11.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number pupils</td>
<td>N = 3 743</td>
<td>N = 200</td>
<td></td>
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<td></td>
</tr>
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</table>
17. The New Educational Technologies Available for Students with Special Educational Needs

Anabela Ramalho Panão and Carla Gameiro Ferreira da Costa
Coimbra, Portugal

Abstract
The case study that we are presenting is based on the use of software, which had not been conceived to respond to the specific situation of this person’s particular need, but thanks to its versatility, allowed adaptations and uses that have benefited the autonomy of this person, who suffers from a severe disability. The project was developed during the academic year of 2010/2011 with a student with Trisomy 21. The resource used was multisensory software GRID2 (G2). Our aim was to use multisensory software GRID2 (G2) as a tool for daily work, which could facilitate the educational strategy of the teacher in order to promote the student’s linguistic and communicational autonomy.

Theoretical basis
After reviewing the literature and in a very brief way, it was concluded that a student with T21:
- shows difficulties in concentration for extended periods of time and low motivation;
- shows deficits in the visual and auditory discrimination skills;
- has difficulties in memorization;
- guides him/herself by images instead of concepts;
- reveals difficulties with mental operations of abstraction and synthesis;
- presents slowness in processing;
- at the language level, shows more limitations in the expressive constraint than in the understanding one;
- needs strong motivation;
- does not understand the reasoning process from the letter to the syllable and from this one up to the word, being more important the visualization of an image that matches the written word than an anonymous image of the different letters.

The same review allowed the systematization of the following propositions:
- The human development takes place, firstly, from the significant interactions with ones microsystem (Bronfenbrenner’s Ecological Model);
- In a learning process, there is an interaction between external stimulation (presented by any 'means') and internal stimulation (cognitive theories);
- The educational response given to a child with SEN should include the entire set of materials and resources, being them educational, informational or audiovisual (Fonseca, *apud* Stobäus and Mosquera (2004);
- Students with T21 require a lot more practice and repetition of activities and exercises, and the presentation of the material should vary, to avoid routine and boredom (Trancoso and Cerro, 2004);
- Con la ayuda del symbol system, these methods acceso y el perceptual field, el profesor puede crear un espacio useful, interactive multisensory y la persona que facilitates un flexible environment psychologically comprehensible y en el al desarrollar puede that maximum sustainable intelligences " (Montoya, 2002);
- Los mejores resultados aun son cuando se rodea de NTs los pictogramas, objetos y materiales para que se puedan manejar y refuerzen los skills skills que se desean desarrollar con el software. (Montoya, 2002);

- A child with T21 has the ability of auditory capture the meaning of a sound in his/her daily life, so they will also have visual and perceptual ability to capture the overall set of signals that form a word, without having the need of decomposing it in letters and syllables, (Troncoso and Cerro, 2004);

- A child with T21 does not understand the reasoning process from the letter to the syllable and from this up to the word, being more important the visualization of an image that matches the written word, than the anonymous image of the different letters (Valente, 2009);

- The use of written words that accompany vivid and familiar images submit the brain to a process where intelligence and affective interest are combined (Valente, 2009);

- The use of visual-phonological clues provides a more improved reading (Cardos-Martins, and Michalick e Pollo (2006) apud Valente, 2009);

- Many ways (two or more) should be used so that information can be assimilated (Lara, Memr and Trinidad (2007) apud Valente (2009).

The Grid2

Of international scope and also adapted to the Portuguese language, one can find the program Grid2 in our market. It is a computer program designed especially to help people with limitations in terms of language and, because of its multiple functions, it enables communication and the control of the computer with a lot of autonomy.

It was designed for universal access and used by people with different types of disabilities. It allows us to create integrated systems of communication, communicate through symbols, control the entire Microsoft Windows environment and includes a Speech Synthesizer with high quality for the Portuguese language. The desktop includes a word processor, email, web browser and other tools such as control of environment.

The G2 features several options to communicate: Direct Speech, which allows us to listen to the text associated to a cell and select it; Writing with Symbols, in which each word or sentence selected comes associated to a symbol and allows the edition of new words or the subsequent appearance, on the desktop, of the words or sentences written by the user. These different forms allow progression from the direct speech to the sentence construction itself, by using symbols and finally, to writing a text.

Most keyboards contain a rectangular text window in the first lines which is called working area. It is very flexible so it’s possible to change its size or location on each keyboard. Work areas are subdivided into: work areas with voice output that let you write and listen to what was written (Writing with Text, Writing with Text and Lists of Sentences, Writing with Symbols and Writing with Symbols and Text); work areas with sentences that enable the communication by using different ways of sending messages (SMS, Email, Contacts) and other work areas that enrich and become an asset for users of the program (word processor, Internet browser; Calculator, Music, Settings, Clock and Access to Computer).

18 • With the help of the symbol system, the access methods and the perceptual field, the teacher can create a useful, interactive and multisensory area that enables the person to have a psychologically comprehensible and flexible environment in which he/she can develop his/her intelligences at the maximum "(Montoya, 2002);

• The results are even better if one surrounds the new technologies with pictograms, objects and materials that can be handled and reinforce the skills and abilities one wants to develop with the software. (Montoya, 2002);
With the work area Writing with Text, the user can write sentences to communicate by speech. The text can be typed letter by letter, word by word, by phrases or expressions. The area Writing Text and Sentences, area is very similar to the previous, differing only in the fact of allowing the user to store sentences in a list that may be used later. With the area Writing with Symbols you can build sentences with symbols and text, including support for literacy. This area also allows you to save the sentences built and hear them. The Writing with Symbols and Text presents a basic way of building sentences block-by-block.

On the work area Email, the inbox is the initial state, allowing the user the reading of mails, replying to With the area of Word Processing, the user can manage (open, create, save and edit) text documents, including formatting options, such as fonts and text alignment.

The access to the computer is a particular work area and when this area is active, the keyboards occupy only a partial area of the computer screen, allowing access to other programs in the Windows operating system.

This program also allows editing and creating original keyboards, as well as copying or modifying already existing ones, making possible the insertion of any words and phrases that the user wishes. It also allows the usage of new keyboards online or sharing the ones that were created by other users. On keyboards for communication there is also the possibility to edit and create new cells enriching thereby the already existing keyboard. These new edited cells can be accompanied by symbols in the library of symbols. If there are not the desired symbols, captured images can be inserted by the user on the Web, part of a photograph, an image file stored on your computer or you can also choose not to insert any image. These new created cells can be moved and placed where each user finds it suitable and one may, if needed, add rows or columns to the keyboard.

Another useful feature is the creation of shortcut keys that make the links to other keyboards easier and thus more versatility in using the program. There may also be keys to which one wants to change the appearance thus helping to distinguish them from others. This change can be at the level of text, image, description and style, namely regarding color, font and cell shape.

The G2 has several options in the area of Speech Synthesis: the command Speaking that reads the contents of the desktop; the command Text Speaking that reads a certain text, regardless of the contents of the work area and it’s useful when one wants to say a pre-defined message; Sentence Speaking just reads the last written sentence and Word Speaking just reads the sentence where the cursor is. This feature is very useful because by writing in the work areas, the user can hear letter by letter, word by word, or only when you finish the sentence. The voice can be programmed at the level of speed, tone and volume. It has a Public Voice Service, which has been assigned the name "Célia" and even a Private Voice Service that is used to listen to the contents of each cell, before it is selected, and it is necessary to activate the auditory feedback.

In G2 it is even feasible to create dynamic content cells: Word Lists, Prediction, Contacts and Bookmarks. The word lists provide access to a restricted set of words, and we can add, move or even remove words. With the Menu Tools of Word Lists one will be able to manage the list: sort alphabetically, browse pictures for words that have no associated image, add space after the words, and remove duplicate words or without picture or even wipe out the whole list if it is no longer useful.

Prediction offers word suggestions as the user types. When the user writes new words not included in the Dictionary of Prediction, the G2 adds them and sorts them according to the frequency of use. To avoid adding misspelled words there is the option of Checking Spelling of Words, inserted in the Dictionary of Correction of Spelling that besides checking the spelling also allows you to add or remove words. Another feature is the Abbreviation Expansion which allows the user to type faster using abbreviations, appearing in the cells of
prediction their expansion. One can also determine the minimum size of words suggested to prevent the prediction of small and easy words, choosing only longer words. Other options are the selection of images in the cells of prediction, presentation of words with images or not to display words already suggested. If desired, it is also possible to add or remove words from the Dictionary of Prediction. Prediction also includes the morphology of verbs that uses the database of conjugated verbs in G2, emerging images associated with each person and verbal tense.

**Hypothesis raised**
Given the problematic in study and after knowing the potentialities and functionalities of the G2, with its implementation it was intended to verify if:
- The use of the program G2 would help the student remain the time required to perform the task of reading the words successfully.
- The use of SPC would facilitate the reading of words.
- The use of words from the student’s reality, aided by the program G2, would promote the reading of words.
- The hearing of the words using the Speech Synthesizer would facilitate the student’s subsequent reading.

**Implementation**

The implementation began on November 16th, 2010 with the diagnosis on the number of words that the student knew, having been presented to her a checklist with a set of words selected according to the information given by her teacher. On the 17th of that month, the first session was held and took place in CRTIC and was meant to familiarize the student with the G2 program and the work with the touch screen, since she didn’t have any of these resources in the classroom.

Within the twenty-two sessions that followed, weekly, in each class, sentences were written, heard and read. New vocabulary associated with SPC was also presented, with exploration of its meaning and relationship to the student’s reality, hearing using the Speech Synthesizer and reading by the student. This presentation also took place without association to the SPC, with listening and reading by the student or just reading by the student. There were moments when words worked previously were reviewed, without association to the SPC, listening and reading by the student or just reading by the student. The revision of words was also associated with the SPC and reading by the student or listening and reading by the student.

For the functionalities of the G2 program used that supported the implementation of this project, stands out the systematic use of the keyboard Writing with Symbols and the Speech Synthesizer that motivated the student a lot.

The keyboard of writing was used in thirteen of the twenty-two sessions, the adapted keyboard five times and the normal keyboard only four times. Opting for the frequent use of the keyboard of writing was due to the fact that it is incorporated into the G2 program. The student’s adapted keyboard was also used, and the normal keyboard. Thus the aim was to vary the resources and not limit the use only to adapted resources.

**Discussion of results**

This project was implemented over seven months, a total of thirty-one sessions including an initial, in which a diagnosis of the situation was made, regarding the number of words that the student actually read; another held in CRTIC, where the student had the first contact with
the G2 program and the touch screen; seven sessions of assessment of the student’s evolution which took place on November 30th, 2010, December 16th, 2010, January 27th, 2011, February 24th, March 31st, May 3rd and May 26th and the twenty-two sessions of working directly with the G2 program.

In the first session of evaluation (diagnosis), the student read eight words of the set presented to her. These words were selected according to the information that the teacher had provided. With the session of November 17th, the first time series began, consisting of only two practice sessions, which took place on 17th and 25th November, 2010. In the evaluation session of November 30th, the student was able to read eleven words. The second time series followed, with only three practice sessions on 2nd, 9th and 15th December. On December 16th, 2010, the student read fourteen words. Afterwards, there was Christmas break. After classes restart, four working sessions were provided, inserted in the third time series, and the evaluation occurred on January 27th, in which the student read fifteen words. From the second to the third time series there were no significant changes in the number of words read by the student. Then the fourth time series began, with the first session on February 2nd, 2011, followed by three more sessions (on 9th, 16th and 23rd February) before the evaluation that took place on February 24th, when the student read seventeen words. During the fifth time series there were four sessions (2nd, 16th, 22nd and 30th March) and on March 31st, the assessment was made and the student read twenty-two words. Significant changes were recorded and came as a result of the systematic work carried out and of the student’s commitment. The sixth time series was composed only of two sessions due to the Easter break, and the results obtained in the evaluation of May 3rd exceeded the expectations, since the student read twenty-eight words. The same happened in the last evaluation session of May 26th, after the four sessions of the seventh series, when the student read thirty-four words, including three words that were only being worked since the sixth time series.

![Figure 1](image.png)

**Figure 1.** Graphical representation of the evolution of the student regarding the number of words read.

<table>
<thead>
<tr>
<th></th>
<th>16-11-10</th>
<th>30-11-10</th>
<th>16-12-10</th>
<th>27-01-11</th>
<th>24-02-11</th>
<th>31-03-11</th>
<th>03-05-11</th>
<th>26-05-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers of words read</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>22</td>
<td>28</td>
<td>34</td>
</tr>
</tbody>
</table>

The selection of words followed the following criteria: functionality and meaning to the student. Thus, more words related to her personal data, close relatives and others that came associated with these were worked, for example: brother, sister, grandmother, grandfather or...
related to spatial and temporal situation or social relationships. It should be noted that the student was able to learn to read in thirty-four words within seven months, taking into account the attention and learning difficulties. However, the implementation of this project is of bigger importance if one associates the number of words learned to the fact that they have not been worked out of context, because they were associated with the surrounding environment, the reality that surrounds her and inserted into sentences. They reported her experiences, preferences, her moods, but also the training of the use of words such as: personal data, parents’ names, her date of birth, her residence, siblings’ names, social greetings, temporal and local situation.

**Conclusion**

The use of the G2 program provided the enrichment of educational strategy, improvements in the time spent by the student on tasks and subsequent positive results, which resulted in a significant increase in the number of words that the student learnt to read during the implementation period. Thus, we conclude that the G2 program contributed to the reading of words. At the beginning of the implementation of the project, at the time of the diagnostic evaluation, the student identified eight words; when the project ended, thirty-four, independently. According to Kenski (2008), special programs can help to bridge the gap and ensure better learning for everyone. Correia (2008) argues that to optimize learning environments, there is the need to make adjustments that will involve, with some regularity, the use of assistive technologies.

The use of SPC made the reading of the words in the phase of the introduction of the words easier. The symbols were suggestive, easy to understand and representative of the message they intended to convey. Thus, this attribute of the G2 program served as a stimulus that motivated and helped the student with learning. Regarding the importance of using symbols, Kozma (1991), apud Coutinho (2008), advocates "the use of images near the text can provide information necessary to the organization of the mental representation derived from the text with the representation of reality" (p. 109). Coutinho (2008) also refers to the combined use of words and images that help the pupils to understand the didactic message in a more efficient and effective way, because this system of double encryption system or retention is advantageous since the information which is difficult to retain in a way, will be in another one. Another reference is Montoya (2002) who argues that with the help of the system of symbols, the teacher can create a useful, interactive and multisensory area and the results will be better if we add ICT symbols.

In the literature review, the ecological model of Bronfenbrenner (Portugal, 1992) was included, according to which the human development takes place, in a first instance, starting from the significant interactions with the microsystem. In the same context Valente (2009) states that the use of written words that accompany vivid and familiar subjects leads the brain to a process that combines intelligence with affective interest. The use of the G2 program made it possible to respond to the student’s interests and take into account her reality when allowing the insertion of any word. This task is eased, either by prediction or by flexion of the word selected in the writing with symbols keyboard. Prediction allows the inclusion of the new words that the user types in the Dictionary of Prediction, which sorts them out according to the frequency of use. After writing a word, the prediction system tries to predict the word the user will want to write next. This system is based on the memory of the written words. Thus, the more the user writes, the better the prediction of the next word. The problem of adding words with spelling mistakes can be avoided by choosing the option Checking the Spelling of Words before adding them and suggesting.
This technological resource designed in a multisensory aspect, with the possibility of using sound, allows the listening of sentences or words. Its potential is that the speech synthesizer is able to read the contents of the work area, read only the selected part of the message or read the sentence where the cursor is. It also allows you listen to the content of each cell of the keyboard only with its selection, which promotes an autonomous work by the student. Thus, its use promotes independent learning of reading by allowing the listening of what is written without relying on someone else.

This project was not intended to create a new method of learning to read; the primary objective was to use a multisensory resource to promote the acquisition of reading, having been taken advantage of the use and exploitation simultaneous of writing, image and sound and the use of words with meaning for the student.

When this project was initially considered, the intention was to focus attention on reading; however, another skill is associated with it: writing, which was worked out as much as reading. Consequently, the student made progresses not only in the skill of knowing to read, but also in knowing to write. It also succeeded in motivating the student to the tasks. She requested to extend the working sessions and there were attitudes of dedication to the task.

Finally, one must add that, beyond the skills of reading and writing, other uses of ICT have been trained and ameliorated, and which are essential in this society we live in to the autonomy of any individual. Coutinho (2008) states that "years of research involving various medium, from television to computer, lead investigators to conclude that, under certain conditions, the attributes of the" means "can stimulate the activities of processing information and the development of students' cognitive skills (p. 108).

The teaching of a language is of paramount importance because it is a basic tool for human communication. Reading is a matter of great interest and significance, an element of undeniable value that allows us to access the world of culture. This is why teaching to read is a social obligation, not only of the teacher, but also of the community in general. The promotion of this project was intended to make the student acquire reading skills in a functional aspect of practical use in her daily life. If we consider the set of words worked, the student can, at this point, read most of the words from a form and understand its meaning. With this implementation the words to be taught are not run out, and there is still a long way to go, but the strategy to follow has already been found.

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V Urban Education
18. Paradox, Pedagogy and Praxis: Rethinking Ethics in Education

M. Francyne Huckaby, Mila Zhu, Amanda Hutson, Victoria Reneau, Ashly Spencer, Julie Vu, and Freyca Calderon Berumen

Pedagogy is a unique form of ethics. While the paradoxes presented in the ethics of pedagogy are too often ignored, we propose many pedagogical moments and decisions exist within a paradox. We intend to illuminate the nature of paradoxes in education, the suppression of such paradoxes, and explore possible ways of honoring and responding to the ethical challenges within education that the paradox illuminates.

Should the majority or the minority determine the curriculum?
Should we attend to the needs of many students or the needs of an individual student?
Should students have individualized curriculum or a curriculum for all?
Should we focus on how we educate or the results of education?

Careful considerations of these questions yield multiple responses. Such queries are paradoxes because they “suspend us between too many good answers” (Sorenson, 2003, 41/3557). Yet, conceptions of curricula, pedagogies, educational policies, the situated and situational moments among educators and students too often ignore paradoxes. The desire for efficiencies of decision making, budgeting of resources, and winning political strategies force the ignorance of paradoxes.

Stemming from the ancient Greek para (παρά) and opinion (δοξου), paradox (παράδοξου) is a received opinion or expectation that is contrary to belief (Oxford English Dictionary [OED], 2009; Baggini and Fosl, 2003). The paradox is valuable because, in efforts to resolve (or not) the contradiction(s) it poses, the paradox forces us to examine premises and arguments more closely. The paradox exposes contradictions that “force us to scrutinize what seems so obviously right” (Baggini and Fosl, 2003, p. 110). Paradoxes are only re/solved after identification and rejection of mistaken reasoning or erroneous assumption. In the philosophical sense, a paradox moves beyond a common understanding as an “enigmatic or contradictory assertion” (Baggini and Fosl, 2003, p. 108) and becomes a contradiction born out of (1) sound reasoning and (2) true assumptions (Etchemendy, 2006).

Sorensen (2003) conceives paradoxes as the “atoms of philosophy” (p. xi) because they serve as points of departure for philosophy as a question-based discipline. Indeed many philosophers address questions similar to the questions above, and their conclusions are dizzyingly exponential. For example, on the topic of teaching philosophy, Lipman (1977, 1988) proposes all children should be engaged in philosophical inquiry. To make such a claim, Lipman (1988) must deal with Plato’s contradictory desire “for sequestering children and philosophy from one another” (p. 261). Matthews (1994) maintains some children can think philosophically with sophistication and should have opportunities to do so. On this one topic of children and philosophy, three philosophers offer three solutions: teach all children, teach no children, teach interested children. Each well-reasoned answer offers a course of action. However, these collective and contradictory answers do not provide a straightforward route. Philosophy is not about the simple or the singular, but the connections; the paradox offers a particular dialectical opportunity to seek new ways to understand.

Paradox
Palmer (1998) illustrates the commonality of paradoxes, “We enter paradoxical profundities every day because we are human, for we ourselves are paradoxes that breathe! Indeed, breathing itself is a form of paradox, requiring inhaling and exhaling to be whole” (p. 295). Breathing is an easily lived paradox; after all, we cannot sustain life without it. If we ignore one part of this paradox by over inhaling or only exhaling, life would become labored and then non-existent. We intrinsically resolve the opposition of the exhale and the inhale by shifting between the two—inhaling and then exhaling, inhaling, exhaling, and so forth.

Walking, like breathing, is paradoxical, but unlike breathing, we must learn to walk. When toddlers learn to walk, they struggle between standing and falling. Walking requires both standing and falling as we shift weight and balance from one leg to the other. With development and practice, most children learn to walk. When done well, the shifting between standing and falling suspends us in effortless walking. Like the infant must learn how to suspend between standing and falling to become a proficient walker, we as educators and citizens, must learn to do the same at every level of education from classroom interactions to national policy.

Within the realm of education, we often focus on part of a paradox and ignore the other(s). We find easy contentment by amplifying the contradictions, “treat[ing] argument as a form of sport solely for purposes of contradiction” (Plato cited in Lipman, 2008, p. 261), and then playing this sport until only one winner remains, at least for the moment. While Plato’s statement referenced his observations of youth, it is also relevant for current educational discourses. Plato continues, “When someone has proved them wrong, they copy his methods to confute others, delighting like puppies in tugging and tearing at anyone who comes near them” (p. 261). Making one side of the paradox the winner at the expense of the other side may work for the moment, but the gains are short lived as the contradictions posed by paradoxes continue even as we ignore them. We can endure a lopsided existence far longer in pedagogical realms than we can in breathing. The effect, however, is devastating. Education is a moral praxis that ripples through our societies, reaching each individual differently. Simplistic approaches are insufficient, particularly within education where paradoxes are ever present.

Ethics

Education is not simply teaching or learning. We tend to think of teaching as containing moments that require ethical insight or decisions. In doing so, we fail to notice how pedagogy is a form of ethics. Ethics, like pedagogy, is inquiry, theory, and practice—all simultaneously integrated, even though we may focus on one at any given moment.

Inquiry - The aim of ethical inquiry … is an open-ended, sustained conversation of the values, standards, and practices by which we live, discussed openly and publicly so as to take all points of view and all facts into account. (Lipman, 1980, p. 189)

Originating from the Greek, ethikos, ethics addresses the philosophical question—what is good? We cannot answer this question of ethics by identifying what we value or prefer for ethics is not about an individual or a group assessment of worth or preference; neither is ethics a form of appraisal that classifies some things as good and others as bad. Furthermore, valuing, preferring, and appraising are too easily completed to be forms of ethics. Education may entail forms of assessment, but evaluation is a tool of education not education itself. While individuals and individual groups may have specific views about education, education is never limited to an individual opinion. Ethics and education are parallel in these ways. Values clarification and decision-making may be part of ethics and education, but education
or ethics should not be reduced to clarifying values or making decisions. Furthermore, indoctrination is antithetical to education and ethics.

Ethics is something we do, or attempt to do, but cannot complete; it is an ongoing process. Likewise, an individual does not complete education; we are always unfinished pedagogical projects. Ethics is the effort to understand moral conduct and inquire into what behaviors are in accord with justice. This form of inquiry seeks to uncover and critically assess options. Ethics is a way to expand our moral imagination and possibilities with critical inquiry, thus we cannot identify ethics in what exists. In other words, ethics is about what ought to be, not what currently exists. To reference Lipman (1980), Is is not the same as ought and ought cannot follow from is. Thus, ethics cannot present any factual claim.

Inquiry in terms of ethics and education would be a multi-perspective conversation on what is and what could be in terms of our values, principles, and practices. Like ethics, education is an undertaking to develop the young into adults with ways of knowing and behaving deemed good. Often caught between our realities and ideals, education seeks things that are possible and resists the limitations of what is.

Theory

While philosophers have explored many theories of ethics, we focus on two: consequentialism and nonconsequentialism. Consequentialism (see Strike & Soltis, 2004) seeks the end result (or consequence) that offers the maximum benefit for the most people and in doing so, some individuals or groups can be sacrificed for a greater good. On the contrary, non-consequentialism seeks to treat each individual as an end and thus respect each individual. Theoretically, non-consequentialist (see Strike & Soltis, 2004) treat individuals as ends in themselves and do not use any individual or group as means to an end for others. Reversing this maxim, consequentialist theory seeks the best ends, even if a few individuals or groups must serve as means to this end.

Consequentialism suggests we need to be objective, logical, and empirical when it comes to ethics and ensuring the general social welfare. Thus applying an analytical approach, consequentialists calculate what Jeremy Bentham and John Stuart Mill call utility. Utility is a theoretical calculation of total pleasure minus total pain. Utilitarians then divide the total number of people into the sum of all the utility calculations to obtain an average utility. This operationalized definition for general social value offers a means to measure the best for the most.

This formula, while logical, must have been daunting in the late 1700s - 1800s when Bentham and Mill lived. However, the efforts necessary to collect the data even in their country (England)

\[
\text{Average Utility} = \frac{\sum_{\text{total pleasure} - \text{total pain}}}{\text{total # people}}
\]

would be challenging, if not impossible. Furthermore, in the data collection processes, we can imagine how some people could be excluded rather easily. If we could figure out some form of assessment for pleasure and pain, we could apply computer technology to the calculation of average utility. In the absence of consequentialist super

Concerned with respect for each individual, non-consequentialists view people as rational, moral and free who deserve to make their own choices. Nevertheless, theorists who identify themselves as non-consequentialists do not want people doing whatever they want; they are interested in the general social welfare. Immanuel Kant stated, “So act that the maxim of your will could always hold at the same time as a principle establishing universal law” (cited in Strike & Soltis, 2004, p. 15). This categorical imperative demands contemplation of a potential action taken up universally. If the result of everyone doing the same thing in every place is not good, then the action is not ethical. Non-consequentialists seek equal respect for persons and consistency. A well-known example of nonconsequentialism is the golden rule. So many versions of this rule exist that we need to call them the Golden Rules. Two examples follow:

*So in everything, do to others what you would have them do to you, for this sum up the Law and the Prophets. (Jesus, Matthew 7:12, NIV; Christianity)*

*Not one of you truly believes until you wish for others what you wish for yourselves. (The Prophet Muhammad, Hadith; Islam)*
computers, only some forms of consequentialism seem logical to us—sending some to war, imprisoning those that pose dangers to others, and sending a disruptive student to the principal.

When inquiring more deeply into the golden rules and non-consequentialist ethics, we may need to find ways to avoid making some the means to the end of a version of the golden rule they do not believe. Such an endeavor might require knowledge of the various rules and of individuals sufficient enough to individualize a golden rule.

Both theoretical positions, consequentialism and nonconsequentialism, seek a form of greater good, but one seeks to accomplish this greater good for the majority (consequentialism) and the other through equally respected individuals (nonconsequentialism). Both stances pose challenges and difficulties. Humans do not have a good track record of avoiding behaviors that yield the undesirable in terms of the categorical imperative, which is Kant’s idea of universally applying an action. Quite the opposite, we often find pleasure in expressing our individuality. Additionally, if we take nonconsequentialism to its extreme, ethics becomes so individualized that inquiry, theory, and practice would be impossible on any collective level. As for consequentialism, we need to consider how it should be applied—to individual situations or as a general rule.

**Practice**

Lipman (1980) suggests that, in terms of ethics, we should think logically and clearly as we face problems and open ourselves to new options. In education, particularly considering the practice of teaching, ethics can become over simplified into codes of ethics. Please do not misunderstand our intentions. Codes of ethics may indeed be necessary and educators should understand and integrate codes of ethics into their work. We propose educators can think more complexly about ethics than the behavioral guidelines in codes might suggest, but first a consideration of codes of ethics.

The National Education Association’s Code of Ethics of the Education Profession (1975) preamble begins: “The National Education Association believes that the education profession consists of one education workforce serving the needs of all students and that the term ‘educator’ includes education support professionals.” The preamble continues with a conceptually dense second paragraph—including phrases such as *pursuit of truth, freedom to teach, equal educational opportunity, and highest ethical standards*. The third paragraph states,

The educator recognizes the magnitude of the responsibility inherent in the teaching process. The desire for the respect and confidence of one's colleagues, of students, of parents, and of the members of the community provides the incentive to attain and maintain the highest possible degree of ethical conduct. The Code of Ethics of the Education Profession indicates the aspiration of all educators and provides standards by which to judge conduct.

Then, the codes of ethics splits in two principles: Principle I focuses on commitments to students and includes such topics as restraining students points of view, unfair treatment of students, and disclosure of information. The commitment to the profession comprises principle II. The text begins, “The education profession is vested by the public with a trust and responsibility requiring the highest ideals of professional service.” The specifics follow:

- Shall not misrepresent his/her professional qualifications.
- Shall not knowingly make false or malicious statements about a colleague.
- Shall not accept any gratuity, gift, or favor that might impair or appear to influence professional decisions or action.
Codes of Ethics, are both inspiring and disappointing. The ideals espoused in the preamble and introduction rouse the best in us. However, when they demarcate desired behaviors, the codes often become an attempt to avoid problem behavior as opposed to ethical guides.

While offering a means to enhance the ethical practice of educators, these codes of ethics essentialize shadows of the ethical and reduce ethics and pedagogical praxis to compliance with generalized statements designed to function for all educators and general circumstances within a given organization, state, school district, or nation. Clearly, the ideals espoused in codes of ethics are worthy of our attention and actions to uphold, however realizing these ideals is not possible simply through compliance, obedience, or legislation. The Texas Educators’ Code of Ethics is state law (Texas Admin. Code ch. 245, § 245.15, 2000). Educators should know these codes, pay close attention to the language used, and build them into their professional practice. Codes of ethics are useful for they can direct behaviors away from harmful actions; but ethics is not just about avoiding wrong doing. We propose educators in their ethical practices do more than what codes of ethics dictate. We suggest ethical educators move beyond practice into praxis, a process, which requires shifting between theory and practice, reflecting and acting, questioning and transforming in a process much like breathing is shifting between inhaling and exhaling. Praxis is important for ethics and education if we want to engage in an active process of thinking and learning.

Praxis and paradox

We propose praxis relates more with paradoxes than codes, because the world is too complex for codes to be sufficiently comprehensive and specifically relevant. An initial step is to learn to recognize paradoxes within, across, and among moments; and noticing the ways people act in the face of paradoxes is a good start place. After all, most paradoxes are not as easy to live with as breathing (inhaling and exhaling) or walking (standing and falling). Because paradoxes “suspend us between too many good answers” (Sorenson, 2003, 41), we indulge in strategies to make the choices more manageable. Examples of how we respond to the paradoxes follow (see graphic following descriptions).

I. Destroy/make viable: One possible response to a paradox is to destroy a part of the paradox as a viable option and therefore make the remaining side the only viable option. We can consider consequentialism and nonconsequentialism as an example of a paradox—the needs of the many in paradox with the needs of the few. Arguably, slavery as an institution relied on consequentialist logic by denying slaves’ freedom and requiring their servitude to make non-slaves’ lives easier. The abolitionist movement, the Emancipation Proclamation, and laws that slowly granted slaves and their descendants freedom, rights, and citizenship helped destroy slavery as a socially accepted and legal practice. Today, most people find slavery distasteful. While slave conditions exist today (e.g human trafficking), they are illegal and not openly supported. In this example, only one instance of consequentialism is destroyed (at least discursively and legally). If a society used this one example of consequentialism to ban all of its forms that allow the majority to benefit from the sacrifices of the consequentialist side of the consequentialist/nonconsequentialist paradox would be destroyed.

Additional organizations provide codes of ethics such as Fort Worth Independent School District and National Association for the Deaf.
II. Ignore/choose: Another possibility is to ignore (but not destroy) one part of the paradox and therefore leaving the other part as the only viable option. For example, if we decide that “majority rules” is a reasonable maxim, we can use it to be “fair”—voting to settle disputes, selecting the most liked pizza topping for a party, reading the book most student request. Such actions are ways of choosing consequentialism on behalf of the majority and ignoring nonconsequentialism and the wishes of the few. In other words, using consequentialism as a guiding principle for insignificant and significant things to the point of habituation could render non-consequential options unnoticed and inconsequential. Of course, the reverse could occur where nonconsequentialism is over used to the detriment of consequentialism.

III. Seek compromise: Seeking a middle ground, an average, the median, or a compromise is another approach to paradoxes. Such an approach would please and displease with some parity. An example might be to order pizzas with toppings(s) that will satisfy and dissatisfy, to read favorite books and least favorite books regularly in class, or to settle disputes in such a way that the middle ground between the desires of the majority and the few are balanced.

IV. Compromise/resist: A fourth way of approaching a paradox is to seek compromise on one side and to resist any middle ground on the other side. Within this approach, one group might be willing to compromise on which book to read each day and the other unwilling. This pairing of responses could lead to a pseudo-compromise that favors the resisting side.

V. Resist/Resist: Both sides of the paradox could continue in opposition indefinitely.

VI. Shift between: A sixth option is the one we propose as a model for ethical praxis in education—shifting between the poles posed by the paradox. This response to paradoxes replicates the model of breathing and walking (discussed at the beginning of the paper) by acknowledging the necessity of both sides of the paradox. Using breathing and walking as analogies to comparatively analyze these six possibilities, illustrates what type of living with paradoxes each option makes possible. Destroying the option of inhaling will destroy life (destroy/make viable) and ignoring the possibility of taking a step to stop falling will leave one only standing (ignore/choose).

The median place between inhaling and exhaling is half-empty, half-full lungs, which cannot sustain life (seek compromise). If the step taken gives way to legs refusing to stand, one falls (seek compromise/resist). If the inhale and the exhale continuously resist each other, existence would be cripplingly labored (resist/resist). Destroying, ignoring, compromising, and resisting are all good and viable options in the face of divergent options. But in the face of paradoxes, we propose that such actions are debilitating. Therefore, we are suggesting that
an ethical praxis for education would be able to sustain the paradox (shift between), to shift within the paradox, to suspend us between too many good answers long enough to breathe, to learn how to walk, and to notice when and how nonconsequentialism and consequentialism are useful and when they are not.

We do not yet know how to do this, but are trying to develop a conceptual framework to begin this praxis of paradox. The most important pedagogical questions yield so many wonderful options and we too easily dismiss paradoxes.

Should we educate for the potential of the individual or the needs of the society?
Should the curriculum draw on the past or prepare for the future?
Should education form the society or result from society?
Should the common or the elite determine the curriculum?

We identified these questions as means to begin identifying paradoxes within education, and believe exploring them is a start to considering ethics as paradox, pedagogy, and praxis.

References


Introduction

U.S. teacher educators continue to grapple with the identification and implementation of practices to equip future teachers with content knowledge, knowledge of learners and the learning process, pedagogical repertoires and professional dispositions. In addition, they face the challenge of balancing off-site P-12 field experiences with on-campus coursework.

Meanwhile, their programs are under increasing scrutiny, unsettling pressure and mounting criticism from the U.S. Department of Education, state departments of education, the National Council of Accreditation in Teacher Education (NCATE), the media and the public at large. In an October, 2009 address at Columbia University’s Teachers College, U.S. Secretary of Education Duncan commented, “By almost any standard, many if not most of the nation’s 1,450 schools, colleges, and departments of education are doing a mediocre job of preparing teachers for the realities of the 21st century classroom. America’s university-based teacher preparation programs need revolutionary change – not evolutionary tinkering.”

According to Ball and Forzani (2010, p. 8), “Public confidence in the value of university-based teacher education is low. In fact, there is widespread skepticism about professional preparation for teaching, with many advocating for a strong liberal education coupled with on-the-job experience.” Issues include unclear and inconsistent teacher education program goals, delivery systems that are idiosyncratic rather than research-based, a lack of focus upon the reality of contemporary classrooms especially in terms of working with culturally and linguistically diverse learners and students with exceptionalities in the general education setting, and disappointingly high attrition rates among program graduates with nearly half of all new teachers leaving the profession within five years. (National Commission on Teaching and America’s Future, 1996)

Research focus

Solutions proposed for the crisis in teacher preparation emphasize a change of setting, from the college campus to the P-12 school. But, will augmenting the field-based component in teacher education programs result in desired program improvements? Is it in the field where teacher education candidates (TECs) learn what is needed to navigate once they are in their own classrooms? Do field experiences in and of themselves lead to growth?

In this article, we explore the role of field experiences in the preparation of TECs, discuss issues and challenges in arranging for TEC field work, and then, using examples from our own work with TECs, describe and analyze TEC field experiences in P-12 schools at four stages in the program – observation; exploration; pre-student teaching; and student teaching. Finally, we offer suggestions for what TECs, school-based mentors and university faculty can do to maximize the value of these experiences.

The role of field experiences
Ideally, the field experience component in teacher preparation programs provides TECs with sequential, developmentally appropriate, well-supervised in-a-real-classroom activities beginning with the first semester of college study and culminating with the final semester of student teaching. Teacher education candidates need field experiences to understand diverse learning contexts, learner characteristics and the complexities of teaching. In some instances, field experiences lead TECs to question their career choice. However, much more frequently, TECs report that these field experiences are impactful, motivating, highlights of their college years.

For example, after one of our students, Joey, a freshman TEC – Class of 2015, returned to his home district to interview and observe a teacher in his targeted area of certification, in his reflective essay, he affirmed: “It is one thing to learn about what you should do as a teacher, to learn about educational concepts on campus in coursework, but to see these concepts implemented in a real life situation opened my eyes to what teaching is all about. It made me excited to become a teacher and reminded me why I am here in school right now.”

**Issues and challenges in arranging for TEC field work**

However, design and implementation of field experiences come with significant obstacles. First of all, there needs to be shared commitment, effective communication and cohesiveness within and across the faculties of the colleges of arts and sciences where TECs are expected to acquire content knowledge, the colleges of education where they are expected to learn pedagogy and the P-12 settings where TECs are expected to apply learning from university coursework.

But, more often than not, these organizations function as loosely coupled systems. According to the National Research Council (2000, p. 201), “The components of teacher education programs – collections of courses, field experiences, and student teaching – tend to be disjointed; they are often taught or overseen by people who have little ongoing communication with each other.”

Elsewhere, Bain and Moje (2012, p. 62) rue, “Current teacher education comprises ill-organized sets of educational experiences in different spaces, for different purposes, and led by people who don’t work with one another and may never even have met.” They contend that in this confusing context of silos, without necessary, intentional interventions, TECs are often left to navigate for themselves.

![Figure 1. Silos and the teacher education candidate: What is.](image)

Selection of school sites and school-based mentors is of critical importance to TEC development and should be done based upon considerations of quality, with candidates
placed where they will most likely be exposed to exemplary teaching and learning. As Professor Darling-Hammond (2006, p. 308) reminds us, “It is impractical to expect to prepare teachers for schools as they should be if teachers are constrained to learn in settings that typify the problems of schools as they have been.”

Regrettably, selection is frequently based upon convenience factors such as the school’s proximity to the college campus, space availability, or school-based personnel willingness to accept candidates into specific classrooms. In these contexts, TECs may receive mixed messages, encouraged in their university coursework to do the opposite of what is modeled at their field experience sites.

For example, one of our Spanish TECs, Lauren, Class of 2013, was paired with a high school Spanish teacher for her pre-student teaching field work. During the semester, on campus she was required to prepare a unit of study for a Spanish 1 course with a ten lesson sequence, each lesson following a framework that included learning objectives, standards, topics, materials, an “at-the-bell” activity, an anticipatory set, a teaching the content section, guided practice activities, tiered questions, checks for understanding, homework, closure, contingency plans and a self-evaluation.

In sharp contrast, Lauren’s field mentor demonstrated little planning. In a field experience reflection paper, one of the prompts was: Discuss the differences you noted between your field experience and the ideas presented in your on-campus course. In response to this prompt, Lauren wrote, “My field mentor never had any lesson plans. Her unit plans had no detail. This was completely different from what we were doing in my on-campus class.”

Education faculty should possess a thorough understanding of the school contexts where TECs are placed and know the school-based personnel with whom their students are paired. Field experience arrangements should be part of a larger university-school partnership program, such as that proposed by the professional development school model, that benefit and enrich all involved – school-based faculty and students, university faculty and TECs. See the discussion of professional development schools, for example, in Darling Hammond, et al. (2005).

Unfortunately, given current upheavals in U.S. school districts and universities, given unpredictability in both settings, given unwillingness to invest the supports needed for establishing high quality professional development schools, these “should be” statements are often replaced by “can’t be”s. Where funds, resources and commitments are lacking, the parties involved in field experiences may settle, albeit reluctantly, for cooperation rather than collaboration. In these contexts, TECs may not be able to benefit from mutually reinforcing learning environments. University-based education faculty may not have opportunity to articulate the teacher preparation program’s conceptual framework and school-based personnel may not be able to offer TECs the field experiences envisioned by university faculty.

The value of field experiences

In Pennsylvania, the Department of Education now mandates a four stage field experience sequence. The stages include: observation where TECs visit a variety of school settings – urban, suburban, rural, high-performing and low-performing; exploration where TECs perform supervised work with small groups of students; pre-student teaching where TECs teach small groups of students and present lesson segments to a whole class under the supervision of a certified teacher; and student teaching where, under the direction of university faculty and over a twelve-week period, TECs take on the teaching rosters of
school-based personnel – cooperating teachers who are “trained” by preparation program faculty.

Notwithstanding the less than favorable design and implementation conditions described above, TECs continue to participate in developmental, sequenced field experiences on their way to obtaining teaching degrees. We are certainly not suggesting that field experiences be discarded. Rather, we are examining how these field experiences can be incorporated into teacher education program designs in order to prepare TECs for successful teaching careers: how to make the experiences educative. If this is the desired learning outcome, then we place more relevance and value for field experiences in terms of rigorous, internal mental activity that the experiences engender afterwards rather than in situ. (Dewey, 1938) Wrenn and Wrenn (2009, p. 260) in their effort to integrate field and course work offer a recommendation similar to ours: “Experience must be followed by reflective thought and an internal processing that links the experience with previous learning, transforming the learner’s previous understanding in some manner. Learning, therefore, takes place within a cycle that includes action, reflection and application.”

Field experiences

To illuminate possibilities for TECs to learn from practice at each developmental stage, we examine field experiences of our own East Stroudsburg University students.

Stage one – Observation: visits to a variety of school settings
At this stage, students have just begun their university studies and are taking arts and science courses concurrently with education coursework. For their first education class, they must spend fifteen hours observing in P-12 classrooms. Many of our TECs have always wanted to be teachers and are impatient to begin field experiences. None has ever visited a classroom other than as a student and now each is challenged to see classrooms as an aspiring teacher.

“Missy”
Nicole, a first year TEC, visited a small urban high school in a predominantly Latino neighborhood of Philadelphia with one of the authors. She and a group of her peers spent the day observing classes, interviewing teachers and participating in workshops organized by the high school faculty and administration. Upon return to campus, field trip participants shared their experiences during an open forum in class. One of the questions framing this discussion was: What surprised you? Responding to this prompt, Nicole stated that student-teacher relationships were much different from what she had herself experienced as a high school student, that in her suburban New York high school, the students treated teachers with much more respect than at the Philadelphia locale. When asked for the evidence upon which this contrast was based, Nicole reported that the students called their female teachers “Missy” rather than “Ms. Adams” or “Ms. Bell”.

Class discussion led Nicole to move beyond her own culturally determined formula for polite address to understand that there was another culturally determined formula, that for Latinos and for other ethnolinguistic minority groups in the U.S., using the teacher’s family name would be inappropriate! Without sharing her story and without the ensuing uncovering of these cultural differences, the TEC’s stereotypical thinking – that urban minority kids treat their teachers disrespectfully – would have been confirmed by the field experience.

Stage two – Exploration: supervised work with small groups of students
At this stage, our TECs are continuing their arts and science courses and also taking an educational psychology course. For this second education course, they must tutor students for fifteen hours in a classroom or in an after-school setting. They are excited but anxious at this first opportunity to help with instruction.

“Teaching is not telling. How do I interpret the unexpected and what do I do about it?”

151
Jordan signed on to tutor in an on-campus after-school program for elementary school students living nearby in a low-income housing development. At his first tutorial session, Jordan had his student complete her homework assignment. In an initial tutoring journal entry, Jordan described how whenever his student hesitated, he explained what to do next. The journal prompts included: identify low points and use one or more educational theories to explain these low points; identify high points and use one or more educational theories to explain these high points; and present plans to improve future tutoring sessions, offering a rationale for these plans.

Through the reflective journaling process, Jordan was led to reconsider the “teach by telling” method and to articulate and subsequently put into practice more learner-centered educative approaches embodied by techniques such as prompting, wait time and the novice-expert framework. Later on in the semester, in a class discussion of TEC field experiences, Jordan expressed his frustration with the after-school program. When asked to elaborate, Jordan characterized his student as a “bad kid”, “blatantly defiant” with behavior that was a result of “poor upbringing”. His views triggered an animated classroom conversation about teacher-student relationships, trust-building over time, confronting pre-existing teacher and student biases, viewing student behaviors as fixed versus modifiable, identifying root causes for student defiance, strategic responses, separating judgment of behaviors from judgment of the student, what to do when students “cross the line”, when to handle unexpected behaviors on your own and when to report them to a supervisor. The after-school program director attended the next class session as a guest presenter, continuing the problem setting/solving process with Jordan and his fellow TECs and offering additional explanations, insights and suggestions.

In both of these examples, the on-campus coursework activities rather than the field work by itself stimulated TEC development.

Stage three – Pre-student teaching: teaching small groups of students and presenting lesson segments to the whole class under the supervision of a certified teacher

Our third year TECs gain formal admittance into the teacher education program. For education courses dealing with instructional structures and strategies, they must spend forty hours in classrooms with teachers certified in the same areas that they themselves have targeted. They are eager to observe, to try out some of the lesson plans that they have prepared as course assignments and to use methods that they have been learning about.

“Toxicity in the Teacher’s Lounge”

Cory is paired with a high school English teacher in a district close to the university campus. Prior to his first visit, field experience “dos and don’ts” were reviewed in class. The guidelines included being careful about offering opinions on school policies and procedures, never publicly criticizing the mentor teacher, the student body, the administration, or the school; and remembering that TECs are guests in the schools and to act accordingly.

During a subsequent discussion of the similarities and differences noted between field experiences and the ideas presented in the on-campus course, Cory shared his shock and dismay at the way in which teachers made so many disparaging remarks about students in the teacher’s lounge, calling them “lazy”, “unmotivated” and “stupid”. He noted that based upon the guidelines distributed and discussed at the beginning of the semester, he did not engage in any of these conversations and made it a point to avoid the teacher’s lounge except when having to use the photocopy machine. Cory added that his mentor teacher, herself a newcomer to the school, dreaded these toxic conversations and stayed away from the teacher’s lounge as much as possible herself.

Cory’s pre-student teaching experience exposed him to an unanticipated school culture, but fortunately he had the benefit of prior on campus response guidelines. Cory’s comments led to accounts by other TECs of inappropriate, unprofessional teacher remarks at their field sites. A rich conversation ensued regarding standards for professional conduct, possible repercussions for lack of professionalism, teacher “burn-out” and what TECs should look for when making decisions regarding where to apply for teaching positions.

Once again, on-campus in class discussion following the field experience rather than the field experience itself fostered TEC development.
Stage four – Student teaching: taking on the teaching rosters of school-based personnel under the direction of university faculty and supervised by cooperating teachers

At last, our TECs reach their final semester of college studies. They will be spending most of the semester off campus in two different school settings, six weeks at one P-12 setting and six weeks at another. Filled with mixed emotions, they prepare to take on the teaching schedules of their cooperating teachers.

“How Do I Decide Upon Content Delivery?”

Megan is paired with an English/Language Arts middle school teacher. Megan’s mentor teacher adopts a rigid stance regarding what should take place in her classroom, even when the student teacher assumes the helm. She insists that Megan continue her practice of students taking turns reading aloud in class page by page, chapter by chapter, stating that this is the only way to get her students to read an entire novel.

Megan is worried and uncertain about what to do next. Should she follow her mentor teacher’s directions? After all, her mentor teacher would be evaluating her performance and possibly serve as a reference for eventual employment. Should she disregard what she has been taught in her university program about reading as personal, cognitive, psycholinguistic interaction with text? Should she risk disapproval ratings from her university supervisor?

Megan talked through the problem with fellow student teachers and with her university supervisor at an on-campus “practicum” seminar. All agreed that Megan should discuss content delivery with her field mentor and let the mentor know that one of her goals as a student teacher was to test out research-based methods learned in her university courses and that her university supervisor was expecting her to do so.

Megan proceeded to offer her field mentor convincing arguments for an alternative instructional approach. Her field mentor agreed and, instead of the “read-aloud-in-class technique”, Megan had her students prepare written responses to teacher-made question sets with most of the reading assigned as homework. In class, Megan was able to shift the focus of instruction from the mechanics of oral reading to making meaning of the printed word. Her students eagerly shared literal, interpretive and evaluative responses that they had composed at home. They re-read excerpts from the story silently and discussed significance in terms of setting, character development, plot and theme.

On campus, working with her peers and her university supervisor, Megan was empowered to set and solve a field experience problem.

Conclusions

Based upon this small but representative sample, it appears that field experiences may be insufficient for candidate growth and development, that field experiences may, at times, even be counterproductive, that teaching is not learned simply by putting TECs in P-12 classrooms or by expecting TECs to follow mentor teacher practices without question. The worth of TEC field experience lies in prior, concomitant and subsequent on-campus course time dedicated to conversation, reflection and mediation in the Vygotskian sense (Vygotsky, 1986 translation), where TECs share stories from P-12 settings, analyze them with fellow TECs and with guidance from university faculty and decide upon as well as test out next steps.

<table>
<thead>
<tr>
<th>Step one</th>
<th>Engage in field experience.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step two</td>
<td>De-brief with field mentor.</td>
</tr>
<tr>
<td>Step three</td>
<td>Share field experience and field mentor de-briefing in on-campus course.</td>
</tr>
<tr>
<td>Step four</td>
<td>Make sense of the field experience with fellow TECs and university faculty through conversation, reflection and mediation.</td>
</tr>
<tr>
<td>Step five</td>
<td>Decide upon next steps and test them out through re-engagement in field experience.</td>
</tr>
</tbody>
</table>

Figure 2. Five steps in the field experience process: What if?
Through a recursive process of collaborative and critical inquiry, TECs can develop their understanding of classroom complexities as well as characteristics of diverse learners, realize instructional implications, acquire skills to address teaching and learning challenges – both anticipated and unexpected, engage in reflection, learn to plan relentlessly and demonstrate perspicacity in justifying next steps.

Moreover, it is this same cycle of inquiry that we hope will become part of our TECs’ modus operandi after graduation when they join the education workforce and that, in this manner, they will help to sustain robust professional learning communities at their schools.

Recommendations

Much can be done by TECs, school-based mentors and university faculty to maximize the value of field experiences. The suggestions that follow are based upon consideration of our own work.

What TECs can do to maximize the value of field experiences
- Understand their personal prior P-12 schooling experiences as one lens and develop a new, more expansive and sharper “teacher” lens.
- Strengthen their knowledge of teaching and learning theories.
- Design and conduct authentic action research projects, testing teaching and learning theories in practice settings.
- Develop a repertoire of teaching strategies.
- Persist in personal teaching efficacy.
- Reflect on field experiences in journals.
- Participate in “critical friend” networks.

What school-based mentors can do to maximize the value of field experiences
- Learn about and support the teacher preparation program vision, mission, goals, requirements, assignments and assessments.
- Encourage TECs to connect university coursework themes including teaching and learning theories with the P-12 classroom.
- Look for a win-win approach: the possibility for TECs to support instructional goals especially in their work with at-risk students.
- Share, observe, critique and coach.
- Model espoused teaching practices and professional dispositions.

What university faculty can do to maximize the value of field experiences
- Learn about and support the P-12 school’s vision, mission, goals, strengths and challenges.
- Communicate with P-12 field mentors and engage in true partnerships.
- Bring P-12 presenters on campus – staff, students, parents and community activists.
- Encourage TECs to connect P-12 classrooms with university coursework themes and with their own prior schooling experiences.
- Use “in baskets”, case studies, problem-based scenarios, videos, and simulations to move along the “theory in practice/practice in theory” continuum.
- Share, observe, critique and coach.
- Model espoused teaching practices and professional dispositions.

With knowledge of content, of pedagogy and from practice, it is ultimately the responsibility of TECs to prepare their own teacher “toolkits”. However, by implementing these “can dos”, we will increase the likelihood that teacher education candidates transform otherwise fragmented, disconnected learning experiences into more coherent, integrated and steadfast understandings and graduate from our programs prepared for rewarding, lifelong teacher journeys!
References


Urban schools in the United States have been facing considerable challenges recruiting and retaining qualified teachers for their students. There is evidence that teacher education graduates prefer to take their first teaching jobs very close to their hometown, or where they attended college, in areas which have similar characteristics to the culture and community in which they grew up (Boyd, Lankford, Loeb, & Myckoff, 2005; Leland & Harste, 2005). Also, many teacher preparation universities and colleges are located in suburbs and small towns in the United States, and the majority of teacher education students are white, from suburban and/or small town backgrounds, and of middle-class families. As a result, urban schools are often greatly disadvantaged in recruiting qualified teachers who are willing to teach in the urban classrooms.

Even when the urban school districts can manage to hire enough teachers, teacher shortages remain as a problem due to the high rate of attrition and teacher turnover. Research has found that about 30% of the teachers hired in urban school districts leave their teaching positions in the first three years. By the end of the first five years, close to half of the teachers hired in urban schools leave, either to other schools or to other professions (Ingersoll, 2001b; Liu, Kardos, Kauffman, Preske, & Johnson, 2000). The high teacher turnover rate greatly affects the adequacy of education in urban schools.

In order to attract and retain qualified teacher in hard-to-staff schools, states and school districts have responded with a variety of strategies, including signing bonuses and alternative pathways to teacher certificate. In spite of the good intentions, such efforts to alleviate teacher shortages in urban schools have not been effective.

One problem that remains under researched is an understanding of the factors that contribute to people’s decisions to teach, or not to teach, in urban schools. Most teachers cite such factors as their interest in working with children, love of teaching, and a desire to make a difference as their motivations for choosing a teaching career (Richardson & Watt, 2006; Watt & Richardson, 2007). However, little is known whether these same factors motivate individuals to take teaching positions in urban schools.

Meanwhile, research on teacher shortages has found that teachers leave their positions in urban schools due to such factors as low salary, poor working conditions, low student motivation for learning, discipline issues, and little involvement in decision making (Ingersoll, 2001a). Interestingly, between the choice of a teaching career and the decision to leave urban schools, little explanation is available about why teachers decide to teach or not to teach in urban settings apart from geographic proximity and social identity (Boyd et al., 2005; Strunk & Robinson, 2006).

The purpose of the current study is to explore what motivate pre-service teachers’ choice of a teaching career, and how the motivational factors are related to their intention to teach or not to teach in urban settings. First, recent studies on teacher motivation are reviewed. Next, the current study is described and results of the study are discussed. Finally, the implications and recommendations for future practice are presented.

**Literature review**
Research of motivation for becoming a teacher has been focusing on intrinsic, extrinsic, and altruistic factors that influence the decision. In general, doing the work they love, contributing to the society and helping other, and having positive experience at school are reported as important to the decision of entering teaching in most studies (Brookhart & Freeman, 1992; Farka, Johnson, & Foleno, 2000; Reif & Warring, 2002; Richardson & Watt, 2006). In addition to these common findings, research has demonstrated several other themes. Researchers found that subject is the prime driving force in secondary teacher candidates’ desire and motivation to teach- the intrinsic value of the subject itself and the opportunity to continue working within the subject area (Andrew & Hatch, 2002; Barnes, 2005; Jarvis & Woodrow, 2005; Wang, 2005, Younger, Brindley, Pedder, & Hagger, 2004). On the other hand, wanting to work with children is particularly important to the decision for candidates of elementary education (McCray, Sindelar, Kilgore, & Neal, 2002; Reif & Warring; 2002; Richardson & Watt, 2006). In addition, King (1993), Harms and Knobloch (2005), Milanowski (2003), Richardson and Watt (2006) found that perceived teaching ability was one of the important factors that affect individuals’ decision to teach.

Several studies involving minority teacher candidates indicated that influence of family and/or community members was a determining factor to candidates’ choice to become a teacher (King, 1993; McCray et al., 2002; Miller & Endo, 2005; Su, 1996; Williams, Graham, McCary-Henderson, & Floyd, 2009). Unique to the findings of these studies also include a belief that minority children need role model to succeed in school, and sense of social justice (McCray et al., 2002; Su, 1996).

Research findings regarding extrinsic motivation factors presented very inconclusive results. Some studies found factors such as having time with family and job stability are very important to teachers and teacher candidates’ choice of a teaching career (Farkas et al; Milanowski, 2003; Reif & Warring, 2002). Others found salary and low social status were not considered important factors in participants’ decision to become teachers (Richardson & Watt, 2006). Several researchers’ suggested that financial concerns usually appeared as barriers to overcome rather than a factor that motivates people to teach (Beng Huat, 2004; King, 1993; Manual & Huges, 2006; Su, 1996; Williams et al., 2009). Lortie (1975) suspected that teacher were reluctant to admit explicitly the role of material rewards in their decision to enter teaching due to the emphasis on teaching as a service and a profession of dedication. Therefore, “Such normative pressures make it probable that material benefits influence teachers’ decision more than their answer indicate” (p.30).

The relationship between pre-service teachers’ initial motivation for teaching and their later career decisions has been hardly studied. The only study to date was conducted by two Australian scholars, who examined how motivation factors that influenced pre-service teachers’ choice of a teaching career was related to their planned persistence in teaching (Watt & Richardson, 2008). The researchers found that majority of teacher candidates who chose to teach due to such factors as a passion for teaching, satisfaction with the choice of a teaching career, a desire to work with children and adolescents and to make a difference in their lives intended to teach for their whole career. Interestingly, people who had chosen teaching because it offered a satisfying career and supported their family life also planned to spend their whole career in teaching. However, whether such relationship exists among teacher candidates in different cultural and educational settings is yet waiting to be discovered.

In contrast to the growing research activities on motivations for the choice of a teaching career, there is a very limited literature about factors influencing the decision to teach in urban settings. Moreover, the limited number of studies available in this area generated different findings. Farkas and colleagues’ finding (2000) suggests that working conditions, such as administrative support, parental support, and student behavior, were considered
significantly more important to new teachers’ choice of where to teach than salary. The researchers suggest that money can be effective in attracting teachers only if other critical working conditions are in place. Consistent with Farkas et al., Johnson and Birkeland (2003) studied factors influencing whether new teachers stayed, moved, or left teaching and found teachers’ career decision was influenced by a sense of success, which was significantly related to the working environment. Tamir (2009) found that graduates of elite colleges who chose to teach in urban school were inspired by a sense of mission to change society and make a difference in the lives of poor inner-city children. However, due to the small sample size (10 participants) and the special characteristics of the participants, it is hard to generalize.

Two other related studies contributed critically to what influences people’s choices to teach in certain geographical settings. Boyd and colleagues (Boyd et al., 2005) found that distance and hometown region had powerful effects on individuals’ choice of where to teach. Beginning teachers had a strong preference to locate their first job close to their hometown, or regions similar to that of their hometowns. Consequently, 61% of teachers entering public schools in New York from 1999 to 2002 first taught in schools located within 15 miles of their hometown, and 85% entered teaching within 40 miles of their hometown. Strunk and Robinson (2006) explained individuals’ choice of a teaching location with the concept of social identity. They suggest that teachers may prefer to teach in schools where the student and/teaching staff reflects their own identity in order to seek racial similarity and comfort. Such argument supported Boyd et al.’s finding about draw from hometown.

The findings about influence of social justice and working conditions seem to be consistent with some of the initial motivation factors. Future study is need to find out if there is evidence for such relationship, and whether other motivation for entering teaching are related to the decision to teach or not to teach in urban schools. In this study, we examine the existence of such relationship. As the participants are pre-service teachers, we will look at relationship between their motivation for choosing a teaching career and intention to teach in urban settings.

Methodology

The purpose of this study was to identify pre-service students’ motivations for choosing a teaching career and to examine how this motivation is related to their intention to teach in urban settings. The study focuses on the following research questions.

1. What are the factors that influence pre-service teachers’ motivations for choosing a teaching career?
2. To what extent are pre-service teachers’ motivations for choosing a teaching career related to their intention to teach or not to teach in urban settings?

The target population for the current study included a group of 490 pre-service teachers from 14 state universities and five private universities in a northeastern state of the United States. At the time of the study, all participants had been accepted into an elementary or secondary teacher education program at one of the 19 universities and were attending a two-week urban field experience in a large inner-city school district.

A paper copy of a researcher designed survey was administered to the entire target population on the first day of the field experience. The survey consisted of two parts. Part A measured pre-service teachers’ motivation for choosing a teaching career, using the FIT (Factors Influencing Teaching) Choice Scale, an instrument developed by Watt and Richardson (2007). It consisted of 60 questions, 18 factors (see Table 1).
Table 1. FIT-Choice scale and subscales.

<table>
<thead>
<tr>
<th>Higher-order factor (where applicable)</th>
<th>First-order factor</th>
<th>N of Items</th>
<th>Sample item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A: Influential factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>Ability</td>
<td>3</td>
<td>Teaching is a career suited to my abilities.</td>
</tr>
<tr>
<td>N/A</td>
<td>Intrinsic career value</td>
<td>3</td>
<td>I am interested in teaching.</td>
</tr>
<tr>
<td>N/A</td>
<td>Fallback career</td>
<td>3</td>
<td>I chose teaching as a last-resort career.</td>
</tr>
<tr>
<td>Personal utility value</td>
<td>Job security</td>
<td>3</td>
<td>Teaching will be a secure job.</td>
</tr>
<tr>
<td></td>
<td>Time for family</td>
<td>5</td>
<td>Teaching hours will fit with the responsibilities of having a family.</td>
</tr>
<tr>
<td>Social utility value</td>
<td>Job transferability</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shape future of children/adolescents</td>
<td>3</td>
<td>Teaching will allow me to have an impact on children/adolescents.</td>
</tr>
<tr>
<td></td>
<td>Enhance social equity</td>
<td>3</td>
<td>Teaching will allow me to work against social disadvantage.</td>
</tr>
<tr>
<td></td>
<td>Make social contribution</td>
<td>3</td>
<td>Teachers makes a worthwhile social contribution.</td>
</tr>
<tr>
<td></td>
<td>Work with children</td>
<td>3</td>
<td>I want a job that involves working with children/adolescents.</td>
</tr>
<tr>
<td>N/A</td>
<td>Prior teaching and learning experiences</td>
<td>3</td>
<td>I have had inspiring teachers.</td>
</tr>
<tr>
<td>Part B: Beliefs about teaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social influences</td>
<td>3</td>
<td>My family think I should become a teacher.</td>
</tr>
<tr>
<td></td>
<td>Task demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expertise</td>
<td>3</td>
<td>Do you think teaching requires high levels of expert knowledge?</td>
</tr>
<tr>
<td></td>
<td>Difficulty</td>
<td>3</td>
<td>Do you think teaching is hard work?</td>
</tr>
<tr>
<td></td>
<td>Social status</td>
<td>6</td>
<td>Do you believe teaching is a well-respected career?</td>
</tr>
<tr>
<td></td>
<td>Salary</td>
<td>2</td>
<td>Do you think teachers earn a good salary?</td>
</tr>
<tr>
<td>Part C: Your decision to become a teacher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>Social dissuasion</td>
<td>3</td>
<td>Did others influence you to consider careers other than teaching?</td>
</tr>
<tr>
<td>N/A</td>
<td>Satisfaction with choice</td>
<td>3</td>
<td>How satisfied are you with your choice of becoming a teacher?</td>
</tr>
</tbody>
</table>


The instrument was developed on the basis of the expectancy-value theory, which proposed that individuals’ achievement, performance, persistence, and choice were directly related to expectancy-related and task-value beliefs (Atkinson, 1957; Eccles et al., 1983). Participants are asked to rate how each item influences their choice of a teaching career on a Likert scale of 1-7 (1 = “not at all important”, and 7 = “extremely important”). Part B of the survey asked questions about pre-service teachers’ intention to teach in urban settings and open-ended questions about demographic information. Two hundred and fifty-eight students responded to the survey, resulting in a response rate of 52.7%.

Using SPSS 19, several statistical analyses were conducted. First, quantitative data collected were re-coded into 18 factors according to the scale and subscales in Watt and Richardson’s FIT-Choice model (2007). Next, descriptive statistics were used to describe the factors influencing participants’ choice of a teaching career. Finally, Pearson correlations were used to calculate the relationship between the motivational factors and participants’ intention to teach in urban settings.
Results

The first research question asked what factors influenced pre-service teachers’ choice of a teaching career. Descriptive statistics were used to answer this question. The means for the 18 factors are shown in Table 2, ranked according to their influence on the participants’ choice of a teaching career. Consistent with the literature, all four altruistic factors, which were called social utility value factors in the FIT-Choice scale, were rated by the participants as highly important to their choice of a teaching career. Among them, shape the future of children/adolescents was rated as the most important factor; work with children and make social contribution ranked number 3 and 5, while enhance social equity ranked number 10. Other top ten important factors included: satisfaction with choice, ability to teach, prior teaching and learning experiences, intrinsic career value, and task demand of teaching (difficult and expertise). All extrinsic factors, which were called personal utility value factors in the FIT-Choice scale, including job security, job transferability, and time for family were rated below the median (5.58). In other words, they were considered less important to the participants’ choice of a teaching career. Also rated as less important were social influence, social dissuasion, and task return of teaching (social status and salary).

Table 2. Motivation for choosing a teaching career.

<table>
<thead>
<tr>
<th>Factors influencing the choice of a teaching career</th>
<th>Mean</th>
<th>N</th>
<th>Std.</th>
<th>Pearson Correlation Intention to teach in urban settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape the future of children/adolescents</td>
<td>6.29</td>
<td>257</td>
<td>0.76</td>
<td>.15*</td>
</tr>
<tr>
<td>Satisfaction with choice</td>
<td>6.28</td>
<td>258</td>
<td>0.94</td>
<td>.19**</td>
</tr>
<tr>
<td>Work with children</td>
<td>6.25</td>
<td>255</td>
<td>0.98</td>
<td>.18**</td>
</tr>
<tr>
<td>Difficulty</td>
<td>6.22</td>
<td>258</td>
<td>0.74</td>
<td>.17**</td>
</tr>
<tr>
<td>Make social contribution</td>
<td>6.13</td>
<td>257</td>
<td>0.91</td>
<td>.18**</td>
</tr>
<tr>
<td>Ability to teach</td>
<td>6.06</td>
<td>256</td>
<td>0.79</td>
<td>.17**</td>
</tr>
<tr>
<td>Prior teaching and learning experiences</td>
<td>5.90</td>
<td>257</td>
<td>1.15</td>
<td>.01</td>
</tr>
<tr>
<td>Intrinsic career value</td>
<td>5.68</td>
<td>257</td>
<td>0.95</td>
<td>.05</td>
</tr>
<tr>
<td>Expertise</td>
<td>5.59</td>
<td>257</td>
<td>0.94</td>
<td>.10</td>
</tr>
<tr>
<td>Enhance social equity</td>
<td>5.58</td>
<td>256</td>
<td>1.15</td>
<td>.33**</td>
</tr>
<tr>
<td>Job security</td>
<td>5.08</td>
<td>254</td>
<td>1.33</td>
<td>-.06</td>
</tr>
<tr>
<td>Social status</td>
<td>4.73</td>
<td>255</td>
<td>1.06</td>
<td>.05</td>
</tr>
<tr>
<td>Social dissuasion</td>
<td>4.55</td>
<td>258</td>
<td>0.94</td>
<td>-.09</td>
</tr>
<tr>
<td>Social influence</td>
<td>4.39</td>
<td>256</td>
<td>1.90</td>
<td>.03</td>
</tr>
<tr>
<td>Job transferability</td>
<td>4.10</td>
<td>257</td>
<td>1.40</td>
<td>.06</td>
</tr>
<tr>
<td>Time for family</td>
<td>3.79</td>
<td>258</td>
<td>1.30</td>
<td>.01</td>
</tr>
<tr>
<td>Salary</td>
<td>3.61</td>
<td>258</td>
<td>1.30</td>
<td>-.03</td>
</tr>
<tr>
<td>Fallback career</td>
<td>1.74</td>
<td>254</td>
<td>0.95</td>
<td>-.01</td>
</tr>
</tbody>
</table>

*p < .05    **p < .01

The second research question asked about the relationship between pre-service teachers’ motivations for choosing a teaching career and their intention to teach in urban settings. In order to answer the question, bivariate correlation analyses were conducted. Results indicated that social utility value factors were positively correlated with the intention to teach in urban settings. Pre-service teachers who chose to become teachers because their ambition to shape
the future of children/adolescents (r=.15, p< .05), work with children (r=.18, p<.001), make social contribution (r=.18, p<.001), and enhance social equity (r = .33, p < .001) were more likely to consider teaching positions in urban schools. Although the correlations were somewhat weak, they were highly statistically significant.

Other factors positively correlated with the intention to teach in urban settings were satisfaction with choice (r =.19, p <.001), belief of teaching as a difficult profession (r =.17, p <.001), and ability to teach (r =.17, p <.001). Pre-service teachers who are more satisfied with their choice of the teaching career, who believe teaching is difficult and demanding, and who are more confident about their ability to teach, are more likely to choose teaching in urban schools.

Interestingly, among the motivation factors rated above the median, intrinsic career value was found to have almost no influence on their choice of teaching in urban schools. Also interesting was the finding that prior teaching and learning experience was negatively correlated with the intention, though the relationship was too weak to be significant. Of the factors rated below the median, no significant correlation was found between any of them and the intention to teach in urban settings.

Discussions and conclusion

Several conclusions can be drawn from the findings of the current study. First, the choice of a teaching career is very possibly the result of a combination of motivational factors rather than a single intrinsic, altruistic, or extrinsic factors alone. Second, pre-service teachers who are attracted to teaching by strong altruistic motivation, including a sense of social justice, are more likely to choose an urban setting as the location of teaching. Third, pre-service teachers, who are confident about their ability to teach, are more likely to take a teaching position in urban settings. Finally, pre-service teachers who have developed a realistic view of teaching are more likely to teach in urban settings.

This study was done, in part, to address the ongoing problem of the shortage of highly qualified teachers in many urban schools. This shortage is due both to the reluctance of many pre-service teachers to choose to teach in cities and to the high attrition rate among urban teachers. The latter factor, teacher attrition, can be considered as the lack of persistence on the part of urban teachers, which may, in turn, be related to the way that teachers are prepared. Some research (Anderson, 2008; Alt & Henke, 2007) suggests that education majors are less likely to leave teaching then those whose major was outside of education. This suggests that the quality of teacher preparation programs can play a crucial role in nurturing the qualities that leads people to choose teaching as a career.

Attempts to overcome the reluctance to choose urban teaching must address the reasons why that decision is made. The results from this study suggest that the desire to “make a difference” and similar ideals are behind that choice and it may be that teacher preparation programs need to develop strategies for channeling those altruistic motives into experiences that lead to successful experiences in urban settings. By capitalizing on the very motives that lead students to seek a teaching career in the first place, teacher education may demonstrate that urban schools offer the opportunity to satisfy the desire to make a difference.

References


