Simplex approaches to develop reading competence in primary school

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Abstract

Survey results from IEA PIRLS (2011),OECD PISA (2012) and by further research conducted by the University of Salerno, have shown that the reading performance of Southern Italian students is below the national average. This worrying scenario led to a research initiative aimed at creating inclusive didactic methods and tools to aid in the development of reading competence on the basis of simplex didactics. This theoretical framework sustains our assumption that reading is an ability that does not form part of the natural development of the individual but needs to be learnt; hence is considered as an adaptive strategy (Berthoz, 2012). Therefore, simplex didactics, understood as a method based on the principles that guide the organisms' adaptation to the surrounding environment, was a natural choice. The research project is divided into four main phases: a preliminary phase, a design phase, field research, followed by the analysis and evaluation of results. It is important to highlight that the scope of this article is to present the initial phase of the research and is intended to:

1. provide an analysis of the context to assess the effective need to introduce a teaching method able to face the critical situation described;
2. explore possible mapping between reading competence and simplex didactics to provide teachers with initial didactic guidelines;
3. introduce the research perspectives upon which the project will be developed.

Keywords

Reading competence; Didactics; Inclusion; Simplexity; Teacher education.

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Introduction

Reading and literacy are polyvalent terms because they are commonly used in relation to different phenomena and media. In this work we will refer mainly to the "reading competence"[5] as the capacity to interact with and manage written text. Specifically, this article focuses on the *instrumental dimensions* of that competence, that is the ability to quickly and correctly recognize and name the words that compose a text (Di Nuovo, 2006).

At school, reading literacy is both a goal to be reached and a means to learn, particularly in primary school. Indeed reading is an instrument that allows everyone to access all disciplinary fields:

- there is no discipline in which one can do without reading;
- reading well provides access to all types of knowledge;
- it is fundamental for educational achievement;
- and a *conditio sine qua non* to actively participate in society and to fully exercise the rights of citizenship (INVALSI, 2012).

Increasing reading competence is one of the main targets of European education systems. In Italy, our education system attributes a key role to this competence. In fact, this position is highlighted in the National Curriculum Guidelines for Nursery and Primary School Years (2012). This document claims that the specific responsibility of the primary school is to promote basic reading through the acquisition of languages and codes that constitute the structure of our culture, in a horizon that involves other cultures and introduces the wise use of new media. It is a social and cultural literacy that has always been summed up as *literacy and numeracy*, the former referring to reading and writing skills, whereas the latter to the ability of making calculations. These skills serve as fundamental tools in all areas of life in order to access the language and knowledge of the various disciplines (MIUR, 2012). More specifically, in relation to *instrumental reading competence,* the National Curriculum Guidelines indicate that by the end of the third year of primary school the students have to be able to master *instrumental reading* both when reading silently as well as out loud; taking care of expression in the second case.

Without dwelling further on the importance the Italian educational system confers to this competence, it is important to emphasize that reading does not form part of the individual's natural development (Stella, 2008). In other words, unlike natural abilities such as walking or language development, reading needs to be learnt and requires ad hoc teaching methodologies. Its acquisition is *imposed* by the cultural environment of the individual and, in this sense, constitutes a requirement which the individual is called to fulfill; hence

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[5] *Reading competence* is commonly used in Italy to refer to the *reading skills*.

adapting to its environment. Therefore it seems to be clear at this point that teaching methodologies cannot fail to consider the principles that guide adaptation. This led to the identification of simplex didactics as the appropriate theoretical framework to guide the development of a methodology oriented to satisfy such need.

In this view, assuming that learning itself is a form of adaptation (Adenzato, 2001; Maturana, 1987; Rossi, 2011; Sibilio, 2014), the research project, currently under development, is oriented at identifying the way in which simplex principles (Berthoz, 2012) can be applied in didactics to facilitate the development of the instrumental reading competence.

Context analysis: international surveys

Due to the importance that the reading competence plays within European educational systems, we can immediately notice that it has been the object of particular attention from national and international surveys to evaluate the quality of education systems. Over the past five years, the surveys OECD PISA (Organisation for Economic Cooperation and Development – Programme for International Student Assessment) and IEA PIRLS (International Association for the Evaluation of Educational Achievement- Progress in International Reading Literacy Study) can be considered as two of the most relevant studies in this field.

Below, we will analyze the results provided by these two international organizations that constitute the starting point of the first phase of the research project. Before looking closely at the results, we must necessarily point out that both these studies start from different definitions of reading competence:

- the OECD PISA survey defines reading competence as the ability to understand, use and reflect on written texts in order to achieve their goals, to develop their knowledge and potential, and to play an active role in society (MIUR, 2007).
- the IEA PIRLS survey defines reading competence as the ability to understand and use written language forms required by society. A young competent reader is able to reconstruct the meaning of many different types of texts, who reads to learn and to be a part of a reading community, at school, in everyday life and also for *personal pleasure* (INVALSI, 2012).
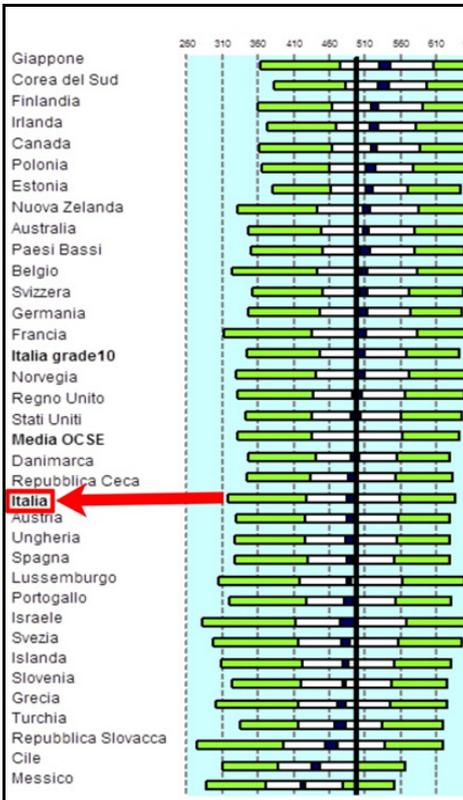
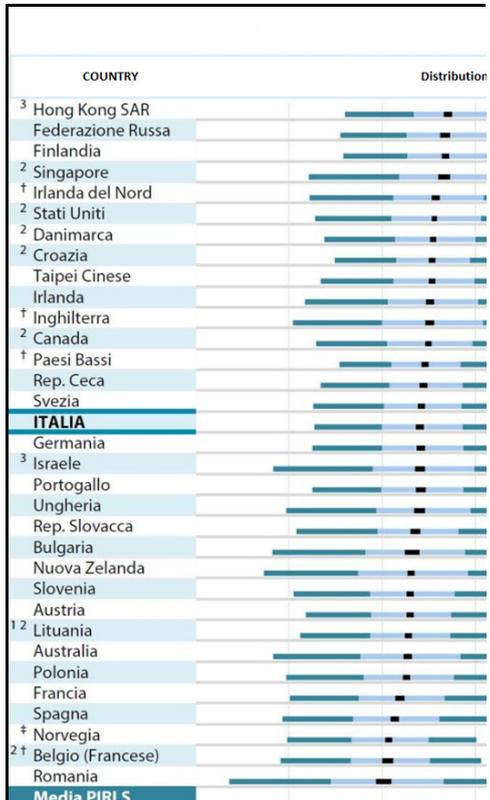Figure 1: OECD PISA 2012 Distribution (OECD, 2012)

Figure 2: IEA PIRLS 2011 Distribution (IEA, 2011)

Starting with these two definitions, we can recognize that the first survey, OECD PISA, is more focused on the functional dimension of reading competence (mainly in relation to the development of each student). On the other hand, the second survey, IEA PIRLS, is more focused on the importance of reading in school and the social environment. However, both surveys are focused on complex aspects of reading (such as: text comprehension, *reading for personal pleasure*, inferential skills etc). It is important to highlight that the difference between these points of view is a result of the different purposes of the two surveys.

Besides this difference, the OECD PISA survey evaluates the development of reading competence among 15-year-old students, while the IEA PIRLS survey assesses 9-year-old students. This means that PISA evaluates this competence when the students reach the end of compulsory school age in OECD countries, whereas the IEA PIRLS survey evaluates in an age when

every student in the IEA countries has attended primary school for four years. Moreover, to date, the participating countries in the OECD PISA survey add up to 70 countries (INVALSI, 2013), while the IEA PIRLS tests are administered in around 50 countries.

Another peculiarity worth noting when analyzing and comparing the data from these two surveys is that the IEA PIRLS average is obtained from the structure of the tests and is fixed before measurements commence, while the OECD PISA average is taken directly from data collected in the particular survey. In other words, while the IEA PIRLS average is established independently from the results prior to data collection, the OECD PISA average is an effective average based on the students' sample of a particular study and varies from one study to the other. Figure 1 presents OECD PISA 2012 performance distributions for reading competence, while Figure 2 illustrates the IEA PIRLS 2011 performance distributions for reading competence.

IEA PIRLS 2011 and OECD PISA 2012 results

The results of the study on reading competence in the OECD PISA survey show that in European countries the average of 15-year-old students who have very low reading competence reaches 20%. Italy fits perfectly into this average with 19.5% of 15-year-old students who have very low reading competence. Besides, the average reading performance of Italian students is also, on average, below the OECD international standard. IEA PIRLS reports indeed describe a better scenario, with the results of the reading performance of students who have a higher average of the PIRLS standard (+41 points over the average of PIRLS scale). Focusing our attention on our country, as shown in Figures 1 and 2, the two surveys show heterogeneous results in relation to the average of reading competence of the Italian students.

However, while bearing in mind all the differences outlined earlier between the two surveys, it can be concluded that for the OECD PISA 2012 study, the average reading performance of 15-year-old Italian students is significantly below the average for OECD countries. Meanwhile in IEA PIRLS 2011 study, the average reading performance of 9-year-old Italian students, is significantly above the average of the other countries involved in this survey.

Nevertheless, both surveys evidence a common trend: the reading performance in Southern Italy when compared to other geographical areas. In both cases the reading performance is below the Italian national average. In fact, data in the IEA PIRLS 2011 report, shows that with regards to the Italian results, when divided by geographical area, there is a better performance in the

Northern areas than in the South. Although all areas of the country performed significantly above the international PIRLS average, Italy is divided into two with the North and Central areas scoring above Italian average whereas the South and the Islands shows better results than the national average while Southern regions and Islands are significantly lower than the national average. Table 1 show data split by regions.

Primary school 4th year (9-year olds)	Average	Standard Deviation
Average TIMSS/PIRLS Countries	500	
Italy	541	2,2
North West	555	3
North East	547	4,1
Center	542	4,5
South	534	4,7
Islands	522	7,2

Table 1(IEA PIRLS): average performance by geographical area. The average performance of the South of Italy is 7 points less (534) than the national average (541) and 17 points below the average obtained by students in the North West of Italy (555).

In accordance to the results obtained in the IEA PIRLS 2011 survey, the data reported by OECD PISA (2012) showed how the average performance in the South of Italy is below the national average. The survey presents a variation of 18 percentage points between North and South in relation to the students who do not even reach the minimum competency levels. The percentage variations of the students who did not reach the minimum reading levels in the OECD PISA survey are presented in Figure 3.

In summary, this situation described by the two surveys appears discordant in relation to the age groups analyzed at national level, but is consistent in describing the emergency scenario in referring to Southern Italy.

It is also appropriate to mention as both analyses will be partially influenced by the phenomenon of cheating (Montanaro & Sestito, 2006). In fact, teachers help students in general, trying to improve their performance. That alters the test result, generally raising the average values. Although the two surveys normalized the results in relation to cheating, nowadays in literature there is a debate about the truthfulness of these data (Montanaro & Sestito, 2006).
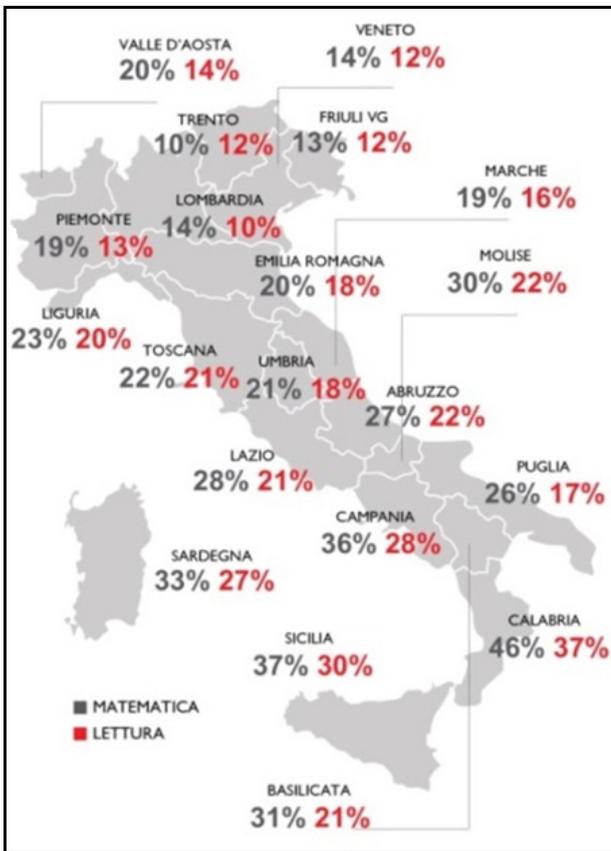
Figure 3 (PISA, 2012): Percentage of students who do not reach the minimum level of reading competence by region.

Monitoring activities

Based on these considerations, the University of Salerno at the beginning of the school year 2015-2016, initiated a monitoring action to develop reading competence in primary school, in Campania (South Italy). This monitoring action has been mainly launched to have a direct feedback, in relation to Campania, to evaluate directly what has emerged by the PISA and PIRLS. This monitoring involved 10 primary schools spread across the territory of the five provinces in Campania (for a total of 197 students attending the third year of primary school).

Tools

To evaluate the level of reading competence the MT reading tests were used, which are one of the most common standardized tools in Italy used for this purpose. These tests consist of a set of calibrated texts, varying in length and difficulty as the age and the time of year progresses. More specifically, each year is divided into school periods (for each school grade there is an entry test, a mid-term test, and a final test). Each of these tests is divided into two: comprehension tests, and correctness and speed tests. The first test is administered to evaluate the student's level of understanding through a series of questions based on the content of the text. The second is to evaluate the *reading fluency* based on the speed parameters (number of syllables/second to read text) and correctness (number and type of errors committed in the reading phase). These tests also provide the reference standard for the evaluation of the performances.

Tests used in this monitoring phase were selected appropriately with respect to the period of the school year 2015-16. Initial tests if the year had just started, midterm tests if in the middle, the final if the school year was ending.

The tests are:

- test targeting understanding: "L'asino nel fiume" [*The donkey in the river*];
- test targeting correctness and speed: "L'idea più semplice" [*The simplest idea*].

The MT tests also provide an effective scoring system for the allocation of points. Tables 2 and 3 show the national standards for the evaluation of the scores obtained in the test "L'asino nel fiume". The score range is also divided into four groups that allow an immediate evaluation of the performance. Each range is matched by a specific criterion for test evaluation.

The four criteria are:

- "fully achieved";
- "passing grade achieved";
- "attention required";
- "immediate attention required".

For a more comprehensive description of the MT reading test, please refer to the manual (Cornoldi & Colpo, 1998). MT reading tests were chosen as an evaluation tool, not only because they are based on standards derived from thirty years of direct observation of the national territory, but also to evaluate if the analysis conducted through the use of a standardized assessment tool different from the PISA and PIRLS tests would effectively lead to similar results to those described in the two surveys taken as a standard reference.

| Test | Text | Criteria | | | |
		"Fully Achieved"	"Passing Grade Achieved"	"Attention Required"	"Immediate Attention Required"
Comprehension	Asino	9-10 points	7-8 points	5-6 points	0-4 points
Rapidity	L'idea	0-3 errors	4-10 errors	11-15 errors	16 errors and more
Accuracy	L'idea	>3.50	3.50-1.83	1.82-1.54	<1.54

Table 2: Percentile average performance (comprehension, speed, accuracy)

Correct answers	Cumulative (%)	Criteria /Action
0	0,6	*"Immediate attention required"*
1	1,4	*"Immediate attention required"*
2	3,2	*"Immediate attention required"*
3	5,8	*"Immediate attention required"*
4	9,6	*"Immediate attention required"*
5	16,4	*"Attention required"*
6	28,6	*"Attention required"*
7	43,2	*"Passing grade achieved"*
8	68,6	*"Passing grade achieved"*
9	91,4	*"Fully achieved"*
10	100	*"Fully achieved"*

Table 3: Percentile average performance (comprehension, speed, accuracy)

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Data analysis and results

Monitoring was conducted directly from the staff of Department of Human Sciences, Philosophy and Education of the University of Salerno, in order to keep the cheating phenomenon under control, as much as possible. It is specified that the data presented below have not taken into account the reading performance of students with Specific Learning Disorders or disabled students. This decision was taken in order to obtain the average profile of the *standard-reader* student who attends the third year of primary school in Campania.

Table 4 shows the descriptive statistics obtained from the analyzed data. Comparing the parameters of understanding, speed and accuracy with the ranges indicated in table 2 of the average student reading performance criteria for all three parameters analysed is within the "Passing grade achieved" as indicated in the MT manual, even if very close to the range below - "Attention required". A more exact evaluation, taking into account percentile scales (last row of table 4), shows that average reading performance for all three parameters is below the 50th percentile (as shown in Graph 1). More specifically the accuracy parameter is particularly compromised.

Average Standard reader in the third year of primary school in Campania		
Parameters	**Comprehension** (N. of correct responses)	**Speed** (syllables/sec)	**Accuracy** (N.and type of errors made)
Average	7,0	2,1	7,8
SD	1,8	0,7	5,0
Criteria	Passing grade achieved	Passing grade achieved	Attention required
Percentile	43°	35° circa	30° circa

Table 4: Percentiles Average MT Performance

The MT survey also showed that 19.79% of the analyzed students possessed a reading competence which was significantly lower than the reference standards. Thirty-nine of the results ranked below the 5th percentile in relation to at least one of the three parameters analyzed. As indicated by the MT testing manual, a medical consultancy to verify the presence of specific learning disorders was suggested.
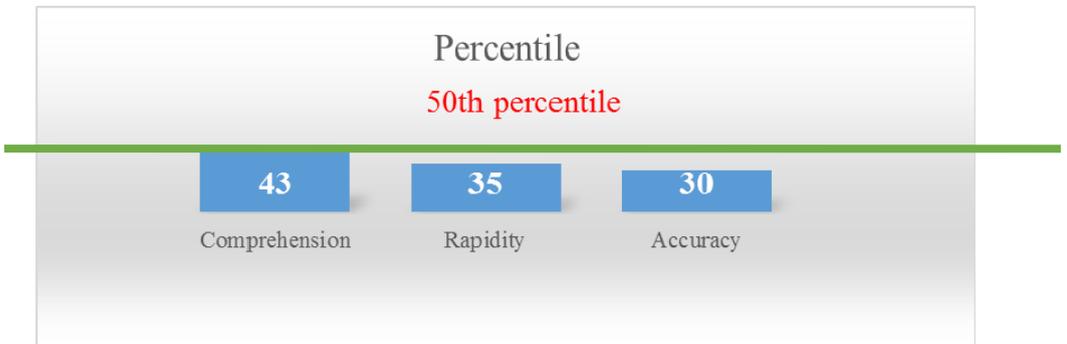
Graph 1: Percentiles Average Performance MT

The monitoring results seem consistent with the results of OECD PISA and IEA PIRLS, even taking into account the clarifications made initially about age difference of students and new type of test. Bearing in mind that the sample analyzed in our survey cannot be considered representative of the entire population of the students of the third class of primary school in Campania, these collected data appear alarming and require an intervention, as the same range of MT test "Attention required" suggests. It should also be highlighted that the data presented are in line with another survey conducted by C.A.N.E.E. (Centro Aziendale di Neuroscienze dell' Età Evolutiva [*Business center of Developmental Neuroscience*]) about typical and atypical development of reading competence in the province of Salerno.

Discussions

Although the factors that contributed in determining the scenario described above are multiple and complex, one of the most significant elements detected directly in the monitoring phase is as follows: teachers need simple and flexible methodologies that can overcome contingent situations that they face in teaching practices (Rivoltella, 2015). In relation to the above, the University of Salerno has started a research project to develop inclusive tools and teaching methodologies to support the development of reading skills in primary schools. The methodologies are currently under design and drafting. This article is part of this larger project and its purpose is to provide:

- research data on the situation in South Italy;
- propose inclusive teaching methodologies to improve the instrumental reading skills.

As previously shown the parameters that need to be improved are accuracy and speed that are required to improve fluent reading and are generally considered the best indexes for the evaluation of an adequate achievement of

the automatism of reading (Stella, 1996; Maschietto & Vio, 1998; Cornoldi, Tressoldi & Perini, 2010; Di Tore, Fulgione & Sibilio, 2014; Trisciuzzi & Zappaterra, 2014).

As illustrated, the PISA and PIRLS surveys focused on the evaluation of more complex components of reading skills. However, lacking the acquisition of instrumental reading can be considered as one of the main elements that led to determine the scenario previously described. As research has shown, reading fluency has many times been associated with difficulties in understanding the text. In reality, decoding and comprehension are two separate processes. This means that a bad decoding does not necessarily imply a lack of understanding, and, vice versa. (De Beni, Cisotto & Carretti, 2001; Di Nuovo, 2006). However, the parameters of speed, accuracy and understanding appear to be strongly related to each other. In other words, generally speed is considered as a good index of the reading competence in general. Further, on average, when students read quickly, they have a good understanding of the text and at the same time commit fewer reading errors (Cornoldi & Colpo, 1998; Stella, 2008; Stella, Faggella & Tressoldi, 2001; Vio & Tressoldi & Presti, 2012).

Although the National Guidelines (2012) goal for mastering instrumental reading refer to the end of the third year of primary school, despite the fact that the monitoring phase was performed at the beginning of the year (September-October, 2015), the average reading performance attested was below the standard of that expected at the beginning of the year. Based on these elements, it must be assumed that the analysed students will have difficulty in reaching the target at the end of the year or that at the end of the year will not have fully developed reading automatism. Consequently, for the students, it will take more time to decipher the text with respect to the semantic access time to the text itself.

In addition, if a student has difficulty with reading, it will limit this activity, and also cannot develop "the pleasure of reading", with all that this causes (less use of written texts, less exercise of decoding skills, lower level of access to information, etc.), creating a vicious circle for the development of transversal key competences for lifelong learning that are particularly necessary for personal fulfilment and development, social inclusion, active citizenship and employment as described in Recommendation 2006/962/EC of the European Parliament and of the Council (2006). Digital competence is reduced because the student has difficulty with reading and writing codes, and reduces the capacity and autonomy in the use of hypertext, perhaps reducing the evaluation of a web page solely by its images and graphic layout, not reading written content. Learning to learn, another key competence, will see written text as an obstacle. The list of consequences is never-ending as reading will remain a fundamental competence for the citizens of tomorrow.

In this sense, this project presented here is to illustrate the design process of a methodology primarily to support the development of instrumental reading competence, in order to obtain, as a result, an improvement also in the other dimensions of the competence of reading evaluated as a deficit by the analysis conducted in the PISA and PIRLS surveys.

Conclusions

Starting from the analysis of the data in Southern Italy it can be concluded that action needs to be taken to counteract this emergency situation. Teachers are called as key role players in this strategic action to help their students achieve the reading competence required. To this aim, reference was made to simplex didactics (Sibilio 2012a, 2012b, 2014a, 2014b, 2015; Aiello, Di Tore, Di Tore & Sibilio, 2013) which can represent possible operational guidelines for teachers to promote the development of such a competence. In the first part of the article we illustrated how simplexity can make the teacher aware of the principles that guide teaching-learning processes and, therefore, how these processes could be effectively implemented in teaching practice and could provide a useful guide to create activities aimed at developing the abilities at the basis of the reading competence (Cornoldi, 2014).

We can imagine an application of a metacognitive approach to teaching that allows the teacher and learners to reflect on the principles and mechanisms that guide the acquisition of reading competence understood as an adaptive-learning strategy.

The metacognitive dimension of teaching is not only to build upon the competence of "Learning to learn" (Recommendation 2006/962/EC of the European Parliament and of the Council), but it is also present in several teaching methods oriented at encouraging the development of reading competence (Bakker, 1992; Celi, Alberti & Laganà, 1996; Tressoldi, Vio, Lorusso, Facoetti & Iozzino, 2003; Cazzaniga, Re, Cornoldi, Poli & Tressoldi, 2005; Allamandri, Brenbati, Donini, Iozzino, Ripamonti, Vio & Tressoldi, 2007).

Based on the outlined theoretical framework, ongoing studies at the University of Salerno are aimed at building an inclusive teaching methodology that encourage the development of instrumental reading in primary school. In further detail, the project envisages the following phases:

1. Preliminary phase:
- Analysis of the context.
- Analysis of the main methods (direct and indirect) (Stella, 2008) to support the acquisition and development of reading competence in primary school.
- Analysis of teachers' knowledge in relation to teaching methods to facilitate the acquisition of reading competence (the use of questionnaires is envisaged).
- Identification of the predominant teaching practices in our geographical area (Campania).

2. Design phase:
- Starting from an analysis on existing teaching methods, ways in which the principles of simplexity can effectively act on the development of reading competence will be identified. As a result, exemplifying activities to apply simplex principles to facilitate the development of this competence will be designed.
- Teacher training of primary school teachers on how to carry out simplex exercises aimed at developing reading competence.

3. Field Research:
- Teachers will be asked to implement the method during the second year of primary school.

4. Data Analysis and Evaluation:
- Impact and outcome evaluation of the method will be based on the administration of MT tests prior to the implementation of the method (at the beginning of the second year) and at the beginning of the third year of primary school.

In conclusion, the need to plan a didactic methodology targeted at sustaining the development of instrumental reading in primary school is not merely a requirement expressed by the territory, but also reflects the need to provide teachers with a theoretical framework able to guide their practice. In fact, as research has demonstrated over the years, making methods and tools available for use does not suffice to change teachers' practices (Rivoltella, 2015). For this change to be achieved, it is necessary to offer teachers a set of tools and methods that are underpinned by specific methodologies and didactic theories (Sibilio, 2014).

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