



Ca' Foscari University of Venice

Graduate School

Ph.D. in Philosophy and Educational Sciences

Curriculum: Educational Sciences

31st cycle

Year of discussion: 2018

**Exploring the opportunities of multimodal literacies for the participation and learning
of young people with dyslexia in multimodal digital environments:
informing learning design**

Scientific disciplinary sector: M-PED/04

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ABSTRACT IN ENGLISH:

The arise of social network sites and Web 2.0 technologies allowed the development of multimodal literacies, promoting learning opportunities distant from traditional pedagogies and their principles. Although the use of these digital spaces is widespread thanks to their social nature, limited research has considered the potential offered by multimodal literacies for the participation and learning of young people who struggle with literacy development. This research addresses the aforementioned issue through two concatenated empirical studies with young people with dyslexia, by re-framing the condition as a ‘learning difference’ in line with the paradigm of neurodiversity. The first study focused on how multimodal affordances mediate participation and identity work for dyslexic teens, suggesting participants’ reliance on visual literacy practices. The second empirical work investigated the relationship between visual materials, visual literacy skills and learning goals’ setting and accomplishment, capturing the learning dynamics occurring in multimodal digital environments. Following, theories and findings were re-elaborated into a set of learning design principles. A final empirical study involved secondary school teachers into designing learning activities based on the identified principles, with the aim to explore their potential impact on established educational practices.

Keywords: Multimodal Literacies; Dyslexia; Neurodiversity; Learning; Educational Technology

ABSTRACT IN ITALIAN:

Le 'literacies' multimodali sviluppate interagendo in ambienti digitali multimodali che offrono 'affordances' multimodali, ad esempio i social network e altre tecnologie del Web 2.0, rappresentano opportunità di apprendimento distanti dai principi fondanti le pedagogie tradizionali. Nonostante l'utilizzo di questi spazi digitali sia ormai una pratica quotidiana grazie alla loro natura sociale, poche ricerche hanno considerato se e come le 'literacies' multimodali promuovano la partecipazione e l'apprendimento di adolescenti con difficoltà nella letto-scrittura. Considerando la dislessia come 'differenza nell'apprendimento' in linea con il paradigma delle neurodiversità, la ricerca mira a colmare questo gap tramite due studi empirici concatenati fra loro che hanno coinvolto adolescenti con una diagnosi di dislessia. Le due ricerche qualitative hanno esplorato rispettivamente se e come le affordances multimodali mediano la partecipazione e l'identità dei partecipanti, e come le pratiche di visual literacy, identificate come prevalenti nel primo studio empirico, promuovono il raggiungimento degli obiettivi di apprendimento. A seguire, teorie e risultati sono stati rielaborati in un set di principi di progettazione dell'apprendimento. Una ricerca empirica finale ha coinvolto insegnanti della scuola secondaria nella progettazione di attività didattiche basate sui principi proposti, con l'obiettivo di esplorare il loro potenziale impatto in contesti educativi.

Keywords: Literacies Multimodali; Dislessia; Neurodiversità; Apprendimento; Tecnologie Educative

“...Exploration is, depending on the standpoint taken, a distinct way of conducting science – a scientific process – a special methodological approach (as contrasted with confirmation), and a pervasive personal orientation of the explorer.”

(Stebbin, 2001, p.3)

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Acknowledgements

Embarking in a Ph.D. in an unfamiliar area means casting doubt upon the assumptions and paradigms guiding previous work and studies, opening up to the uncomfortable feeling of uncertainty regarding what is ‘right’ and ‘wrong’. However, adopting the perspective of doubt can lead to much more rewarding achievements: above all, the understanding that ‘right’ and ‘wrong’ do not exist, in favour to widely accepted or less accepted *perspectives* on the object of investigation. For me, this Ph.D. has been a three-years travel across disciplines, paradigms, epistemologies, cultures and countries that taught me how to think. I cannot explain how much I learnt from more experienced researchers, colleagues and all the fantastic people I met along the way.

A special thank, in chronological order, to the people who offered me an opportunity: Prof. Umberto Margiotta who accepted me in his doctoral program in 2015 and offered his precious wisdom in many occasions; Dr. Monica Banzato, my main supervisor, for her personal support during the last three years; Dr. Asimina Vasalou who welcomed me at the UCL Knowledge Lab twice, and supervised my Ph.D. work throughout with kindness and experience; Prof. Costa for offering me the opportunity to work on his projects and participate to the academic life in many different ways.

I would have not made it without the support of my Ph.D. colleagues, who shared the last years with me in both professional and personal ways. Thanks to Simona, the first person I met when I moved to Venice and who is still a dear friend (and a great cook); thanks to Andrea, Luca, Elena, Paula, Valentina and Alice for being fantastic researchers and companions of educational lunches and spritz; thanks to Cecilia and Frank who work in very different areas but have been always happy to share their academic experiences with me, and too many dinners and films; thanks to the members of the UCL Knowledge Lab for their kindness and patience in the last months, and in particular to Jenny, Laura, Seray and Pablo for their help in thinking.

Last but not least, thanks to my family and friends who really know me and my eclecticism. I have been away for years but the brief weekends in Bergamo are always the best moments. Thus, thanks to my brothers Eric and Susanne, my mum Laura, my grandmothers Margherita and Ines; my beloved Italian friends Gaia, Ester, Linda, Alice, Michele and Alberto. To conclude, thanks to all the member of the families I have had in the last years: Emilio, Fabiana, Beatrice, Antonio, Aidan, Manoela and Suzie.

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Chapter 1.

Introduction

Theoretical perspectives on mind and disabilities directly influence the design of educational technology and pedagogies for individuals labelled as ‘lacking’ of specific skills, such as children diagnosed with dyslexia who struggle with literacy development. The main ‘medical’ approach to dyslexia suggests interventions and technologies that aim to fill the gaps with skilled readers, focusing on specific aspects of literacy such as fluency, phonological awareness, and spelling. However, in the diagnosed individuals, the insistence on the inadequacies and the correlated negative academic experiences can generate secondary social impairments (Vygotsky, 1978), such as a negative development of one’s self-concept, generating distorted or damaged ideas of different selves (Burden, 2005; Coleman and Hendry, 2002). As Humphrey suggested (2002), self-development is a “social learning activity”, in which individuals with learning difficulties often manifesting problems, especially during the sensitive period of adolescence.

Alternative perspectives re-interpret learning disabilities as ‘neurodiverse’ conditions (Amstrong, 2014), prompting research on possible ‘learning differences’. This approach suggests that moving beyond the reliance on traditional literacy could allow *“the full development of all kinds of human*

potentials” (Kress, 1998, p.75) by creating learner-centred technologies and pedagogies. In the last decades, the rise of multimodal digital environments including multimodal affordances has spontaneously required individuals to expand their competences to multimodal literacies (Kress, 1996; Jewitt, 2008). Social network sites and similar Web 2.0 technologies are calling individuals to construct their own communication and learning processes. These environments naturally promote the expression of learning differences thanks to their multimodal and social nature, thus representing a critical case for the present dissertation.

This dissertation aims to explore the opportunities offered by multimodal literacies for the participation and learning of young people with dyslexia with the final aim to inform learning design. In particular, the research takes a goal-oriented perspective on learning, going beyond the composing orientation of many studies on multimodal literacies (Lim et al., 2015; Smith, 2018) and their view on learning as restricted to ‘literacies pedagogy’.

As Erikson and Rogers pointed out (1963), the only way to establish a strong, positive identity for any child is by achieving goals (Burden, 2005). However, for those with dyslexia and other learning difficulties, this can be more difficult to accomplish (Lackaye and Margalit, 2006), due to continuous difficulties in coping with the literacy requests of school. In line with the Vygotskian perspective, this dissertation re-interprets multimodal literacies as skills promoting learning through actions which use external resources to reach the goals, and learners are active agents who construct their learning and development through social interaction. Thus, the main object of this investigation is the relationship between multimodal materials, multimodal literacies, and learning goals.

The thesis is organised as follows. Chapter 2, 3 and 4 critically discuss the interdisciplinary field of the manuscript. In particular, chapter 2 focuses on the theories of dyslexia, and their influence on education; chapter 3 describes the influence of theories on the design approaches for education, and technologies for learning disabilities; chapter 4 provides the epistemological and theoretical foundation of learning. Chapter 5 covers the research aims and it motivates the methodological choices adopted to investigate the research questions. Then, chapter 6, 7, and 8 describe the three empirical studies conducted. The first focused on the role of multimodal affordances in mediating participation and identity work for young people with dyslexia on social network sites. The study reveals the participants' reliance on visual literacy and how the perceived differences are socially reconstructed in other forms. Informed by the first research, the second phase focused on learning, exploring how teens with dyslexia constructed and accomplished their learning goals using visual literacy in multimodal digital environments. In the last empirical study, the identified theories and findings guided the development of design principles that were used by secondary school teachers to create didactic activities. This final investigation explored what form of educational 'change' is conceived as possible by teachers when transferring the new forms of learning developed in multimodal digital environments into everyday education. Chapter 9 summarises the main contributions of the dissertations, pointing out its limits and opening to future research directions.

The sequence of the 9 chapters develops a narrative that reflects the dynamic and flexible nature of qualitative research, where the object of investigation is constructed progressively, finding answers to the research questions but also developing new ones throughout the process.

Chapter 2.

Dyslexia

In this Chapter, the main models of dyslexia are described. The aim is to give the reader an overview on the different theories guiding research, and to propose a reinterpretation of dyslexia as learning difference through the paradigm of neurodiversity.

2.1 The medical model

2.1.1 Definitions, manifestations and interventions

The term “dyslexia” was used for the first time in 1887. Rudolf Berlin, a German ophthalmologist, defined the term as a particular form of *word-blindness* found in adults. According to him, it was the consequence of brain lesions.

In 130 years, while many definitions have been offered for the term, none has been universally accepted that is not “*imprecise, amorphous, or difficult to operationalize*” (Elliott and Grigorenko, 2014, p.5). The problem with defining dyslexia is that the term has been interpreted both as synonymous and different from other problems with literacy, such as specific “reading retardation”, “reading difficulties”, “specific reading difficulties”, “reading disability”, “learning disability”, “unexpected reading difficulty”, and “specific learning difficulties”. However, many researchers,

clinicians and educators reserve the word “dyslexic” to describe a smaller population within the larger group of poor decoders.

The draft of the 5th version of the Diagnostic and Statistical Manual (DSM-5) by the American Psychiatric Association suggested the replacement of the expression “Learning Disorder” with “dyslexia”. The proposal was that the term “dyslexia” should have been used to describe struggles with reading accuracy or fluency which are not consistent with the individual’s age, educational opportunities, or intellectual abilities. In the final version, the diagnosis of Learning Disorder was substituted by “Specific Learning Disorder”, without any specifications of the various types of such disorders (including dyslexia). The manual defines the cognitive dimension of what will be called “dyslexia” in the present dissertation in the following way:

1. Difficulties in accuracy or fluency of reading that are not consistent with the person’s chronological age, educational opportunities or intellectual abilities. Multiple sources of information are to be used to assess reading, one of which must be an individually administered, culturally appropriate and psychometrically sound standardised measure of reading and reading-related abilities.
2. The disturbance in criterion A, without accommodations, significantly interferes with academic achievement or activities of daily living that require these reading skills¹.

¹ <http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=84>

With specific relation to the intelligent quotient (IQ), this conceptualisation conceives dyslexia as a specific reading difficulty affecting children for whom reading achievement is below that expected on the basis of their age and IQ (“discrepancy definition”, Snowling 2013). Different scholars see dyslexia occurring *across* the IQ spectrum, affecting comprehension in different measures. Indeed, those with higher IQ are likely to perform better in comprehension tasks (Snowling, 2013).

In the United Kingdom, the independent Rose Report (Rose, 2009) sponsored by the government defined dyslexia in the following words: “*Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling*” (p. 30). The same report identified three main characteristics of dyslexia: weakness in phonological awareness, weakness in verbal memory, and weakness in verbal processing speed. More generally, lists of symptoms of dyslexia include: difficulties with phonological awareness, poor short-term or working verbal memory, poor ordering and sequencing, weak spelling, clumsiness, a poor sense of rhythm, difficulty with rapid information processing, poor concentration, inconsistent hand preference, impaired verbal fluency, poor phonic skills, frequent letter reversals, poor capacity of mental calculation, difficulties with speech and language, low self-image, and anxiety when being asked to read aloud (Elliott and Grigorenko, 2014).

The origin of the disorder is neurobiological (Lyon et al., 2003). Indeed, medical studies identify a deficit at the phonological level of processing, impeding adequate acquisition of the grapheme-phoneme correspondence necessary for learning to read in an alphabetic system (Ramus, 2003; Vellutino et al., 2004). However, as a *developmental disorder* the difficulties associated with dyslexia are likely to change. Drawing on the researches of Frith (1997), Bishop (1997), Snowling (2010) and

the Rose Report (2009), signs of dyslexia at the preschool stage are typically a delayed or problematic speech, poor language while expressing oneself, poor rhyming abilities and little interest in learning letters. Later in time, during middle school years dyslexia is often associated with slow reading, poor decoding of new words, and difficulties with spelling, that usually are the symptoms that lead teachers to suggest further medical examinations to the pupils' parents. During the years of adolescence, the most evident signs are poor organisation and time management, little social communication, weak organisation of ideas while writing, comprehension problems during reading, difficulties with spelling and mathematics (McLoughlin & Leather, 2009).

The prevalence of dyslexia varies according to the definition adopted and population considered (Rose, 2009). It is generally agreed that more boys than girls are affected (Snowling, 2013). More broadly, Crisfield (1996) with the British Dyslexia Association suggested that the 10% of the population may have "mild" dyslexia, with the 4% having a severe form. In another context, Shaywitz (2005) conducted a longitudinal study in Connecticut in which he identified the 17.5% of the sample as having dyslexia, on the basis of a reading performance below age, grade, or level of intellectual ability. Working with a sample of Dutch children, van Bergen et al. (2012) classified individuals whose scores on a reading fluency test corresponded to the weakest 10% of the population as dyslexic. Taking all these results into account, Fletcher et al. (2007) suggested the prevalence of dyslexia between 6% and 17% of the school age population depending on the criteria employed. Butterworth and Kovas (2013) estimate a prevalence of 4-8% of dyslexia. As Snowling pointed out repeatedly in other works (Hulme & Snowling, 2009; Snowling, 2013), these percentages are wholly arbitrary as dyslexia does not represent a precise diagnostic category.

A fundamental criterion of variation among the percentages is the language considered (Ziegler and Goswami, 2005). Indeed, dyslexia manifests itself across languages in different ways depending on the consistency by which phonology is represented in orthography. Therefore, given its biological origin dyslexia can be considered “universal”, with differences in its manifestation across languages (Ziegler and Goswami, 2005). In particular, if the English language reveals a reasonable percentage of 6-8% due to the opacity of the language, more transparent idioms such as Italian suggest a lower percentage of 3-4% (Stella and Savelli, 2011).

For many years, early identification on dyslexia and the related educational intervention have been stressed all over the world. Accordingly, research has increasingly focused on the identification of symptoms of dyslexia in children aged 0-3, involving kids with a family risk of reading difficulties into international studies (e.g. Gallagher et al., 2000; McBride-Chang et al., 2008). On the basis of the results of these studies, researchers developed different screening tools and questionnaires, that have been commercialised and widely used (Snowling, 2013). The main aim of identifying early manifestations of dyslexia is to implement early interventions before academic underachievement, lowered self-esteem and weak motivation start to play an important role in the person’s life (Snowling, 2013).

2.1.2 The impact of dyslexia on self-concept

Despite the fact that dyslexia is defined as a specific difficulty with reading tasks, research has evidenced its secondary effects on the academic achievement in areas not directly related to literacy, for example in mathematics (Miles and Miles, 2004). Low results with respect to literacy tasks can influence how a child feels about oneself, in turn impacting the performances in academic tests more

broadly. This reveals an inseparable connection between academic results and the concept of the self (Humphrey and Mullin, 2002). Taking this into account, it is not hard to imagine the influence of years of negative academic experience on the development of a sense of identity (Lithari, 2018).

During the entirety of their academic career, students are expected to achieve specific “developmental goals” (Burden, 2005). As Erikson and Rogers pointed out (1963), the only way to establish a strong, positive identity for any child is by achieving these goals (Burden, 2005). However, for those with dyslexia and other learning difficulties this can be more difficult to accomplish (Lackaye and Margalit, 2006), due to continuous difficulties in coping with school, and in turn socially. According to Vygotskij, the social consequences experienced as a result of one’s primary disability turn into “secondary impairments” (Kozulin et al., 2003). Furthermore, academic and social problems can impact a positive development of one’s self-concept, generating distorted or damaged ideas of different selves, for example intellectual, academic, social, emotional selves (Burden, 2005; Coleman and Hendry, 2002; Wortham, 2006). Indeed, as Humphrey suggested (2002), self-development is a “social learning activity”, with individuals with learning difficulties often manifesting problems in it.

Self-concept and a sense of identity develop during the period of adolescence (Burden, 2008). In this period of life, individuals start to think of themselves in the future, developing their identity accordingly to the discrepancy between their idea of “who I am” and “who I will be” (Coleman et al., 1976). As demonstrated by Coleman et al. (1976), young people in general can experience anxiety with reference to negative perspectives about the future. In the long term, this as well as other secondary impairments created by dyslexia can impact work and life-long prospects (Alvermann, 2001), influencing the whole life of an individual. Moreover, the period of adolescence reflects one

of the most challenging life transitions for young people: the passage to secondary school. While external support is usually removed, academic responsibilities increase. It is during this time that young people's self-concept and self-esteem can sharply decline (Coelho and Romão, 2016), and this decline can be even more drastic for those who have dyslexia and enter secondary school with poor reading and writing skills. Indeed, this period involves a growth of learning requests through an increasing quantity and quality of tasks requiring high competence in both reading and writing. In turn, this can impede pupils with dyslexia to reach their potential due to continuous struggle to *access* the curriculum and cope with the number and difficulty of the requests.

Various theories and approaches have been developed to support the development of literacy for young people with dyslexia in secondary school. For example, Rose (2009) suggests specific support for the following tasks: organising time and workload; planning and organising written work; taking and making notes, planning to meet deadlines, revision and memory strategies for tests and exams. Offering a more holistic approach, Long et al. (2011) developed an emotional model of literacy that can foster the academic achievement and emotional well-being of young people with dyslexia, highlighting how teachers may lack approachability and empathy during their practice. Given the relationship between phonological awareness and music, Douglas and Willatts (1994) promoted a structured programme of musical activities that can help pupils to develop multisensory awareness, and response to sounds.

More generally, research showed how difficulties with literacy in secondary school can apply to the broader population. Regarding the English language in United Kingdom, the reports "Moving English Forward" (2012) and "Removing barriers to literacy" (2011) highlighted how one in five students has

not reached the expected level in reading and writing when entering secondary school, revealing the fundamental need and potential impact of structured programs to support literacy development for young people.

Dyslexia and its the secondary impairments have been targeted in different educational policies. The following section presents the current policy framework adopted to address dyslexia in the two countries which are the subject of the case study analysis of this dissertation: United Kingdom and Italy.

2.2 Compensatory and dispensatory measures

At an educational level, dyslexia is considered a part of the Special Education Needs (SEN) (Woolfson and Brady, 2009) all over Europe². This generic term refers to difficulties that affect learning, social, emotional and behavioural development, the ability to communicate and care for self, and to become independent in life (Lindsay, 2007). The concept implies the existence of a gap between the achievement of the child and what schools expect from her in terms of curricular goals (Stakes and Hornby, 2000; Wedell, 2003) due to learning difficulties or disadvantaged conditions. The SEN framework is compatible with an interactionist model of causation (Warnock and Norwich, 2010) that recognises that child factors and environmental factors interact with each other to result in difficulties that promote a special education need (Wedell, 2008). Therefore, it is expected that not only the individual difficulties, but also some causes of social nature together impact the rise of SEN (Warnock and Norwich, 2010). The identification of SEN is a responsibility of the school system,

² For an overview of the latest best practices and improvements collected by the European Union, please see: https://ec.europa.eu/education/compendia-categories/special-needs-education_en

that recognises the necessity of differentiated or additional educational needs consequently to multiple failures in the child's achievement.

In England, "dyslexia" is recognised as a disability by the Special Education Needs and Disability Act in 2003 (DfES, 2001). Schools are expected to have a teacher designated to special education needs: the SEN coordinator (SENCo). Furthermore, schools are called to develop personalised educational plans that describe the support provided by the social workers who support teachers (Warnock and Norwich, 2010). More broadly, children identified with SEN can be eligible both for SEN support at school (e.g. speech therapy), and for an "education, health and care plan" (EHC), a plan that offers further support to children and young people who are aged up to 25 and manifest additional needs³.

In the Italian context, on October 8th, 2010 the parliament approved the law n.170, titled "New Norms on Specific Learning Disorders in Education" (*"Nuove norme in materia di disturbi specifici dell'apprendimento in ambito scolastico"*, translation of the author). Clause 1 of the law recognises dyslexia, dyscalculia, dysorthographia and dysgraphia as "*specific learning disorders that manifest themselves in conditions of adequate cognitive abilities, and without the simultaneous presence of neurological or sensory pathologies*" (translation of the author). According to the law, these specific learning disorders might represent an important limitation in everyday activities. Through its various clauses, the law 170/2010 suggests shared guidelines on how to recognise the learning disorders, and it provides educational and didactic measures that can support students. In particular, Clause 5 opens

³ <https://www.gov.uk/children-with-special-educational-needs>

with the right of students diagnosed with specific learning disorders to make use of specific *compensatory* and *dispensatory* measures for didactic flexibility during their primary, secondary and tertiary education. Furthermore, it requires that teachers guarantee to each student with specific learning disorders an *individualised*, and *personalised* approach to teaching and learning, that needs to be described in detail in the *personalised didactic plan* (“piano didattico personalizzato”, translation of the author). This document is prepared by the class council at the beginning of each academic year according to the individual student’s functional profile. It involves specific educational methodologies and strategies based on the student’s needs, specifying which compensative tools will be allowed during the activities at school and at home, and which non-fundamental learning activities can be avoided by the student during the year (dispensatory measures). In particular, the “compensatory materials or tools” are defined as didactic and technological tools that substitute or facilitate activities for which the student has *deficient* ability. Among the most common compensatory measures there are tables, formularies, conceptual maps and text-to-speech tools. In addition to this support, the child can be identified as in need of being supported in class by an additional teacher. More broadly, each Italian school is asked to prepare a three-year developmental plan, within which it must specify its “plan for inclusion” for all the SEN pupils.

2.3. From a medical view on disabilities to a neurodiverse view on individuals

As described in the previous pages, the medical view on dyslexia focuses on the deficits correlated to the disorder. Furthermore, it promotes research and educational approaches aiming to ameliorate the performance in reading and other literacy-related tasks. This occurs through programs that support literacy development and compensatory measures allowing dyslexic individuals to perform similarly to non-dyslexic people. According to this view on dyslexia, promoting *inclusion* in education and

more broadly in social contexts means *filling the gap* between non-skilled readers and normal readers through various means and tools supporting literacy. This medical view of dyslexia is based on the philosophical view of essentialism (Slee, 1988), which locates individuals' disabilities in their individual pathology. In line with this *normative* view, children are identified as dyslexic according to their achievements through standardised tests that are designed for their chronological age, i.e. Intelligent Quotient (IQ). These tests are considered accurate measures of the learner's potential, and they usually classify individuals into educationally "subnormal" and "normal" (Abbott, 2007).

Some criticisms of essentialism focus on its individual-centred view of human thinking and behaviour, without considering external aspects. Indeed, the medical view sees the educational need as caused by factors that are only internal to the child, ignoring the environmental factors. All the various forms taken by the medical model exclude the interactions between the child and possible deficiency of resources available in the environment that are fundamental for the child's development, such as lack of appropriate learning opportunities and tools (Abbott, 2007; Kirk and Gallagher, 1979).

On the opposite side of the continuum of the disability theories, the epistemological perspective of social constructivism is based on the interaction between individuals and society in the construction of knowledge (Schwandt, 2003). This approach emphasises the role of culture and context in shaping individuals' identity (Burr, 2003) and learning. A social constructivist view theorises disabilities as socially shaped constructs derived from social beliefs and values (Slee, 1998). Taking a more moderate position within the social constructivist views on disabilities, Vygotsky and Luria argue that they are both a natural and a cultural deficiency (Vygotsky and Luria, 1993).

The shift from the individual to the social captured by social constructivism is described by the “social model of disabilities”. This model, in contrast to the medical view, re-locates the problem from the individual to the ways in which the groups, classrooms or schools are organised. For example, some of the problems addressed within this model are the insufficient resources available or the inappropriate grouping of students, and their effects on pupils’ learning (Abbott, 2007). This perspective on disabilities contributed significantly to ameliorate the design of the environment and architecture. The aim is to optimise students’ learning by encouraging a diversification of the social, material, and cultural *conditions* and *contexts* in which all children should be allowed to learn (Thomas and Loxley, 2007). Therefore, on the one hand the social model of disabilities promotes the removal of barriers within schools, and it redefines inclusive education as a way to *foster access* to existent or new physical spaces. On the other hand, this model often ignores the disability itself, shifting its focus of attention from the individual to the environment, and reducing its analysis to the context around the disability.

Other criticisms to the medical view focus to its perspective on the human brain. Indeed, the medical view divides brains into two distinct categories: normal brains and abnormal brains (Armstrong, 2015). The critical threshold from normal human variation to pathology is defined in diagnostic manuals written by the medical community, which classify the neurologically-based human behaviours into the aforementioned two categories.

In contrast to the medical view, Armstrong (2015) stated that a standard “human brain” does not exist. Medical research has helped to show that these conditions exist due to permanent differences in brain structures rather than poor parenting or laziness (Cooper, 2009), as theorised in previous models. This

approach has “medicalised” all the forms of disabilities as conditions to be “cured”, creating both blindness on possible strengths of individuals, and a social *stigma* associated with individuals with human brains labelled as “non-standard” by the medical community (Scior et al, 2016). In particular, according to Goffman (1963), a stigma is a process by which the reaction of others spoils an individual’s identity, negatively influencing the self-concept of a person through isolation and differentiated behaviours. More recently, Link and Phelan (2001) have defined stigma as a process whereby individual attributes are labelled and evaluated negatively, promoting experiences of loss and discrimination. Furthermore, categorising people as dyslexic have a negative impact on their personal identity, as stated by Professor Cooper who defines himself and his dyslexia with the following words (2009): “*I am not someone with dyslexia. I am dyslexic. Were I not dyslexic, I would not be me*”. Integrating such self-definition into one’s identity means that medicalisation can force individuals to “be someone else”, sometimes neglecting the potential of the individual that can be fundamental for their identity and uniqueness (Dalton, 2013).

From a neuroscientific point of view on human evolution, Professor Stein commented the persistent existence of conditions such as dyslexia with the following words: “*If conditions like dyslexia are wholly negative, they would have never evolved out*”. In the last 10 years, growing research is suggesting that many “disorders” of the brain bring with them patterns of weaknesses *and* strengths (Amstrong, 2015). For example, individuals with autism spectrum disorder usually exhibit absolute strengths in working with computer languages or mathematical systems, and in controlled studies they perform better than control subjects at identifying details in very complex patterns (Baron-Cohen et al., 2009). Furthermore, they obtain higher scores in the nonverbal Raven’s Matrices intelligence test aiming to measure abstract reasoning (Motttron, 2011). According to non-academic

investigations, these cognitive studies have generated concrete impact in society, with technology companies recruiting individuals with autism spectrum disorder to manage databases, writing computer manuals, and searching for bugs in codes (Wang, 2014). This way of conceptualising humans has been defined as “neurodiversity” (Amstrong, 2015).

The movement of neurodiversity arose online to respond to the experienced marginalisation of children and parents with autism (Chamak, 2008; Ortega, 2009). However, studies based on the theoretical view of neurodiversity have been conducted on autism as well as on other disorders. In the case of dyslexia, research has identified strengths of diagnosed individuals in visual-spatial abilities. Indeed, individuals with dyslexia often rely on visualisation (three-dimensional, spatial thinking) as the primary mode of thought, reflecting difficulties when processing information presented in the written form (Davis and Braun, 2010; Grant, 2005, and West, 2009). Not surprisingly, research has shown that individual with reading disorders perform better on spatial than on sequential or verbal tasks (e.g., Bannatyne, 1971; Gordon, 1983; Naidoo, 1972; Rugel, 1974; von Ka’rolyi, 1998), revealing clear *relative* strengths in the spatial area, and speculating on possible absolute strengths. “Relative strengths” means that individuals with dyslexia are aligned with individuals without a diagnosis in their performance in visual-spatial tasks, but they perform better than themselves when compared to literacy tasks. Reliance on such visual-spatial areas of the brain may be employed in jobs that require three-dimensional thinking, for example in computer graphics, engineering or astrophysics (Amstrong, 2015). This can explain why many successful individuals working in these fields describe their reliance on visual thinking to perform professional tasks (West, 2009). Similarly, Appleyard (1997) investigated the artistic abilities of students with dyslexia, showing how they often demonstrate an artistic potential. Confirming this finding, he also

demonstrated that in the context of a British professional art school three-quarters of the students appeared to have some forms of dyslexia (Appleyard, 1997).

By adopting the holistic paradigm of neurodiversity, dyslexia can be reframed from a literacy deficit to a difference in learning. More broadly, dyslexia can be considered one of the many, possible neurotypes within the spectrum of neurodiversity (Armstrong, 2010), with each neurotype involving specific patterns of weaknesses and strengths.

In a research study in Italy, Mendenez-Blanco et al. (2017) explored a reinterpretation of dyslexia as a difference through a critical design approach with the aim to reinforce a positive view of dyslexia. Through this process, they fostered the emergence of cooperative activism among the different social worlds of teachers, parents, children, academics and institutions. This prompted critical reflections on the current narrative of dyslexia in Italy, and the creation of a new space for dialogue among the different actors and stakeholders. As described by the authors, the view that dyslexia is a *difference in learning* fosters an inclusive approach to education, in the sense that it should encompass all the differences and promote multiple ways of teaching and learning. This is in line with the advocates of inclusive education who claim that inclusion is about schools adapting to all the diverse needs of pupils, and not just about *accommodating* those who are labelled as “disabled” (Slee, 2011).

Interpreted critically, neurodiversity suggests that society should take a “positive” attitude towards the biodiversity and cultural diversity that most people offer (Armstrong, 2014) alongside its application to the differences among human brains. In cognitive research this approach can foster the development of a larger body of literature on possible cognitive strengths linked to the deficit, and

within the literature on education it can promote a positive attitude that can impact extensively pedagogies and policies.

Speculatively, based on the work of Armstrong (2015) and Cooper (2006) it is possible to conceptualize neurodiversity on a spectrum, explaining how dyslexia and other conditions fit into the broader population as one of the many expressions (Figure 1, vertical lines) of the human variation (Figure 1, horizontal line).



*Figure 1. Speculative representation of neurodiversity
(each spike identifies a set of strengths and weaknesses for an individual).*

2.4 Implications

This doctoral research takes a neurodiverse view on dyslexia, interpreting it as “learning difference”. By reinterpreting dyslexia “positively”, the work aims to identify and stress the strengths of dyslexic individuals in their everyday digital learning activities. The research is based on the idea that educators should become more familiar with the preferences of their students with SEN, trying to promote talents, abilities and interests at every level through learner-centred methods and activities.

Chapter 3.

A critical perspective on the design of technologies for SEN

Based on the different theoretical perspectives on disabilities described in the previous section, this Chapter illustrates how the different conceptualisations of disabilities have guided the design of technologies for SEN, and in particular for dyslexia. Then, the potential of multimodal digital environments as spaces of analysis for learning differences is described.

3.1 Challenging Assistive Technologies

The medical view on dyslexia has inspired research on design and evaluation of Assistive Technologies as possible means to compensate or remediate for the lack of literacy skills (Wise, 2012). These technologies can be located on a continuum that differentiates them according to their purpose (Lange et al., 2006). On the one hand, a remedial use of technologies implies the intention to impact literacy skills directly, inspiring the design of tools to improve aspects of reading such as phonological awareness through tasks focused on particular words or sounds (Wise, 2012). Usually, this kind of technologies is administered by highly specialised professionals, such as researchers, speech therapists or special education teachers, with pupils involved in small groups or alone (Lange et al., 2006). On the other hand, technologies can be used in a compensatory way, with students using hardware, software or applications with minimal support from the teachers or other adults (Lange et

al., 2006). Examples of this sort of technologies are electronic dictionaries that help find meanings for complicated words during reading (Lange et al., 2006), speech synthesis tools and electronic reading pens (Higgins and Raskind, 2005).



Figure 2. Quicktionary Reading Pen II

As Lange et al. pointed out (2006), the most desired outcome of an intervention session with assistive technologies is enhanced literacy skills or reading comprehension. However, research has showed that the use of assistive technologies in a compensatory way does not lead to a benefit in terms of remediation (e.g. MacArtur et al., 2001). This occurs mainly because these tools do not involve individuals in any sort of *active learning*. For example, spell-checkers propose alternatives of correct spelling among which people can choose, avoiding the active process of creating a correct spelling (Lange et al., 2006). Compensatory tools are deemed useful for those who fail to achieve basic literacy skills or who do not want to be differentiated through separated classes with special education teachers (Lange et al., 2006). It is clear from these results that these tools do not promote learning, in favour of a compensation of the lacking skills.

While this research has been important in supporting student to participate within the boundaries of formal education and their traditional text-based tasks, it has also tended to approach technology as

a tool that can “solve a problem” rather than as one that offers new opportunities for learning. Indeed, guided by the medical view on disabilities, and in turn on the design of technologies for disabilities, these tools allow to overcome the deficit by providing *access* across a broad range of interfaces. In the specific case of dyslexia, technologies bridge the gap between poor and skilled readers by *enabling* individuals. In the words of Moser (2006), according to this approach, disability is *normalised* through different arrangements of both people and technologies, with individuals dependent from a distributed, *delegated agency*. Indeed, if on the one hand, able people are seen to have agency and subjectivity naturally, on the other hand disable people are not, with able people distributing their agency *away* from them (Moser, 2006). In other words, these tools are designed considering the medical view on dyslexia, thus without involving preferences and strengths of “disable” individuals. This condition of dependence is perpetuated by the continuous reproduction of the boundaries between disable and able, in this case by poor readers and skilled readers, through Assistive Technologies. In particular, working toward a shared normality implies the assumption of the un-normal, deviant, and lacking, building upon it, and helping to reproduce it (Moser, 2006). Indeed, it is the specific order of social, technological and human factors that *creates* disability (Moser, 2006).

However, alternatives for designing educational technology do exist, and their frameworks are founded on different perspectives on disabilities. In particular, in some cases these views have been used to critique technology design, with the aim to propose alternatives. For instance, the theoretical perspective of “disabilities studies” has sometimes been used in this way. This field of critical inquiry focuses on the lived experiences of disable people, involving the medical, political, societal aspects concerning the disability. In line with this view, using critical thinking and interdisciplinary participatory methods from disabilities studies, Mankoff et al. (2010) discussed two case studies on

autism and computer accessibility. Their first case study focuses on the difficulties in balancing the aims of children with autism, their parents and the educational institutions involved, showing how technologies designed for this population can or cannot empower individuals. In their second case study, the authors discussed the implications of the theoretical perspective of the social model of disability for technology design, and how this relate to universal design (Mankoff et al., 2010).

The ideas beyond neurodiversity have sometimes been used in design in the form of design principles. One famous example is the educational framework of the Universal Design for Learning (UDL) (Rose and Meyer, 2002). This approach to education is an extension of the architectural movement of *universal design*, and it has its origin in in the neuroscience of learning and the study of media. The objective is to develop a curriculum that includes multiple alternatives, to make it accessible for students with different cognitive skills, backgrounds and abilities in the most different learning contexts (Rose and Meyer, 2002). The main aim of UDL is to help teachers differentiating their methods of teaching and assessment, and the range of materials they propose to their students (Rose and Meyer, 2002). In particular, UDL proposes three main principles of learning design to foster flexibility in the classroom:

- 1) To support recognition learning, provide multiple, flexible methods of presentation;
- 2) To support strategic learning, provide multiple, flexible methods of expression and apprenticeship;
- 3) To support affective learning, provide multiple, flexible options for engagement.

The main outcome of UDL is to propose a variety of options, both on paper and through the versatility of digital media for an effective and efficient process of learning for everyone. From a cognitive point of view, this can foster personalised ways to appropriate information and construct knowledge. However, providing multiple kinds of representation to support specific kinds of learning implies

both a view on learning limited to cognitive processes, and the idea that providing a variety of representation can *accommodate* diverse learners.

In addition to UDL, other widely accepted educational frameworks based on the idea of “universal design” are the Universal Design for Instruction, and the Universal Instructional Design (Rao et al., 2014). Similarly to UDL, these approaches *extend access* in educational environments by proposing principles to reduce barriers in learning spaces and curriculums, in particular for pupils with disabilities.

An alternative perspective is provided by the field of special education, and its more humanistic view on learning and education focuses more broadly on *learner themselves*, and not only on how their brains work. In line with this pedagogical view of learning, there is research that focuses on the idea of *talent* in disability contexts. “Talent” is interpreted as personal potential of development (Tessaro, 2011) rather than genius or superiority. Broadly speaking, this means that every person owns some talents that can be developed through education. Consequently, according to this view the role of teachers and educational contexts is to allow those talents to emerge in whichever form they are present in a person (Tessaro, 2011), going beyond the idea of a learning process fully centered on the brain.

A further perspective on technology design focusing on the role of individuals in the design process is provided by Participatory Design (PD). PD considers individuals from the “target population” as equal participants throughout the design process (Mankoff et al., 2010). In particular, by involving users and stakeholders as co-designers, PD methods promote the consideration of end users’ *needs*,

values, and *experiences* through mutual learning dynamics among participants (Muller and Khun, 1993), shifting away from a cognitive view on individuals' performance. Users' participation in the design process can be configured in different ways, and it can be interpreted as a balance between "tradition" (people's current practices and experiences to inform design) and "transcendence" (reflect on what individuals do to go beyond their traditional practices, generating new possibilities) (Vines et al., 2013). Despite this perspective becoming popular, research shows that it has been used in a limited way for special education needs. For example, through the theoretical lens of neurodiversity and using Participatory Design (PD) methods, Benton et al. (2014) proposed a framework for involving children with SEN which is based on the evidence-based program TEACCH (Treatment and Education of Autistic and related Communication handicapped CHildren). Benton et al. (2014) highlighted how neurodiverse children need support to emphasise their strengths and provisions to mitigate their difficulties. Thus, designers are required to "*learn with*" participants by involving them in the design process, rather than "*learn about*" them. Thus, PD can be considered more broadly as one of the manifestations of *inclusive research*, defined as:

"...research that seeks to involve those who tend to be the subjects or objects of research, such as learners, practitioners or parents, as agents in the conduct of research; it addresses issues that are important to them and includes their views and experiences. Such inclusive research tends to have a practical agenda of improving educational experiences as well as being concerned with democratization of the research process" (Parsons et al., 2014, p.1)

In the broad field of PD, Learner-Centred Design (LCD) represents a specific approach to PD that focuses on educational technologies, alongside a consideration of individuals' learning needs and characteristics (Soloway et al, 1994; Good & Robertson, 2006; Nettet & Large, 2004). As Parsons et

al. (2014) pointed out, this approach does not only consider individuals' views as individuals, but also their *necessities and experiences as learners*, focusing in particular on how technology can support them and their learning (Soloway et al., 1994). Therefore, LCD aims to provide effective scaffolding for children through technologies.

LCD has been conceptualised in different ways. For example, Soloway et al. (1994) developed the TILT model (Tools, Interfaces, Learner's needs, Tasks), situating learners at the centre of model, and considering other connected factors such as, for example, tasks and tools. According to the authors, the model should guide the design of a software that aims to be learner-centred. However, this model has been critiqued due to its lack of guidance for designers who are likely to implement a learner-centred design process, in turn prompting the development of other models to conceptualise LCD (Good and Robertson, 2006). One of them, CARRS, (Good and Robertson, 2006) recognises the value of involving various actors in the design process, such as individuals, a range of stakeholders, and designers with their set of relationships with the project considered.

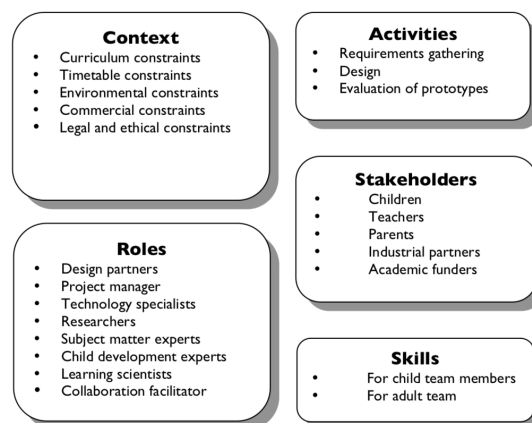


Figure 3. The CARRS Framework (from Good and Robertson, 2006)

As explained by Parsons et al. (2014), the model considers the learner activities and needs within the design of the technology, but it does not include the *theoretical position* of the design activities and how this can dramatically influence the ways in which learning, and learners, can be supported. To conclude, further theoretical and empirical research on LCD taking the complexity of learning and its context into account is needed.

The “theoretical position” implies the definition of what “teaching” and “learning” are. Research aiming to understand the impact of educational interventions with technology showed that their design is mainly informed by individuals’ *implicit assumptions* on the meaning of “teaching” and “learning” (Price and Korkwood, 2014). Price and Korkwood (2014) demonstrated how their meaning is often taken for granted, and how technology is considered the agent of improvement in outcomes. This technological determinism reflects an opinion-based practice while teaching with technological support (Ravenscroft and Boyle, 2010), raising interesting questions about the role of evidence to inform design.

Historically, learning has been seen as *quantitative change* in knowledge of facts and procedures (e.g. see Bransford et al., 2000). As shown by Trigwell and Prosser (1996), educators’ approaches to their teaching practices relate to their conceptions of teaching, that in turn corresponds to their idea of how students learn. Consequently, teachers who interpret teaching as “transmission of knowledge” often prefer a *teacher-centred approach*, conceiving students’ learning as enhanced knowledge (Säljö, 1979). In other words, teaching is their full responsibility, with students passively absorbing theoretical concepts and notions. In more recent times, educational research has showed that *engaging learners conceptually* promotes learning generalisation, fostering students’ application of their

learning to multiple circumstances (Baxter Magolda, 1992; Marton, Dall’Alba, & Beaty, 1993). When teachers adopt a view on teaching that “promotes conceptual development in students”, they are more likely to design *learner-centred approach* to learning, intended as “qualitative improvement in understanding” (Säljö, 1979), sharing their agency with their students.

The learner-centred perspective on teaching and learning with technologies also involves underlying assumptions about how students learn. Throughout Chapter 1, it was described how assumptions on the human brain can influence whole educational systems, societies, and thousands of “disabled” individuals’ lives. Embracing the theoretical view of neurodiversity means valuing individual differences, starting without pre-conceptions on the existence of a *normative* way of thinking. Thus, the learner-centred approach to both learning and design adopted in this dissertation creates a first broad, open question of interest for the present doctoral research: how “qualitative improving in understanding”, which could be rephrased in “conceptual change”, occurs for individuals with dyslexia? In other words, how dyslexic individuals learn. To explore and refine this guiding question, we need to identify the most appropriate *context* in which learning can be investigated according to the guiding paradigm of neurodiversity (next section), and then to define *what learning is in this context* (next chapter).

3.2 Individuals as designers of their own digital space

3.2.1 Open multimodal digital environments

Multimodal digital environments (MDE) are digital spaces involving multimodal affordances, in which individuals can construct their own communication and learning (Kress, 1996). Examples of

MDE are social network sites, Web 2.0 technologies, videogames and multimodal learning technologies.

According to the level of the construction permitted, MDE have been theoretically positioned on a continuum that goes from open to closed MDE. On the one hand, open MDE (e.g. social network sites and Web 2.0) are contexts where the influence of the designers on the users' paths and activities is limited, and the experiences happening are exploratory, also across different media. On the other hand, closed MDE such as videogames and multimodal tools explicitly designed for learning are built on pedagogies or pre-fixed paths underpinning the users' play or learning experiences. In these spaces, the construction by the learner is present, but it can be more "structured" and guided by designers' choices.

In particular, open MDE are characterized by design affordances that shape online identities and interactions. Drawing from Faraj and Azad's definition, DeVito et al. (2017) describe affordances as "*the mutuality of actor intentions and technology capabilities that provide the potential for a particular action.*" Given DeVito's interest in self-presentation, the same authors identify a set of social media affordances involved in identity work online. In a similar vein, Morioka et al. (2016) investigate the role of SNS in facilitating students' identity transition from high school to college. In doing so, they motivate a case for focusing on two SNS affordances to understand identity curatorship, *asynchronicity* and *selective self-presentation*.

The diffusion of these means of communication and learning promotes an expansion of the modalities of expression available to individuals, where the written form co-exists with *images, visuals, videos* and *other symbolic representations*. The different modalities of expression are orchestrated together

in “artefacts” by individuals with the aim to make meaning (Gee, 2007; Jewitt, 2006). In particular, open MDE have also been theorised as participatory culture’s dynamics because of the collaborative interactions they rely on (Jenkins, 2006). This idea of “participatory culture” theorises the existence of social processes of communication and learning that are guided by personal and social identity work (Gee, 2007; Jewitt, 2006), re-defining literacy as the result of these complex, social dynamics. In particular, the written form is limited in favour of visual, sometimes abstract representations in the process of meaning-making. According to Jewitt (2006), this occurs through the affordances of MDE that are reconfiguring the multimodal aspects of reading and writing, involving non-linguistic means of representation and communication on screen.

As described in the previous paragraph, a fundamental component of this conceptualisation of literacy is *identity*. Indeed, although identities are personally lived by individuals, they are also socially constructed online and offline as individuals build and manage a “discourse identity” within a social group (boyd, 2007; boyd and Ellison, 2007). Discourse-identities represent ways of being, belonging and being recognised (Barden, 2016). They are partially sustained through literacies (boyd and Ellison, 2007), grounded on community involvement and the participatory culture (Jenkins, 2006). Therefore, identity is not only manifestation of an individual’s expression, personal state or disposition. It is more broadly a collaborative and collective entity mediated by SNS, which engenders presentation and narration (Mallan, 2009) through literacies that involve new forms of multimodal consumption and production. Previous empirical research has examined different facets of identity by considering the opportunities and constraints of open MDE, such as SNS. For example, Litt et al. (2014) argue that face threats to identity can be collective. In line with this, they show that face threats do not only result from self-disclosure, but also follow from friends’ sharing behaviours.

Mallan (2009) considers how youth engage in subtle authenticity negotiations around their identity in SNS. Self-presentation forms part of a performance toward one's current audiences, but also future ones as young people imagine their identity work to be "discovered", leading to new opportunities for fame and recognition.

Thus, the multimodal affordances embedded in SNS and their relationship to individuals' construction of personal and social identity foster new "literacies" that require the ability to express and understand ideas across a broad range of different systems of representation and signification. As Jenkins points out (2007) this tendency towards multimodality (Livingstone and Lunt, 2013) gives young people the ability to identify the most effective modalities of expression to reach their audience and the best techniques in conveying information through each channel. MDE users must be equally adept at reading and writing through images, texts, sounds, and simulations (Jenkins, 2007) contrasting with the narrow view of literacy based on the written word. As a consequence of individuals' engagement with multimodal affordances based on social dynamics, Gee (2007) points out that digital environments, such as videogames or social media, require individuals to expand their competencies to multiple literacies which has been termed *multimodal literacies* (Jenkins, 2006; Livingstone and Lunt, 2013).

3.2.2 Practices of young people in multimodal digital environments

Youth are in the vanguard of MDE practices: according to Eurostat investigations published online in December 2017, young people made greater use of the Internet on a daily basis than the average

for the whole of the EU-28 population (71% in 2016)⁴. To the current interest, in an Italian context, a recent survey with more than 1000 participants showed that the 97% of young people aged 15-17 use their smartphone to access the Internet on a daily base, for an average of more than three hours per day (Mascheroni & Ólafsson, 2018). The same report highlights that 85% of respondents have an active social network profile, with a particular preference for *visual media sharing* platforms, such as Instagram. In a 2014 survey of 500 children in the UK, 55% of users aged 13-14 and 64% aged 15-16 reported having an active profile. In the same report, Instagram ranked second in popularity with an active user base of 19% of users aged 13-14 and 21% aged 15-16 (Livingstone, 2014). Since Instagram's recent acquisition by Facebook, its popularity among young people has been continuously growing together with Snapchat (Kemp, 2017).

The uses and practices of SNS and the Web 2.0 by young people have been well documented in the literature. For example, Danah Boyd dedicated years to a deep investigation of American teenagers' uses of SNS (Boyd, 2007; Boyd and Ellison, 2007; boyd, 2015) As the author described in her books (Boyd, 2007; Boyd, 2015), the online practices of teens cannot be separated from their interests, values, attitudes and desires. Furthermore, this use of technology does not aim to escape reality, but it represents a way to engage with a more extended social dimension in *networked* public spaces. Because of the pervasiveness of SNS, both academic and not academic publications started to write about the "digital natives". This expression helped to shed light to new forms of learning and cultural expression, and to the differences that exist between two different generation of learners. However, as the media theorist Henri Jenkins explains (Jenkins, 2006), the concept of "digital natives" implies

⁴ http://ec.europa.eu/eurostat/statistics-explained/index.php/Being_young_in_Europe_today_-_digital_world

the existence of a shared space for all teenagers, and a body of knowledge that they have all mastered, and this is not possible.

3.3 Implications

This Chapter discussed critically how the different conceptualisations of disabilities, and more broadly on the human brain, influenced the design of technologies for Special Education Needs, with a particular focus on dyslexia. Then, it suggested that the openness and multimodality of MDE is a critical case to investigate learning differences according to the paradigm of neurodiversity.

The main implication of this Chapter is the identification in MDE of the *context* in which learning will be investigated in the present dissertation.

Chapter 4.

Multimodal literacies and theories of learning

In this Chapter, different perspectives on multimodal literacies and learning theories are discussed, and their critical points highlighted. This work led to the definition of the most appropriate learning model for the present analysis.

4.1 Multimodal literacies from cognitivism to social constructivism

Multimodal literacies are often studied as cognitive skills. This view is based on a cognitivist perspective on learning that separates the individual from the environment. Indeed, cognitivism considers learning as a process of perceiving, recording, storing, retrieving and applying information (Ackermann, 1998; Wheatley, 1991). Therefore, cognitivism recognises the existence of an objective knowledge in the environment that the individuals need to *import* through learning. More broadly, cognitivism sees the mind as an information processing system, and intelligence as the ability to process the information existing in the environment. In other words, it takes a “computer metaphor” of the human mind. Accordingly, this perspective theorises literacy as something that has to be “imported” into the mind of the child. Some interesting studies taking this perspective on learning as a cognitive process have been conducted by Holsanova (e.g. de Léon and Holsanova, 1997; Holmqvist et al., 2006; Andersson et al., 2006; Holsanova, 2007). In particular, Holsanova is interested in investigating multimodal interactions with new media through eye tracking methods

combined with verbal protocols. Her perspective is that by studying visual and attentional processes in similar ways, it is possible to understand how individuals integrate information from different modalities of expression (e.g. texts and images) in multimodal digital environments.

Different perspectives on knowledge and learning recognise the interactions between the individual and the environment. In this context, knowledge is actively constructed by each individual through experience. According to this epistemology of knowledge, defined as “constructivism”, knowledge is not objective and existing in the world, but it is constructed by individuals through continuous processes of selection, consolidation and reorganisation of the experience (Piaget, 1967; Piaget, 1969; Piaget, 1970; Piaget, 1974; Ackermann, 1988). Therefore, this view on multimodal literacies recognises that they are constructed. However, in this context, as well as in the cognitivist perspective, literacy is seen through an individual’s lens. To the best of my knowledge, there is a lack of empirical research that investigates multimodal literacies in a constructivist way. In fact, the existence of multimodal literacies themselves was theorised alongside the analysis of the social dimension of social network sites and the Internet.

In particular, the social nature of the digital spaces in which multimodal literacies develop and their multimodal opportunities have led to new ways of theorising what they are, and how they are practiced (Jewitt, 2008). This theorisation has occurred within the field of linguistics, and it has been especially pursued in social semiotics. Three fields of study have developed in the last 20 years with the aim to *recognise* and *investigate the development* of multiple literacies: New Literacies Studies, multiliteracies, and multimodality. These fields of research build on critical literacy and discourse studies by Fairclough (1992), Foucault (1980), Lankshear and McLaren (1993), Luke (1996), and

Street (1995); genre studies based on systemic functional linguistics by Cope and Kalantzis (1993), Freedman and Medway (1994a, 1994b), gender studies by Cranny-Francis (1993), and critical cultural studies by Hall (1997). In the next paragraphs each of them will be reviewed, with the aim to illuminate their tradeoffs and motivate the shift of the present dissertation to the learning science domain. This passage overcomes the composing orientation of some of these studies and their promotion of a view on learning restricted to ‘literacy pedagogy’, moving toward a broader view on the forms of learning developed in multimodal digital environments.

New Literacy Studies focuses on the theorisation of multiple literacies as culturally and socially situated practices (Street, 1998; Barton et al., 2000). These scholars aim to document different and emergent literacies in various contexts. Therefore, they promote a view on literacies as *local* and *situated*, shifting away from a view on literacy as a set of competences and skills that individuals develop through formal education. More importantly, this view on literacies emphasise analysis on how social practices of literacy foster the development of social structures through power relations, identities and forms of knowledge (Luke & Carrington, 2002).

“Multiliteracies” is a term coined by the New London Group (1996), a group of educators interested in literacy pedagogy. The aim of this team was to find an answer to the changing social landscape promoted by global capitalism. In particular, the New London Group focused on designing new educational curricula which involved: 1) the diversity of languages and cultures fostered by the new global economy; and 2) multimodal forms of communication and representation, in technological and non-technological contexts. Its guiding ideological ambition was to create a cosmopolitan and egalitarian social future (Luke and Carrington, 2002), informed by the political pedagogies of Freire and Marcedo’s (1987). According to this perspective, students and teachers are active participants

and designers of the future, and the curriculum should encompass their identities, values, design and power (Jewitt, 2008).

Multimodality was born to answer to similar social needs. Its basic assumption is that meanings are made, distributed, interpreted and remade through multiple *resources* for communication and representation (Kress, 2000; Kress and van Leeuwen, 2001). In this context, language is just one of the many *modes* (defined as semiotic resources for meaning making) that compose communication (Kress and van Leeuwen, 2001). According to the perspective of multimodality, meanings are made “*through the situated configuration across image, gesture, body posture, sound, writing, music, speech, and so on*” (Jewitt, 2008, p 246). Given its interest in communication, multimodality is mainly informed by linguistics and its theories, in particular by the social semiotic theory by Halliday (1978) and its subsequent developments by scholars such as Hodge and Kress, 1988.

As described by Jewitt (2006), the nature of communication and learning that occurs in MDE causes tensions for traditional conceptualisations of literacy that are typical of formal education and still maintain language at their core. In the digital tools used outside school, for example *for pleasure*, such as in open MDE, the role of writing is usually marginal, and it is part of a multimodal ensemble (Jewitt, 2006). These “tensions” in the conceptualisation of literacy promoted research by linguists and teachers that aimed to include multimodal literacies in the curriculum by *extending the modes of expression considered in “literacy pedagogy”* (Lotherington and Jason, 2011) to promote a shift from “literacy” to “literacies” in education. For example, Dooley (2008) developed multimodal materials using multiple modes and languages for L1 and L2 learning environments, taking different social and cultural contexts into account. Cummins (2006) stressed the relationship between identity and text in

the writing process, concluding that promoting students' identity statements positively influenced their learning of literacy. Ware (2008) designed activities in which students had to "switch" the mode of expression, for example translating text into comic strips with the aim to broaden their linguistic repertoire. These examples describe the main focus of this line of research: investigating how to promote students' learning of literacies.

Theoretical and empirical investigations that take a linguistic perspective on multimodal literacies *"focus on the design of discourse by investigating the contributions of specific semiotic resources (e.g. language, gesture, images) co-deployed across various modalities (e.g. visual, aural, somatic), as well as their interaction and integration in constructing a coherent text."* (Lim et al., 2015). This body of research has been fundamental in acknowledging the significance of all the modalities of expression in the presentation of knowledge. The perspective of these scholars is that the ways in which knowledge is represented is an essential component of knowledge construction, more generally involving the representations in the process of meaning making and learning (Jewitt, 2008). As Jewitt pointed out (Jewitt, 2008, p.241): *"the ways in which something is represented shape both what is to be learned, that is, the curriculum content, and how it is to be learned."* According to the author, this also refers to both the digital spaces, which represent the context of interest for the present research.

Multimodal literacy scholars also stressed the importance of the affordances and constraints of different semiotic resources. As O'Halloran and Smith (2012) pointed out, *"different semiotic resources bring with them their own affordances and constraints, both individually and in combination, as well as analytical challenges in terms of the natures of these media, the detail and scope of analysis, and the complexities arising from the integration of semiotic resources across*

media". Building on this, a growing body of research is investigating the multimodal nature of communication in teaching and learning, considering language and corporeal resources as peers in knowledge construction and presentation (O'Halloran and Smith, 2012). What is interesting for the learning sciences is that this research can provide evidence on which "multimodal factors" can make teaching and learning more effective in the classroom (Lim et al., 2015), both while working with technology and without. Furthermore, this literature reveals that a "multimodal literate" person makes *effective, deliberate choices* in the ways he or she produces texts and presents knowledge.

To summarise the contribution of the different multimodal literacy theories to the theoretical background of this dissertation, we can conclude that this perspective on semiotic resources and representation of knowledge has emphasised a multimodal approach on literacy, in particular in multimodal digital environments. However, their most important aspect of interest for the present research was conceiving literacy and its relationship to learning to be a *social practice* (Bezemer and Kress, 2016; Jewitt, 2008). In this context, the choice of the modality or multimodal ensemble which conveys meaning is influenced by personal and social identity work, and by the expected audience of one's expression (Cope and Kalantzis, 2000; Jewitt, 2008).

As explained above, to date, the growing body of literature in multimodal literacies has taken a limited view on learning focusing on the "composing" dimension of multimodal texts, in particular recognising and analysing how the different modes are orchestrated together, and how this influences meaning making and the development of multimodal literacies (Smiths, 2018).

In isolated cases, specific aspects of learning have been considered. For example, activity theorists consider “goals” as “*object*” of a broader activity system (Bernstein, 2017; Oskoz & Elola, 2016). This theory of learning suggests that individuals’ behaviours are the result of the integration of culturally, socially constructed “*forms of mediation into human activity*” (Lantolf and Thorne, 2006, p.18). For example, Fraiberg (2013) uses a start-up from Israel as a case study to link practices of multimodal literacies that are local and multilingual to broader cultural and institutional contexts. This as well as similar research conceptualise multimodal literacies practices within an ‘ecology’ to understand the ways in which symbols and signs circulate (Fraiberg, 2013).

Using a similar social focus on ‘practices’ of multimodal literacies, other studies on multimodal literacies and learning re-interpret contexts as ‘community of practice’ (Wenger, 1998). For example, Mills (2013) investigated the *engagement* in a Facebook community complementary to the activities taking place in a classroom, in particular exploring the main elements constituting the idea of ‘community of practice’: a shared set of practices; mutual engagement; joint enterprise (Mills, 2013). Her study concludes that “*this self-directed learning context served as a complement to the classroom environment and established an interactive community where various resources and choices were readily available, and collective reflection, focused on the promotion of grammatical accuracy, this project aimed to encourage meaningful social interactions, the development of community membership, and shared cultural products*” (Mills, 2013, p.365). These are interesting conclusions that are in line with the social theories guiding the work, and they surely *influence* the learning process, but they do not show how self-directed learning, individuals’ interactions, and these shared cultural products interact.

Other researchers has taken a similar social constructivist perspective on learning from an educational point of view. For example, Uricchio (2004) pointed out how the participatory nature of MDE tools and their pervasive influence on contemporary youth's lives would suggest an appropriation of these technologies to stimulate a "participatory turn" in education (Uricchio, 2004). With the aim to explore the Web 2.0 "opportunities", Crook et al. (2008) explored patterns of use among students in secondary school in the United Kingdom, identifying four areas of practices that in turn foster opportunities for learning: collaboration; exploring new literacies; pursuing inquiry; publishing to audiences. However, further studies by Crook (2012) found that these practices in MDE, as well as all the communicational or intellectual practices developed in certain environments, are shaped by the socio-cultural context (resources, design, tradition) in which they are enacted, and questioned the possibility of importing these practices into a very different socio-cultural context, such as formal education. This is particularly seen in different studies that explored the intersection of digital technology and educational practices, suggesting the existence of *tensions* rather than transformative practices (Crook, 2012; Schroeder et al., 2010; Collins and Halverson, 2010). For instance, the same author (2012) reported on 53 focus groups with students aged 13-15 in United Kingdom, exploring issues regarding the use of MDE in and outside school. His findings reveal how young people were positive and engaged by these technologies, but they also associated a set of circumstances of potential or real use in school that could generate stress, frustration, and devious behaviours (Crook, 2012). The author concluded that there are marked tensions between the different expectations and ambitions associated with out-of-school culture and in-school culture. Very recently, a large European project involving 10 institutions in 8 different countries, "Transmedia Literacy", conducted a broad investigation on what teens are doing with media (transmedia skills) and how they are doing it (informal learning strategies). In particular, the concept of Transmedia Literacy is defined as "*a set of skills, practices,*

values, sensitivities and learning and exchange strategies developed and applied in the context of the new collaborative cultures” (White Paper⁵, p.4). The project ended in March 2018, when they published a free white paper and teacher kit as one of the outcomes of the project. The researchers identified 8 main learning strategies adopted to develop the 44 identified Transmedia Literacy skills: learning by doing; problem solving; imitating/simulating; playing; evaluating; teaching. The following figure summarises their findings:

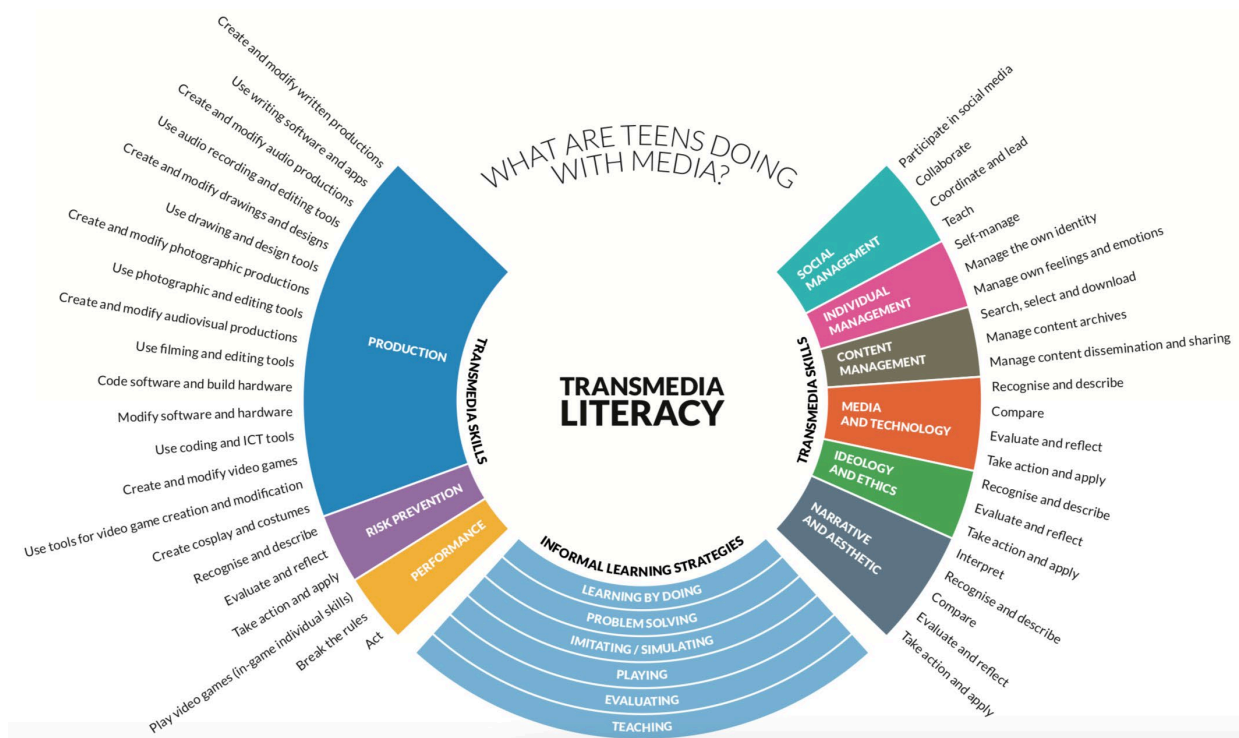


Figure 4. Conceptual representation of the Transmedia Literacy project’s findings (from the White Paper, 2018)

⁵ The White Paper is accessible at: http://transmedialiteracy.upf.edu/sites/default/files/files/TL_whit_en.pdf

The researchers involved in the project are currently organising dissemination activities to promote teachers' awareness and adoption of new teaching strategies based on the identified learning dimensions.

Taking a similar educational perspective, one single author explored the potential of multimodal literacies for the learning of dyslexic individuals. Owen Barden co-constructed a new Facebook group with dyslexic students aged 16-19 intended to facilitate their learning (Barden, 2012; Barden, 2014; Barden, 2016). His results show that young people perceived Facebook to be a desirable and inclusive technology in their education (Barden, 2016). In particular, Barden identified five dimensions that “level the playing field” with Facebook: the platform helps them to meet deadlines and keep up to date; it promotes control over the learning process; it enhances control over literacy process and demands; it supports the development of metacognitive awareness; it makes young people feel like helpers and experts. More broadly, this was attributed to the social and collaborative nature of Facebook, which was found to promote a sense of shared identity among the participants, strongly influencing their identity and engagement with texts (Barden, 2012). Consequently, Barden concluded that Facebook might engage dyslexic students in active and critical learning through multiliteracies (Barden, 2014). Barden's research is significant in two ways. First, it departs from the deficit view that dominates research on special education needs and technology (Moser, 2006), by showcasing the enabling opportunities afforded by MDE. It also identifies five dimensions of learning, and it specifies practical implications for education by identifying a new forum to engage dyslexic students. However, how particular affordances within MDE contribute to the construction of new forms of communication and learning that may “level the field” for dyslexic individuals has

not been investigated so far. Furthermore, how active and critical learning through multimodal literacies occurs remains an open question.

4.2 Multimodal literacies as skills that mediate higher-level processes

4.2.1 Learning goals

An exception to the body of research taking the ‘multimodal literacies’ perspective described in the previous section is the work by Paul Gee (2007). Building on Vygotsky’s perspective on knowledge, mind, and learning, and on New Literacies Studies, Gee (2007) showed that *literacies practices are means to foster specific, active and situated learning* within semiotic domains. Semiotic domains are any set of practices that recruit one or more modalities (e.g. oral or written language, images, symbols) to communicate distinctive types of meaning. The mastery of semiotic domains subsequently allows one’s participation in affinity groups, i.e. groups of individuals who share interests, goals and practices in MDE (Gee, 2007), emphasising the relationship between literacy and social interaction. Therefore, practices of multimodal literacies can be considered as *socially and culturally shaped actions of learning* (John-Steiner and Mahn, 1995). Building on this conceptualisation, the aim of the next sections is to construct a relationship between multimodal literacies and the social constructivist perspective on learning, to show how individuals do not only learn multimodal literacies themselves, but how they learn *through* these actions of multimodal literacies. In other words, the aim of the next section is to re-interpret multimodal literacies as *skills for mediating higher-level learning*.

The variety of modalities of expression and the ability to make meaning out of them through multimodal literacies mediate the way we react to the stimuli in the social and physical world around

us. By conceiving literacy and its relationship to learning to be a social practice (Bezemer and Kress, 2016; Jewitt, 2008), we can consider these mediating sign systems and their literacies as “building blocks” of our advanced processes of human thinking (Vygotsky, 1978; Vygotsky, 1986; Vygotsky, 1987). These advanced forms of thinking, and learning, evolve through the ability to communicate with each other through multimodal forms of communication, and the ability to work collaboratively (Lukin, 2018). The link between social interactions and psychological processes is referred to as “internalisation” by the Russian psychologist Vygotsky. This complex process is the way in which the *external* signs are transformed in *our thinking*. This means that the way we interact together in culturally different ways results in culturally different ways of processing our thoughts. For this reason, Vygotsky’s view on learning has been defined as *social constructivist*. In particular, it is the nature of a *goal-directed activity* that transforms the individual, through an “externally mediated activity” (Kozulin et al., 2003). This means that learning happens through actions that use external resources to reach the goals, and learners are active agents who co-construct their learning and development through social interaction.

By stressing the social dynamics and their influence in knowledge construction, the Russian psychologist Vygotsky contributed to decades of research in the fields of cognition, learning sciences and education. However, his view on the mind cannot be considered fully comprehensive. Most recent research illuminates how older children start to develop awareness and knowledge of their own mental functions, and to regulate them according to their aims and necessities. These processes interested both Piaget and Vygotsky, who agreed on their importance. The former focused on how children think and construct their own view of the world, the latter suggested that children work through various stages to help construct meaning, and they need to *make things* to make them understand how things work (Boden, 1980). However, the processes of “knowing about knowing”

and “regulate the knowledge about knowing” remained undefined until the late seventies. Indeed, the term “metacognition” has been introduced by John Flavell (1979), and from that moment on it has been of much interest for the educational psychology community. The author defined it as “*knowledge and cognition about cognitive phenomena*” (Flavell, 1979, p.906). In other words, thinking itself becomes the object of thoughts (Larkin, 2010).

Many taxonomies of metacognition exist in the literature. The work by Taricone (2011) is an example of a comprehensive taxonomy, differentiating between *declarative metacognitive knowledge* (knowing about knowing), *procedural metacognitive knowledge* (knowing how to know) and *conditional metacognitive knowledge* (knowing when, where and why to know). Developing a sophisticated metacognition is fundamental for intellectual development and performance in school and beyond (Lukin, 2018). In particular, *self-regulated learning* has been shown as strongly connected to the increment of academic achievement (Zimmerman, 2011). Self-regulated learning can be defined as an “*active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment*” (Pintrich, 2000, p.453). Luckily, research has showed that metacognitive knowledge, skills and regulation can be developed and improved through support and teaching that are supportive and challenging (Eccles et al., 1993). In older learners, and especially in adolescence, a key aspect of self-regulation development is the creation and use of appropriate learning strategies (Eccles et al., 1993). Research has showed how good self-regulators set their learning goals, construct effective strategies for learning, constantly assess their progress to reach their goals, set environments that are productive for their learning, and they manage to maintain a sense of self-efficacy (Zimmermann, 2011). More broadly, thinking in a

metacognitive way can lead learners to acquire quicker and more efficient ways of learning, enhancing both the motivation and task behaviours meanwhile individuals develop new learning strategies (Larkin, 2010).

Thus, metacognition in all its manifestations is related very closely to learning processes, and self-regulation can be interpreted as *applied metacognition*. There are many models of metacognition that will not be used explicitly in this dissertation as frameworks of analysis, but which support the goal-oriented view adopted while taking a learner-centred orientation. For example, Nelson and Narens (1990) developed a model widely used in educational research today, theorising that cognitive strategies are carried out with the goal to progress with the task itself, and metacognitive strategies such as monitor (become aware of the progress) and control (of thoughts and behaviours to change the cognitive strategies used, if needed) guide the process (Larkin, 2010).

However, metacognition is not the only factor of influence on if and how we set and achieve the learning goals. There is a substantial body of work in psychology, social science, and neuroscience that demonstrates the fundamental importance of the way we feel on how we learn. For example, some early, over-simplistic models (Ortony et al., 1988; Lazarus, 1991) connected goals to emotions, concluding that the achievement of a goal is something important to individuals. Throughout the years, more and more studies has focused on the relationship between our emotions and our learning, and in particular on the role of *motivation*. Pintrich (2000a) analysed an extended body of literature, trying to pin down a theory of motivation based on previous research. He identified three components: an *expectancy component*, namely our beliefs about our ability to complete a learning action; the *value component*, which represent our beliefs about the value of the learning action under

consideration; the *affective component*, namely our emotional reactions to the learning action in question. However, this last component is quite complex. As shown by Pekrun et al. (2002) in their cognitive-motivational model, our emotions influence our motivation to complete an action according to their properties to be *positive, negative, activating* or *deactivating*. The authors revealed how an emotion needs to be positive *and* activating to increase motivation. Furthermore, these emotions can be orientated toward increasing competence (mastery orientation) or an orientation toward increasing performance relative to others (performance orientation) (Boekaerts, 2006).

Motivation and self-regulation are interwoven, and they influence each other. Furthermore, they interact within the concept of self-efficacy (Lukin, 2018). Perceived self-efficacy is defined by the Stanford Professor Albert Bandura (1982, p.5) in the following terms: “*perceived self-efficacy is concerned with judgements of how well one can execute courses of action required to deal with perspective situations*”. Bandura and his collaborators conducted many studies on perceived self-efficacy and its influence on academic performance and achievements. Narrowing down on goals, “*perceived self-efficacy influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties. Perceived self-efficacy is theorized to influence performance accomplishments both directly and indirectly through its influences on self-set goals*”. (Zimmermann et al., 1992, p. 664). Interestingly, the authors showed that self-efficacy intensively influenced not only students’ own setting of goals, but also the achievement of the goals, revealing how one’s beliefs in their academic efficacy are a determinant. Self-efficacy also influences the teacher-student dynamic. Indeed, positive and accurate perceptions of students’ self-efficacy in teachers have been related to a higher level of their students’ achievement and motivation (Skaalvik and Skaalvik, 2007; Woolfolk et al., 2005).

These studies are valid for *all* learners. However, literature suggests that learners with dyslexia tend not to spontaneously develop a good metacognitive awareness of their own learning preferences and processes (McLoughlin, Leather, and Stringer 2002; Reid 2009). It should be considered that their “preferences in learning” are usually not encouraged in formal education, where learning is usually scaffolded on traditional literacy. In line with this critical view, Barden’s research provides evidence that dyslexic students’ self-directed learning is intensively influenced by their learning preferences, in turn improving their metacognitive knowledge (Barden, 2014).

4.2.2 Linking multimodal materials, multimodal literacies and learning goals

The first paragraphs of this Chapter described the focus of linguistic perspectives on learning on the interactions between multimodal practices or ‘materials’ and the social development of multimodal literacies. Then, the fundamental importance of goals on the learning process was discussed through the main contributions of research on learning goals from an educational psychology angle.

However, an appropriate model to investigate how multimodal literacies skills mediate learning has yet to be formulated.

In particular, there is a need for a broader perspective on the interactions between multimodal materials, multimodal literacies and learning goals. The following figure illustrates the interactions among the concepts so far, showing the gap with a question mark.

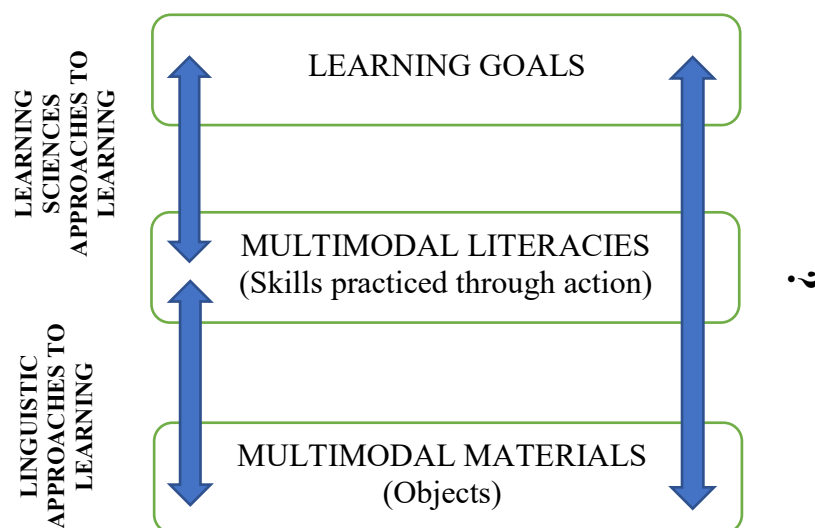


Figure 5. The relationships between multimodal materials, multimodal literacies and learning goals

The link between the three elements is central to investigate learning empirically in multimodal digital environments. However, this particular approach to learning is missing both within the multimodality theories traditions (linguistic approaches to learning) and in the cognitive and metacognitive studies (learning sciences approaches to learning).

In other words, what is the relationship between the multimodal digital materials, the ability of making meaning through them, and learning goals?

A broader, though less systematic approach to learning that considers objects, actions and goals has been identified in the design theory in the concept of *tinkering*. The concept of tinkering has its origin in the Maker Movement, and it has been defined and used in different ways in design. In particular, its relationship to learning has been object of debate in the field. For example, Norman and Verganti (2013) described tinkering with the following words: “*When someone plays around a product or a*

technology with no goal, neither for enhancement of meaning nor for practicality, we call it tinkering” (Norman and Verganti, 2013, p. 78). However, the authors also pointed out that this process can lead to brilliant ideas and insights, and in turn, new products. They justify their position on learning by claiming that this process is “accidental” (Norman and Verganti, 2013, p. 78).

Other positions recognise the relationship between tinkering and learning, encouraging project based experiential approaches to education (Resnick and Rosenbaum, 2013). This tinkering approach to learning is identified a “*playful, experimental, iterative style of engagement in which makers are continually reassessing their goals, exploring new paths, and imagining new possibilities*” (Resnick and Rosenbaum, 2013, p.164). When individuals are tinkering, they are constantly re-assessing their goals through adjustments and refinements, over and over. This approach is a bottom-up process in which learners start without goals but with “*a conversation with the material*” (Schön, 1983), and goals emerge from their playful exploration. Despite the origin of the concept in the world of physical objects, Resnick and Rosenbaum (2013) pointed out that if interpreted as a style of interaction, tinkering supports the idea of making things despite their concrete or digital nature. Indeed, it is possible to ‘tinker’ both while programming or playing with LEGO. Therefore, in the context of interest tinkering describes a style of interaction that connects materials (in this case multimodal materials), skills (multimodal literacies) and goals. Going back to the model above, this view on tinkering offers the opportunity to complete the image:

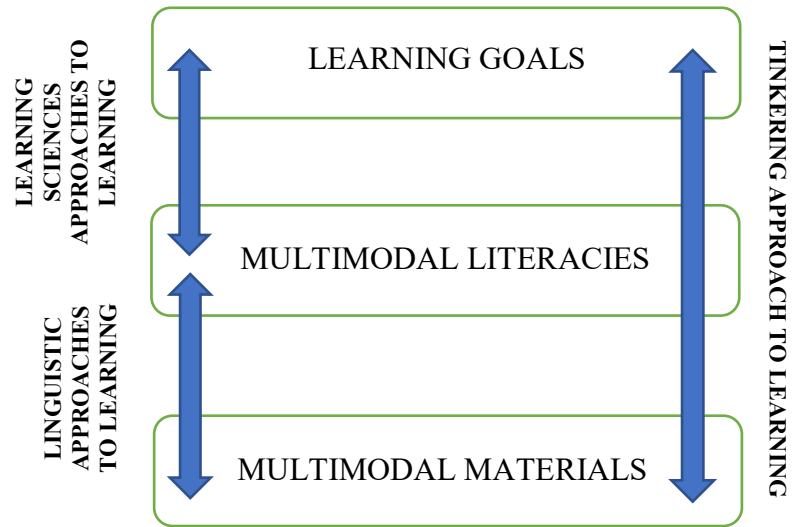


Figure 6. The role of tinkering in the learning model

4.3 Implications

Barden's research provides a starting point for the present dissertation. Taking his findings into account, a new model of learning *through* multimodal literacies has been developed involving the process of *tinkering*. This conceptualisation involves the relationship between multimodal materials, multimodal literacies and learning goals. Its nature is multi-disciplinary, and it hopes to reflect, or at least capture from a broader angle, the complexity of learning dynamics in open multimodal digital environments.

Chapter 5.

Research aims and methodological considerations

In this Chapter, the research questions are specified, and the main contributions of the theoretical sections are summarised, leading to the statement of the methods.

5.1 Research design

The work by Barden (Barden, 2012; Barden, 2014; Barden, 2016) provides a starting point for this research. In particular, it is significant because it shifts away from the deficit view that dominates research in learning and technology design for SEN, and it provides practical implications for educational contexts. Furthermore, it recognises the relationship between multimodal literacies and some aspects of metacognition.

This research takes a neurodiverse view on disability, and a social constructivist perspective on learning through multimodal literacies focusing on goals. The aim is to explore the opportunities offered by multimodal literacies for the participation and learning of dyslexic adolescents in multimodal digital environments. This is achieved through two connected empirical studies that focus on 1) how multimodal affordances in social network sites mediate participation and identity work for dyslexic teens aged 14-16; 2) how the identified preferences for visual literacy and its opportunities

for learning fostered participants' setting and accomplishment of learning goals. The final aim of the work is to bridge through Design-Based Research the identified forms of learning developed in informal digital context and formal education. To contribute to this goal, 3) the third phase of the research developed a set of learning design principles based on theories and empirical evidence, and it involved a group of secondary school teachers in co-design sessions to create learning activities based on the principles. The aim of this work is to explore how teachers appropriated the principles, identifying different forms of educational 'change' envisioned in the opportunity to innovate pedagogies involving the identified new forms of learning.

5.2 Summary and main contributions of the critical Chapters

Before stating the research methods, a summary of relevant implications of the accepted theoretical perspectives is provided:

- A neurodiverse perspective on dyslexia can help to illuminate the strengths of dyslexic individuals, shifting away from a medical model of learning disabilities that interprets dyslexia as a deficit to be *normalised* through compensative technology;
- A learner-centred perspective on technology and learning design can promote the design of pedagogies and educational technologies which encompass different learners' strengths and preferences in learning;
- In mainstream multimodal digital environments, such as social network sites and the Internet, learners spontaneously construct their own space in environments that allow multimodal affordances, and they develop multimodal literacies through social dynamics;

- To the best of my knowledge, Owen Barden is the only researcher who explored the opportunities offered by multimodal literacies to increase participation and learning among dyslexic teens. His findings provide a starting point for this empirical work.
- The linguistic perspective on multimodal literacies recognises their social nature and explores how literacies are learnt through interactions with multimodal materials.
- Building on Gee’s perspective, this research interprets learning *through* multimodal literacies as an active and situated process based on social dynamics. Thus, multimodal literacies are skills that mediate higher-level processes of learning.
- Recent research in the field of learning sciences showed the fundamental role of goals in every self-constructed learning process.
- The concept of tinkering identifies a style of interaction that connects materials (in this case multimodal materials), skills (multimodal literacies) and learning goals.

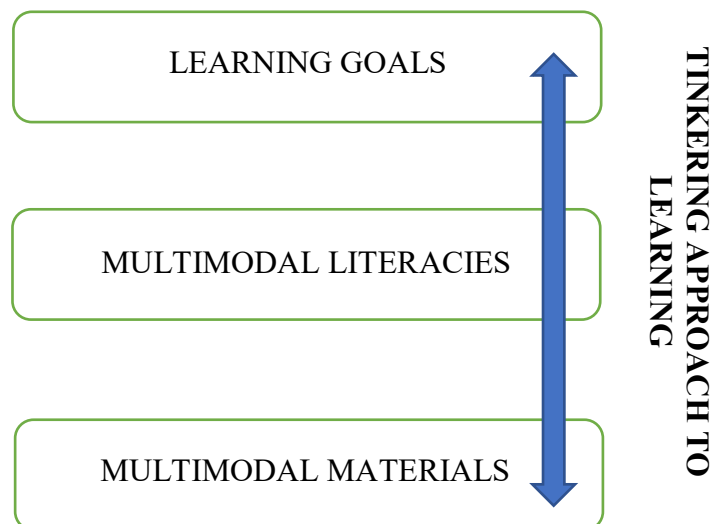


Figure 7. The proposed learning model

5.3 Methodological choices and considerations

In the nineteenth century, research in the social sciences aimed to neutralise the influence of the researcher on the “objective reality” (Poupart, 1997), echoing the dominant positivist perspective of the natural sciences. According to this view on reality, research should be a *reception of objective facts observed from the outside* (Poupart, 1997).

More recent theories accept the influence of the researcher on the data collection and their interpretation. Consequently, there is no objective “truth”, but the construction of reality differs from person to person: it depends on how people experience an event, and how individuals interpret it and make meaning according to their personal values (Rubin and Rubin, 2005). “Interpretivism” (Gadamer, 1960) is in line with the epistemological positions of constructivism and social constructivism discussed in Chapter 4, according to which knowledge is constructed or co-constructed by people based on their context and background. Interpretivism recognises the varied interpretations that different researchers may have of the data. In line with this, an understanding of phenomena observed is reached through personal and socially constructed experiences and meanings that guide the interpretation of the phenomena of interest. Taking this perspective on research means accepting that the researcher’s knowledge affects and influences the research, even if the researcher is not aware of it (Dey, 1993). Therefore, the researchers themselves become “instruments” for research, and their skills of listening, observing and interpreting are crucial (Rubin and Rubin, 2005).

However, this does not mean that the knowledge generated by research taking an interpretivist perspective is not empirically valid (Dey, 1993). Researchers should state clearly their choices and

theoretical beliefs to promote a contextualisation of the results. Indeed, it is the link between theoretical interpretation and empirical data generated through an appropriate methodology that generates scientific rigour (Rubin and Rubin, 2005). Accordingly, in this dissertation the specific context will be described within each of the following empirical chapters.

5.3.1 Exploratory qualitative research

As described throughout the previous chapters which led to the statement of the research questions, the present research involves an “exploration” of phenomena. Social science exploration has been defined as “*a broad-ranging, purposive, systematic, prearranging undertaking designed to maximize the discovery of generalization leading to description or understanding of an area of social or psychological life. Such exploration is, depending on the standpoint taken, a distinct way of conducting science – a scientific process – a special methodological approach (as contrasted with confirmation), and a pervasive personal orientation of the explorer. The emergent generalizations are many and varied; they include the descriptive facts, folk concepts, cultural artefacts, structural arrangements, social processes, and beliefs and beliefs systems normally found there*” (Stebbin, 2001, p.3). As explained by Stebbin (2001), researchers explore when there is no scientific knowledge about the process, activity, group or situation that is the object of investigation. For this exploration to be effective, researchers must adopt two special orientations to phenomena and data: *flexibility* when looking for and collecting data and *open-mindedness* about where to find this data. Exploratory research is primarily qualitative, sometimes supported by descriptive statistics. Furthermore, it is possible to achieve stable results through several concatenated studies that iteratively move from induction to deduction, like a grounded theory approach (Stebbin, 2001). The present research involves two steps of “concatenation”, utilising inductive approaches to data.

This research aims to understand the “how” of phenomena, promoting the creation of further hypotheses. Furthermore, in the previous paragraphs it was explained how the theoretical basis of the object of investigation is represented by fragmented literature, which is often interdisciplinary and explicitly guided by researchers’ epistemological and disciplinary choices on disabilities, technology design and learning. In contrast to the structured format of quantitative methods, qualitative research aims specifically to explore phenomena by asking similar questions such as “why” and “how”, without testing variables but trying to generate and discover them through a fluid and dynamic process in which serendipity plays an important role (Corbin and Strauss, 2008). Therefore, the object of investigation is constructed progressively, and it is refined during the different steps of the research process. By choosing qualitative methods, the present research design was flexible, with the first phase informing the second, and then the first and the second guiding the design of the principles, and their final exploration in context.

5.3.2 Phase I

The specific aims of Phase I were to explore (i) how multimodal literacies mediate the participation of young people with dyslexia, and (ii) how multimodal affordances mediate identity work. Given the little literature available on the issue, the main goals of this empirical study were to help formulate more specific research questions for Phase II. Furthermore, the research provides further directions for investigations about the nature of dyslexia and understand the processes which shape practices of online expression and communication, exploring how they mediate inclusion and participation.

Interviews

To achieve the two specific aims of this phase of the research, we chose to conduct semi-structured interviews, discussing with young people with dyslexia their *sharing* and *interpretive practices* on Facebook and Instagram, using some of their personal posts and posts on public pages to generate meaningful conversations relevant for the research questions of interest. In the context of qualitative research, interviews can be defined as an extension of a normal two-person conversation that is started and guided by the researcher with the aim to collect information relevant for the research (Willis, 2008; Rubin and Rubin, 2005). As Dey pointed out (1993), when the aim is to promote the understanding of participants' points of view, and in this specific case the construction of their own communicative and learning space, interviews are usually a very efficient method of data collection.

Given the exploratory approach taken in this phase, interviews were very flexible. In particular, the interview questions were adapted to reflect the emerging practices of participants. Indeed, semi-structured interviews involve a set of pre-determined, open questions that act as guide for the researcher and they are presented in no fixed order (Aldridge and Levine, 2001). However, importantly, new questions and points of discussion might emerge during the conversation (Aldridge and Levine, 2001). In the interest of the present research, the initial choice was to focus on Facebook, because after analysing the affordances available in the most common SNS, it proved to be the “most multimodal” digital environment. However, the inquiry was extended to Instagram when it became evident that participants used multiple SNS, and among them Instagram was often dominant. Therefore, during the interviews it was particularly considered which SNS each participant preferred to use and why, adapting the questions to the different contexts and practices, and being open to new opportunities for conversation. As Rubin and Rubin explained (2005), the attitude of the interviewer must involve more “active listening” than questioning in an aggressive way. Consequently, the

interviewee will feel free to talk about what is important for “them” (Poupart, 1997). Accordingly, during the interviews a comfortable interview setting was created, minimising the verbal intervention.

A fundamental aspect of this method is the creation of a relationship of *trust* between the interviewer and the interviewee. As a starting point, research goals and context should be stated clearly, and anonymity needs to be guaranteed at each step of the research. All these factors, together with the interviewer’s neutral and emphatic attitude, can foster spontaneous, meaningful contributions (Poupart, 1997). In addition to the personal attitude during interviews, to avoid possible socially desirable responses dyslexia was never discussed directly, as well as its impact on the interpretive and sharing practices.

To gain an understanding of the context, and interpret young people’s interviews in plausible ways, it was decided to also interview teachers and parents with the aim to understand participants’ individual profiles, difficulties and strengths. This data was used as background data, useful to interpret some of the responses (Shenton, 2004). However, in some cases it provided the context for specific actions and practices, such as online bullying episodes or situations where English is the participant’s second language. During the analysis, this data was triangulated with young people’s interview data to promote a richer and more precise interpretation.

5.3.3 Phase II

Phase I was conducted in the United Kingdom and it involved English native speakers aged 14-16 with a diagnosis of dyslexia or with suspected dyslexia; Phase II was carried out in Italy, and it included group-work with Italian speakers aged 14-16 with a certification of dyslexia. The fact that

the two studies involved teens with dyslexia speaking different languages does not represent a limitation. As Ziegler and Goswami pointed out (2005), the neurobiological traits of dyslexia are universal. The differences across languages are limited to the percentages of manifestation, according to how the phonology of the specific language is represented in orthography.

Phase I helped to refine the research interest, identifying visual literacy practices as a preference and means to foster dyslexic teens' participation online. Building on this, Phase II aimed to understand how young people with dyslexia engaged with and learnt through visual literacy in multimodal digital environments. In particular, the interest was in understanding the complex dynamics between setting goals and their accomplishment. Indeed, elucidating the interactions among new visual literacy, goals and dyslexia can move the field of education beyond the basic idea that visual resources (e.g. images, videos) are apt for dyslexic learners, to a nuanced understanding of the ways in which the interaction between individuals with their multimodal literacy skills and the multimodal materials foster particular kinds of learning goals. Accordingly, the main aim of Phase II was to understand (i) what kind of goals emerge while tinkering with VL materials. Furthermore, considering the social ways in which literacies are practiced, defined and informed through joint meaning making, the second aim was to investigate (ii) how meaning making through VL is accomplished while defining goals within affinity groups.

Participatory workshops

To answer the research questions of Phase II, two 1.5 hours workshops were organised in each of the two schools taking part in the research. A workshop is usually defined as an intensive, brief educational activity for a small group of individuals in a specific field that emphasises their

participation in problem solving efforts (Webster, 1977). Active, experiential activities and mutual learning happen within the group, in which people share activities and spaces, both physical and digital (Numa et al., 2008). Usually, a workshop is organised and arranged by a person who acts as *facilitator* for the activities.

It is possible to identify different elements that come into play while designing and performing a participatory workshop. In particular, there are (i) participants, (ii) facilitator(s), (iii) space, and (iv) the task. In the present case, the participants were young people with dyslexia. While I was present in the room during all the phases, monitoring the sessions unobtrusively, at times, I acted as a facilitator to ensure that the work was proceeding, and that participants' questions were answered. About space and tasks, they were designed according to the research contexts and aims. The context of interest were open multimodal digital environments, e.g. social network sites and the Internet. Therefore, to situate the activities in this context each teen was given a computer with an Internet connection. The activities were designed around the main characteristics of multimodal literacies in multimodal digital environments: they fostered participants' choice and learning about a semiotic domain; through group-work, the activities promoted the development of an affinity group around the semiotic domain of interest; they lacked explicit scaffolding and structure, allowing participants to set and accomplish their own learning goals; they required participants to re-elaborate the content into a multimodal digital artefact to be presented to an audience (in this context, other groups and the facilitators) at the end of the work. The task was to construct one story within each group.

As Stainert explained (2000), after a careful planning of the goals and activities, flexibility is one of the key elements for a successful workshop. Indeed, given the active participation of other people in the proposed activities, plans can change, and researchers need to be ready to adapt the activities and

their involvement according to the situation. More broadly, Stainert (2000) proposed 12 practical tips to carry out a good workshop. Her suggestions guided the concrete realisation of the sessions with young people:

“Pre-workshop planning

- 1. Define your objectives for the teaching session*
- 2. Find out who your audience will be*
- 3. Determine your teaching method and design the appropriate workshop activities*

The Workshop itself

- 4. Introduce the group members to you and to each other*
- 5. Outline your objectives for the teaching session*
- 6. Create a relaxed atmosphere for learning*
- 7. Encourage active participation and allow for problem solving and/or skill acquisition*
- 8. Provide relevant and practical information*
- 9. Remember principles of adult learning*
- 10. Vary your activities and your style*
- 11. Summarize your session and request feedback*
- 12. Enjoy yourself - and have fun!” (Steinert, 2000).*

Screen recordings and video recordings

Different conceptualisations of video research exist. The work by Derry et al. (2010) that guides the present research is based on conceptual psychology (Zacks and Tversky, 2001), and it addresses four sets of challenges when collecting, storing and analysing data in complex technological

environments: (i) selection (which elements to record in a complex environment); (ii) analysis (what analytical framework to use for the research problem under consideration); (iii) technology (which technological tool to choose to support collecting, storing, analysing, reporting and sharing videos); (iv) ethics (how to adequately protect the rights and privacy of the human subjects recorded) (Derry et al., 2010).

Derry et al.'s (2010) conceptualisation guided the video data collection and analysis. In particular, regarding data collection, their framework identifies the existence of multiple events in each video recording. They propose a process of decomposition of complex events into specific parts, according to both the researcher's perception of the events, and what happens objectively in the recordings (Goldman-Segall, 1998; Leacock, 1973). After this first part, the researcher's *interest* and *aims* define the "critical events" to consider for the analysis. The selection of critical events can follow an inductive or deductive approach. The former applies when there is not a strong orientation theory that guides the coding. The latter identifies a precise theory guiding the research and specific research questions (Derry et al., 2010). The present analysis follows an inductive approach to data selection.

Learning science research is being transformed by new, affordable high-quality video technologies. Video research is usually apt for studies that examine teaching and learning in the classroom with the purpose to improve learning design and context, and studies that focus on the investigation of learning in informal contexts with particular attention to the interactions between different actors (Derry et al., 2010) and objects. Thanks to these technologies, data can be stored and viewed by different researchers, allowing multiple and more plausible interpretations. In phase II of the research, each computer screen was recorded to register the interactions between individuals and the technology,

and emergent group conversations. Furthermore, each session was filmed with a portable digital video camera secured to a tripod placed in one corner of the room, so that all the participants were in the frame. The camera was placed behind the participants to avoid recording of faces while capturing the whole scene (i.e. verbal and non-verbal interactions in each group; computer screens at a distance).

Post-interviews

Workshops were followed by an hour long semi-structured interview with each participant. The interviews provided first-hand accounts of participants' own perceptions of their learning, allowing me to triangulate the interpretations of the videos. I have already explained the method in the present chapter. The same approach was used in a different context and with a different aim: three meaningful video extracts for each participant were selected, and it was decided to ask questions with specific attention to the role of each participant in the selected video extract. Again, to avoid socially desirable responses, the questions did not directly refer to dyslexia and its impact on how the MDE were used. The 3 video extracts were used as a probe to understand the environments and tools used, the learning that takes place in relation to VL, and its social and individual aspects (e.g. if the video extract involved social activity in some form; roles and collaborative or peer learning episodes; individual learning moments). To collect systematic and consistent data, it was decided to repeat the same questions for each of the extracts presented to a participant.

5.3.4 Phase III

Design-based research

Design-based research (DBR) was advanced initially by Collins (1992) and Brown (1992) through *design experiments*. The aim of design experiments was to test and refine principles of educational design derived from previous findings through formative research (Collins et al., 2004). DBR was conceived to address issues in the investigations of learning, such as theoretical questions about the nature of learning in real-world contexts, and the development of more flexible and realistic measures of learning (Collins et al., 2004).

An important aspect of DBR is the presentation of design principles in a form that aims to be transferable in other contexts, by adapting the principles (Reeves, 2006). In practice, these principles can refer to different aspects of learning design such as its planning and development (van den Akker, 1999). Therefore, they should be expressed in a form of language that can inform practice, to be usable by teachers and designers encountering similar problems. (Wang & Hannafin, 2005). Pragmatically speaking, design principles are usually presented in a form that lists aspects and features of particular learning environments, and their outcomes (Herrington et al., 2009). When presented in this form, they often start with a verb, such as in Jonassen's work (1994). He proposed that knowledge construction might be facilitated by learning environments that:

“• *provide multiple representations of reality, which avoid oversimplification*

• *focus on knowledge construction, not reproduction*

• *present authentic tasks (contextualising rather than abstract instruction)*

• *provide real world, case-based learning environments rather than pre-determined instructional sequences*

• *foster reflective practice*

• *enable context- and content-dependent knowledge construction*

- *support collaborative construction of knowledge through social negotiation, not competition*” (Jonassen, 1994, p. 35).

Similarly, a set of pedagogical design principles was developed, intertwining the theories presented in the previous chapters and the empirical findings generated in Phases I and II. These principles have been used in two participatory workshops with secondary school teachers which had the aim to co-design inclusive learning activities. The participatory workshop method was explained in the previous paragraphs. The method has been adapted here with the aim to co-design learning activities, contributing to verify the consequential validity of the principles developed (Messick, 1992), and their potential impact on education when appropriated by secondary school teachers. Indeed, if one believes that context matters while investigating learning (Barab et Squire, 2004), as educational researchers stress in their work, lab studies or theoretical developments provide arid data.

Narrowing on the design sessions, the aim of participatory design methods to involve users and stakeholders as co-designers promotes the consideration of end users’ needs, values, and experiences through mutual learning dynamics among participants (Muller and Khun, 1993). PD is a set of theories and studies involving end-users as full participants in design activities leading to the development of hardware and software computer products, and other computer-based activities (Muller and Khun, 1993).

In particular, individuals’ participation can be configured in different ways, and it can be interpreted as a balance between “tradition” (people’s current practices and experiences to inform design) and “transcendence” (reflection on what individuals do to go beyond their traditional practices, generating

new possibilities) (Vines et al., 2013). Building on this conceptualisation, in the context of ubiquitous computing, Hornecker et al. (2006) theorise the existence of “opportunity spaces”, where there are not urgent problems to be solved, but there is potential to generate new ways to enhance practices. The authors (Hornecker et al., 2006) aimed to generate new educational practices through design methods. Taking a similar view, the aim of this last empirical study is to explore what form of transcendence teachers envisioned in their practices while designing new pedagogies based on the design principles proposed.

5.3.5 Data analysis

Phase I, II and III generated a large amount of data in different forms, at different times. Phase I provided for audio data that have been transcribed and analysed. Phase II mainly generated video data which have been coded according to Derry et al. (2010) and post-interviews that have been transcribed with the aim to triangulate them with the videos, and a set of digital artefacts. The data collected in Phase III were (i) a set of principles, (ii) a body of digital artefacts created by teachers that describe the learning activities designed, used as descriptive data, and (iii) audio data that was coded and analysed.

Qualitative data analysis

Qualitative analysis allows to stress the complexity of the phenomena investigated (Derry, 2010). However, in contrast to quantification, it requires the researcher to draw on his or her experience and intuition, trying to interpret the reality from the perspective of participants and generating discoveries that can contribute to the development of knowledge in both empirical and theoretical fields (Corbin and Strauss, 2008). To achieve this, the researcher is asked to make a *selection* according to the

research aims and the researcher's perception, with the awareness of the subjectivity involved in this process (Corbin and Strauss, 2008).

There are many ways to analyse qualitative data. Braun and Clarke (2006) divide them into two broad categories according to their applicability across different epistemologies. In particular, the first group of analytical methods, which comprehends for example conversation analysis, which provides a recipe that guides analysis and does not allow variations within the proposed framework. The second category includes methods that do not depend on specific theories or epistemologies and can be applied *across* these in a flexible way, such as thematic analysis (Braun and Clarke, 2006). This does not mean that coding and analysis are not performed *systematically* according to specific rules. As the authors explained in their paper, the "anything goes" critique that is typical of qualitative research can be avoided by following a specific process and rules to code the data and generate themes. Thematic analysis as conceptualized by Braun and Clarke represents the main analytical method of phase I, II, and III.

Broadly speaking, thematic analysis is a method used to identify, analyse and report patterns (themes) within qualitative data. Its strength is describing the data set in rich, meaningful ways through minimally organised themes (Braun and Clarke, 2006). Patterns and themes can be generated in two main ways: a bottom-up or inductive way means that themes are linked to the data themselves, and there is no theory that guides the data analysis (Frith and Gleeson, 2004). Therefore, inductive thematic analysis can be defined as the "*process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions.*" (Braun and Clarke, 2006, p 83). In contrast, a deductive or "theoretical" thematic analysis is guided by the researcher's analytic or

theoretical interest, and it provides a less rich description of the dataset, while presenting specific aspects of it in detail.

5.4 Ethical considerations

Every research involving human beings should follow rigid ethical guidelines to respect participants' privacy and rights and develop a relationship of trust between researcher and participants that is fundamental for qualitative research. The present research has been conducted in different countries. In particular, Phase I took place in United Kingdom, while the following Phases II and III were carried out in Italy. For this reason, it was decided to follow a set of basic ethical principles during all the research phases (Dowling and Braun, 2010), and in particular:

- Obtained informed consent from participants;
- Obtained informed consent from participants' parents when participants were younger than 18 years old;
- Guaranteed participants' anonymity and confidentiality of information at every step of the research;
- Stated clearly that participants had the rights to withdraw from the study at any time, with no consequences. In that case, the data collected would have been cancelled.

Furthermore, Phase I adhered to the BERA Professional Ethics Code, and it was approved by the Research Ethics Committee of the UCL Institute of Education before collecting data. The following two studies conducted in Italy followed the same guidelines.

All the information sheets and consent forms used to involve participants in the research can be found in Appendix 1.

5.5 Implications

This Chapter stated the research aims and research questions, and it discussed the methodological choices guiding the three empirical studies that are presented in the following sections.

Chapter 6.

Phase I: Participation and Identity

The Chapter describes methods, results and discussion of Phase I.

The empirical study was designed in Autumn 2016 to explore how the multimodal affordances available in multimodal digital environments mediated participation and multimodal literacies for dyslexic young people, and how the multimodal affordances interact with their identity work. To achieve this, the paradigm of neurodiversity was used as theoretical scaffold to challenge the conceptualisation of dyslexia as a deficit. Indeed, difficulties with literacy may reflect different strengths and opportunities for dyslexic teens' learning.

6.1 Research questions

RQ1: How do multimodal affordances of SNS mediate participation and new literacies for dyslexic youth?

RQ2: How do multimodal affordances used by dyslexic youth mediate identity work?

6.2 Participants

8 young people were recruited from two secondary schools in London (UK) who voluntary took part in the research. The inclusion criteria were:

- Being aged 14-16;
- Having a diagnosis of dyslexia or being suspected of having dyslexia
- Having a self-assessed experience with SNS.

In addition, one teacher and two parents were involved in the study. Before the study commenced, all the participants gave an informed consent, and in the case of young people it was also required an informed consent from the parents. A copy of each form is included in Appendix 1. At the end of the recruitment process, the participants were:

Participants' ID	Gender	Age	Diagnosis
[P:1]	Female	15	Yes
[P:2]	Male	15	Yes
[P:3]	Female	15	Yes
[P:4]	Female	14	Yes
[P:5]	Female	16	Yes
[P:6]	Male	16	Yes
[P:7]	Female	15	Yes
[P:8]	Male	15	Suspected

Table 1. Summary of participants

6.3 Research Approach, Procedure and Data Collection

Given the very little research in this area, it was decided to adopt an exploratory approach to research (Stebbin, 2001), using qualitative methods with the aim to understand dyslexic teens' practices in two SNS: Facebook and Instagram (Greenhow and Robella, 2009). As explained in chapter 4, the aim of

this kind of research is not to claim a quantitative, causal relationship between phenomena. Instead, the goal of the study is to explore how experiences and characteristics associated with dyslexia are experienced in SNS and their multimodal affordances. The final aim is to understand the *processes* which shape online expression and communication, understand how the strategies mediate inclusion and participation, and generate hypotheses about dyslexia and its nature.

With these goals in mind, a semi-structured, individual interview was conducted with each of the eight participants. Each meeting lasted up to 60 mins ($M = 47$ mins). In particular, while interviewing the six participants from school 1, a teacher was present in the room, and the interviews took place during school hours. The two participants from school 2 participated in the research after school, and the meeting was organised in their respective homes. After the eight interviews, it was possible to reach data saturation (Fush and Ness, 2015), thus it was decided to end the data collection. This means that the data collected allowed to answer in a credible way the two research questions.

The interviews were conducted in a flexible way, thus the guiding questions were adapted to the specific SNS practices identified for each of the participants involved in the research. For instance, the initial decision was to focus on Facebook. However, after analysing the different modalities of expression available in the most common SNS (e.g. Instagram, Snapchat) among teens (Kemp, 2017; Livingstone et al., 2014), Facebook resulted to be the environment with more modalities of expression available. Indeed in 2016, the year in which data were collected, Facebook offered: text, videos, images, GIF, emoji, tag, geotag, external links and feelings/activities. Therefore, its multimodal affordances resulted as the best means for answering the research questions. However, after the first

interview it was decided to also include Instagram, once it emerged that teens employed a mix of SNS, and the use of Instagram was often dominant.

During the interviews, it was considered what SNS each individual used most and why. More broadly, a comfortable interview setting was created, with an attitude of active listening and generally minimising the verbal intervention. Furthermore, dyslexia was never discussed directly, as well as its influence on SNS practices to avoid discomfort or similar consequences. The interview involved 4 parts:

1. Initial, general questions about the participant's use of SNS (e.g. time usually spent in SNS, preferences for reading others' posts or posting); reasons for using the platforms.
2. Reflection on up to 4 recent Facebook and/or Instagram posts to ensure that participants could recall their composition process. Posts were selected by each participant from their personal profile. The goal during this phase was to understand their online *sharing practices*. The choice of the platform to consider was guided by the participants' reflection on their use of SNS. In particular, participants were asked to:
 - a. re-construct the process used to compose each post;
 - b. the meaning they wanted to convey while sharing the post;
 - c. their goal when sharing the post.

We went on to discuss both the different modalities of expression they used in the post and the order of modalities they used to construct it.

3. Reflection on up to 4 posts that were chosen by the participant from a set of public Facebook group pages. The goal during this phase was to understand their online *interpretive practices*. The Facebook group pages were selected after consulting with the teacher taking part to the

research, to ensure their relevance for the teens involved. The selected group pages regarded either art and design and/or videogames. Participants were given a few minutes to explore the Facebook page, with the task to choose a post of interest. Then, they were asked:

- a. to express why they selected a particular post;
 - b. their understanding of the post picked;
 - c. to discuss the modalities of expression available and their order in the comprehension process.
4. Debriefing about the perceived and real goals of the study, and participants' overall reflection about their practices in SNS.

The eight interviews were recorded and transcribed for analysis together with the Facebook and Instagram posts forming the interview focus. In total, 28 personal posts (*sharing practices*), and 20 posts from public pages (*interpretive practices*) were saved and discussed. It was decided to also conduct three additional interviews with one teacher from school 1 and two parents. These data were used to triangulate with young people's interviews, and ensure the interpretations of them (Carter et al., 2014). Indeed, this triangulation of data allowed to (i) understand the individual profiles of participants, their general difficulties and strengths, (ii) they provided for background data to interpret some of the answers (Shenton, 2004). Furthermore, in a few cases these data allowed to understand the *context* of a particular action, supporting the interpretation of the reasons behind their choices. In particular, the questions investigated:

- Difficulties and strengths of each student at school, considering their curriculum;
- Their family situation, and its potential consequences on behaviours online;

- Relevant situations potentially related to dyslexia and SNS practices (e.g. bullying in SNS, English as a second language).

For the two participants who were interviewed at their respective homes, a similar structure was followed in a questionnaire, asking their parents to complete it according to their children's strengths and difficulties while doing homework, and for optional comments on the issues mentioned above.

6.4 Analytic approach

The research took an interpretivist view, recognising the multiple interpretations that different individuals can have of the data collected. In line with this conceptualisation, understanding phenomena means building personally and socially constructed experiences and meanings which in turn guide the interpretation (Gadamer, 1975).

Taking this view on research, an inductive thematic analysis was performed according to the systematic coding process by Braun and Clarke (Braun and Clarke, 2006). The analysis initially identified 9 coding categories which have been organised subsequently into themes based on the key research questions (i) existence and nature of constructive practices by dyslexic young people in SNS, both while sharing and understanding posts in multimodal SNS, (ii) the modalities in which SNS affordances mediate the identified practices, and (iii) identity work. Two researchers reviewed iteratively the analysis with the aim to ensure that the themes expressed the entire data set. Furthermore, it was tried to avoid biases during data interpretation by discussing the results a few times, ensuring that the interpretations of practices in contexts of dyslexia were not influenced by theoretical assumptions or overextended. During this analytical phase, it was decided to consider previous literature to ground the interpretations in the existing research. To improve the validity of

the analysis, it was decided to triangulate data from the participants' interviews, their teacher and the two parents, also considering the modalities of expression used in the posts discussed, enabling to develop a deeper understanding of the context, goals and motivation behind specific practices.

However, during the analysis it emerged that the answers of P:5, one of the participants (P:5), did not fit within the identified patterns. As explained by P:5 during the interview, she admitted she did not have problems in the main domains related to dyslexia i.e. reading and writing. Her difficulties related mainly to her memory: *“I wouldn't say that my dyslexia is really... shown... through kind of this sort of stuff... like... it is not about kind of words and stuff that I read... [...] But it's more about... like... my memory”*. Within the guiding conceptualisation, this participant was then considered as a different neurotype. In particular, recommendations by Shenton were followed (Miles et al., 2013) to develop trustworthy conclusions using qualitative research approaches: during the analyses and discussion of the results this emergent 'negative case' was employed to compare the other participants' results (Miles et al., 2013). By considering the nature and role of multimodal interaction connected to another neurotype, it was possible to isolate more easily the reciprocal influences between dyslexia and multimodality, and its related struggles with reading and writing.

Going back to thematic analysis, it identified 9 codes which were shaped into three key themes that describe how multimodal SNS affordances interact with dyslexia:

Theme 1: *Relationships between visual modalities of expression and participants' perceived dyslexia* expresses the reciprocal influences between the pervasive practices of “reading” and sharing videos and images, and young people's perceptions of their own difficulties with literacy;

Theme 2: *Orchestration and functions of different modalities of expression* describes teens' interpretations of the varied communicative possibilities of text and image, with the “devaluation” of written words to a scaffold used to interpret visual modalities;

Theme 3: *Identity statements* captures participants' interpretation of SNS as “*safe spaces*”, where communication through visual modalities of expression is considered as socially admissible, but it involves the management of individuals' vulnerability.

6.5 Results

6.5.1 Relationships between visual modalities of expression and participants' perceived dyslexia

All the young people involved in the research showed an intense preference for the use of *visual* modalities (primarily images and videos) within the two SNS. This was confirmed by the analysis conducted on the SNS posts collected from the profiles of participants, the 95% of which was visual. In this context, only P:5 (who acted as a “negative case” in the analysis) showed a preference for written communication. Taking a neurodiversity perspective (Amstrong, 2011), the highlighted differences between P:5 and the rest of the participants could be attributed to P:5's different profile of strengths and weaknesses, with neurotypical reading and writing abilities, but problems with memory.

More broadly, sharing images and videos in SNS represented a pervasive practice in the group of participants, supporting the idea that new media and their multimodal features promote the development of multimodal literacies (Jenkins, 2006). However, results show that dyslexic participants tailored strongly their participation around specific modalities of expression, avoiding

orchestrated posts which included written words whenever possible. Similarly, when “reading” others’ posts in SNS, participants tended to focus on images and visuals.

Many of the participants related their visual practices of participation to their own perception of their struggles with literacy. For instance, P:1 declared: *“I don’t really write at all what I think [...] I mean, maybe I should write with it... it’s just easier not to”*. P:3 pointed out: *“It’s just easy for me to communicate for photos I think [...] It’s just tiring of me to write I guess... And I find it kind of confusing in what I write.”* P:7 expressed her preference for ‘reading’ images in Instagram: *“It’s easier for me because I’m not really fan of reading that much so it’s kind of easier for me the way they are presented so that I can understand what is going on, so I find it easier.”*

In particular, videos were considered as particularly appropriate when ‘reading’ complex content. While explaining this, young people identified videos as *“the most suitable means to convey the meaning of informationally dense content”* (Vezzoli et al., 2017). Echoing the findings described in the previous section, teens relied on their perceived difficulties to describe their reliance to the affordances of video. In particular, three participants explained how videos helped them with remembering new content. P:2 motivated this partly to the possibility to re-play videos: *“I prefer videos [...] because you can replay it... and keep replaying it... and it can stick more into your memory as a video...”* Two other participants argued that the transparency and fluidity of information in videos involved less processing and it was more effortless. As P:4 explained: *“When you have a video with voice it’s easier... because they can explain what they’re doing while if... if they don’t you just have to try to work it out by yourself and it took it... to process it... [...] because you don’t have to read it and you might not understand it... and maybe you might have to read it again.”*

Furthermore, three young people identified video as the more engaging modality thanks to their fidelity, and not only because this represents a way to avoid text. For instance, P:6 pointed out: *“Yeah I find it a lot easier for someone to talk it to me and... It’s more engaging in it while if it is writing and I don’t understand... like... you can never communicate if you write it fully... [...] and you get the people’s true emotions...”*

6.5.2 *Orchestration and functions of different modalities of expression*

Each modality’s communicative facility was interpreted by participants in different ways. For example, images were considered as an *informationally dense* modality. However, they also carry with them a high potential for ambiguous interpretations. Importantly, in a social context where online identity statement may lead to vulnerability (Moser, 2006), images were classified by participants as “safe” means for expression and self-presentation. The perceived ambiguity partially transferred the responsibility for the intended meaning’s interpretation to the recipient of the message, consequently decreasing the accountability of the producer over the message. P:3 explained: *“With photos you can say a lot, you can put a lot of meaning behind it, and people can interpret it how they want”*. However, at the same time producers can control the interpretations of their audience by moderating the ambiguity level that is intrinsic to an image. For instance, P:4 explained that while sharing an image she can decide to keep the meaning personal or send a specific message to her audience: *“You may have a meaning but anyone else can see it... that sometimes is OK and sometimes it’s not [...] Sometimes it’s like... the meaning is personal to you and you don’t want anyone to know but sometimes you want to send a message to everyone saying <Oh this is why...>”*.

Furthermore, the findings revealed that text was subjugated to a support for the visual. Indeed, within the SNS posts collected, text was sometimes present. However, it was included in the form of a very short comment that accompanied the main visual content, with the function of a quote, or as a decoration. For example, P:2 explained that he employed text “*randomly*” to complement the Instagram videos, using emoji “*just maybe to make it a bit nice...*”. Similarly, the same participant shared a picture of himself wearing an expensive “*hoodie*” on his SNS profile that was orchestrated visually with Chinese text caption (see figure 8). While reflecting on this practice, the participant pointed out that he was not able to read Chinese, and he translated an English sentence with an online translator. Therefore, it can be argued that the meaning of the Chinese ideograms composed an orchestrated cryptic message which was aesthetically significant.

Researcher: “*Why did you write it in Chinese?*”

P:2: “*I don’t know... I quite... think it went nice with it...*”

Researcher: “*And what did you want to say with that text?*”

P:2: “*I’m not really sure...*”



Figure 8. Examples from the posts discussed (from Vezzoli et al., 2017)

Using a similar practice, in her Instagram profile, P:4 shared a picture of herself in front of a mirror that was taken using the flash. Text accompanied the visual, with her writing “Flashhhhhhh” and adding an emoji of an explosion. While explaining the post orchestration, she revealed how the different modalities used reinforced one single message: *“I thought it went just well with the photo so... [...] Yeah just because it looks like an explosion or a flash or bang...”*

6.5.3 Identity statements

The perceived freedom to use images deliberately and orchestrate text in appropriate ways contributed strongly to participants’ perception that SNS are “safe” spaces where it is possible to leave the stigma of dyslexia behind. As explained by P:7, within SNS it is socially admissible to communicate through visual modalities and content, and to express oneself. For example, P:6, one of the participants, used the safe space to engage in an action of self-advocacy. Indeed, by re-sharing on his Facebook profile a video on a campaign which encouraged men to cry, his intentions were to bring his friends’ attention to the feelings and emotion that accompany dyslexia: *“because it’s like... with my dyslexia I don’t know what is related to, because I get frustrated with... what I can’t say in words in an essay... or whatever I get re-anger myself [...] and so I just got oppressed [...] and I explode... and it comes out and I cry and I hate things... and I say things I shouldn’t say”*.

Nonetheless, the idea of safe space was negotiated and reproduced as a result of participants’ perceived difference from their peers. Indeed, as explained above, text was generally avoided, but young people’s communicative intentions required written words sometimes. For instance, P:1 shared the unique written SNS post out of the 48 posts collected, a Facebook paragraph on charity fund raising. On closer inspection, she revealed that she had used an adult proxy to prepare her Facebook

status, out of fear that spelling mistakes might put both her credibility and that of her cause on charity funds raising at stake. In another example emerged during the interview with the teacher, it was discovered that one participant, P:8, had closed one of his personal SNS profiles after being bullied online due to his multiple orthographic mistakes in his captions and comments.

Most of the interviewees used mainstream identity practices. However, the results showed that two participants reinvented themselves in their SNS profiles, with the aim to reclaim power and status with their peers. For instance, during the teacher interview it was realised that P:2 came from a very difficult family, and he had suffered from depression. Subsequently, he re-constructed his identity by using SNS as an expressive forum. In particular, P:2 had acquired about 30,000 followers on his public Instagram profile, sharing contents about slimes and managing to earn money. He described his videos as *“on theme”* and *“quite cool”* but *“without meaning”*. He explained his popularity with his understanding and sensibility toward what his audience wants, for instance sensory videos of colours and shapes: *“I usually post and provide what they want, not what I want...”*. Adopting similar practices, before the bullying episode P:8 managed a public Instagram profile on videogames. According to his explanation, his posts were mainly *“videos about the kills... the funny kills... or funny kill camps... funny stuff that make people laugh”*. He also revealed the importance of his popularity and its effects on his status in relation to his peers: *“I got like 20k followers there... and my friends were like <Oh how did you get them, it’s hard to get them>”*.

The two participants also kept a private profile where they shared their tastes in fashion with their friends and audience and, crucially, both emphasised the value of their material possessions. In case of P:2, the material possessions were expensive, trendy skating clothes, while P:8 shared pictures of

rare and expensive clothes he could afford. During his interview, he talked about a pair of football shoes (see figure 8) he managed to buy. Soon after the purchase, he shared an image on this profile. While reflecting on this practice, P:8 emphasised the advantage that this post gave him over his peers: *“I like playing football and my friends know that and they would but they can’t have them. It’s hard to get them because they’re quite expensive... yeah... and my friends don’t know where to get them, you have watch videos of Youtube to find out when they’re gonna be... released... like... the shoes...”*

It can be argued that both boys developed creative ways to manifest their socio-cultural identity through fashion possessions and image, to re-claim status amongst both known and unknown audiences, and strengthen their self-esteem. However, while P:2 directed his practices to a wide audience and shaped them according to their tastes, the aim of P:1 was to gain popularity and become an object of envy of his school peers.

6.6 Discussion

Phase 1 was constructed as an exploratory study with a focus on dyslexic teens’ use of SNS. The research aim was to investigate how the multimodal affordances identified in SNS interact with dyslexia, discussing the practices employed by young people with dyslexia in environments where multimodal modalities of expression are accepted socially, and investigating how the practices promote various expressions of participants’ identity.

6.6.1 Multimodal affordances and literacies

Results revealed how dyslexic young people exploited visual modalities of expression in SNS, creating new ways to engage with text to shape their online self-presentation and expression. Indeed,

whilst it was found that text was generally avoided by participants, the choice of visual modalities promoted their feeling of *control* over their communication with others and their expression. Furthermore, video was considered as a particularly appropriate means to convey complex concepts and ideas.

Multiple studies have been conducted on how neurotypical young people use SNS, showing that the use of visual modalities of expression are quite common among young people (Davies, 2011; Livingstone and Lunt, 2013). However, the same researches identified social networking through text as an approach widely used for online participation (Davies, 2011; Livingstone and Lunt, 2013). Within the group of participants, the text-based pattern of practices did not emerge. In fact, the data revealed an intense preference for other sorts of multimodal compositions orchestrated in different ways, and text did not represent a valuable vehicle to convey meaning. This conclusion poses multiple implications of cross-disciplinary nature.

First, the finding extends Jenkins' work on multimodal literacies (Jenkins, 2006), supporting the view that specific groups of individuals may have an explicit or implicit preference toward *visual* practices while sharing and interpreting multimodal orchestrated compositions. Consequently, this indicates the emergence of new, creative forms of *visual literacies*. As Kress explained (1998), this shift toward the visual is changing the significance of the verbal expression, and it may lead to the "*the full development of all kinds of human potentials*" (Kress, 1998, p.75), promoting a more extended and fuller expression of individuals' personal strengths. In this context, just a small group of isolated studies casted a cognitive lens on the theory of neurodiversity (Attree et al., 2009; Everatt et al., 2008;). These studies showed that teens with dyslexia may have a set of strengths associated with

their visual skills. However, given the limited body of studies, this literature has not played a meaningful role in the current conceptualisations of dyslexia, or on the ways in which other neurotypes are considered. However, despite the findings showed a wide use of visual *interpreting* and *sharing practices* in SNS, it was also recognised that there are other factors in play, and that these factors may have influenced the practices collected. To us, this empirical work may motivate further research with confirmatory aims.

In addition, these findings might inform formal education contexts. Indeed, it was asked whether the identified multimodal literacies can shape the design of learning materials and planning of assessment strategies, by considering the needs and building on the potential and strengths of dyslexic students. This question was asked with the purpose to challenge the prevalence of and reliance on the written modality throughout education, while also considering recent calls for a transformation in formal education which legitimises forms of multimodal assessment (Hung et al., 2013; Vincent, 2006; Wyatt-Smith and Kimber, 2009). Furthermore, it was asked whether visual literacy might help dyslexic learners to develop a richer and meaningful “vocabulary” to communicate their ideas and for their self-expression, offering a window onto their strengths to their educators, and consequently a potential for shaping the educational support accordingly.

6.6.2 Socially constructed statements of identity

The social model of disability in its extreme forms advocates the idea that individuals become disabled as a result of their context and environment (Cooper, 2006; Elliott and Grigorenko, 2014; Macdonald, 2009). This conceptualisation can be applied to dyslexia, and its main argument is the non-existence of dyslexia in pre-literate societies (Benton et al., 2014). More moderate positions

exist, and they accept the objective existence of disorders at a neurological level. However, at the same time they would take a *strength-focused view of dyslexia* (Attree et al., 2009; Everatt et al., 2008; West, 2009). In line with this, they would give value to the learning preferences and differences related to dyslexia when designing inclusive environments (Mendenez-Blanco et al., 2017). In line with these two perspectives on disabilities, all the participants recognised how the SNS *designed* environment was a “*safe space*”, which did not promote a “normalising” view of dyslexia. Their perceived sense of safety was an outcome of their agency and feeling of control in orchestrating carefully their posts and their identity statements. For instance, text was mainly used as a secondary cue to reinforce the interpretations of contents expressed with visual modalities. Alternatively, it was employed as aesthetic element, enhancing the meaning of the posts. Images also helped to moderate ambiguity, in turn ameliorating teens’ vulnerability in the SNS context with respect to the ways in which they might be “seen” by their audience and peers (Goffman, 1959; Litt et al., 2014). This reveals another strategy for self-presentation in online context that reflected strongly in their preference and tendency toward visual literacy. Importantly, young people perceived these forms of identity management and expression as widely accepted by their peers.

At a superficial level, these conclusions concur with research by Barden who pointed out how SNS can be considered inclusive environments (Barden, 2014). Based on the findings, it is posited that the impairments associated with dyslexia are *different* and *weaker* in digital spaces that privilege interactions in multimodal forms. However, as Moser explained, disability is configured in different ways, according to the order in which people, technology and material arrangements interact (Moser, 2006). The conclusions provide further insights into the nature and configuration of such ordering,

by showing how participants “*expressed, re-created or even confronted their differences in SNS*” (Vezzoli et al., 2017).

In this context, most of the teens taking part to the research discussed their practices in SNS through their perceived difficulties with literacy. This allowed an evaluation of the different modalities’ potential for their expression. However, at the same time it revealed that “difference” as part of an individual’s identity was not circumvented. Indeed, in contrast to the normative view of difference as “negative”, the results showed that young people’s evaluations of both the environment and themselves fostered complex experiences, i.e. the use of metacognitive skills to choose the most appropriate affordances of the designed environment, and for what purposes (Everatt et al., 2008).

These differences were not only expressed while discussing the multimodal practices, but they were re-constituted by using SNS as a forum to reclaim importance and status. For instance, one of the participants achieved this by shaping his online posts on his followers’ tastes, aiming to gain others’ approval and acceptance through his creative potential and talent. While researchers were aware that it could be argued that this sort of identity practices is relevant to young people more broadly, the findings are significant in showing how teens who are often marginalised at school (Miles and Miles, 2004; Singer, 2008) have equal opportunities to their peers to express themselves in online context. Empirical research by Steinfield et al. (2008) has showed that low self-esteem – as for the major part of individuals with dyslexia (Burden, 2008) – can reflect more social capital in online social contexts. Accordingly, the results of the present study suggest future research that investigates if and how self-esteem is mediated through the SNS’ opportunities for identity construction and manifestation around one’s personal strengths. Furthermore, strategically, two of the participants shifted their differences

with their peers from *literacy abilities* to *cultural possessions*, by showcasing new, selected objects in their personal profiles.

6.7 Implications

Phase I explored dyslexic teens' use of SNS. The goals were to understand (i) how the multimodal affordances available mediated participation, and (ii) how participants' identities were expressed through the SNS affordances. Among the participants, a strong use and preference of visual modalities of expression was identified, promoting the understanding of multimodal literacies. In particular, visual literacies have an important role in fostering dyslexic teens' participation, while extending normative, medical views on dyslexia to give more emphasis to possible visual strengths.

Although the exploration focused on Instagram and Facebook, the findings offer implications to similar socio-technical contexts including this sort of multimodal affordances. Furthermore, the analysis contributes to the universal design agenda by showing how designed possibilities promote inclusive practices in SNS, while also revealing how young people with dyslexia experience both vulnerabilities and opportunities in socially situated, and constructed ways.

To conclude, combining a multimodal conceptualisation of literacy with the potential and preferences of dyslexic teens allowed to contribute to the "*reframing*" of the *status quo* of technology for dyslexic people that tends to "*enable individuals to live as competent normal subjects by trying to compensate the gap with so-called neurotypical individuals through a continuous reproduction of the boundaries between disabled and abled*" (Vezzoli et al., 2017).

Chapter 7.

Phase II: Visual Literacy and Learning

This Chapter presents the methods and results of an empirical study aiming to investigate the opportunities of visual literacy for the learning of young people with dyslexia in open multimodal digital environments (social network sites and similar Web 2.0 technologies).

Phase II was designed in Spring 2017, and it took place in Veneto, Italy. In a similar fashion to Phase I, dyslexia was reframed as a learning difference, according to the paradigm of neurodiversity. Furthermore, the aim to investigate learning required careful choices about its definition and coherence with an existing learning theory, and decisions on which aspects of the learning processes under investigation to focus on. At the end of this theoretical review, it was decided to adopt a social constructivist, goal-oriented view of learning, asking how teens with dyslexia engage with and learn through visual literacy while setting and accomplishing their learning goals in open multimodal digital environments.

7.1 Research questions

Phase I showed that *visual literacy* (VL) plays an important role for dyslexic teens and their digital communication in multimodal spaces where the environment's affordances and individual strengths interact with each other (Vezzoli et al. 2017). In line with these findings, it has been argued that more

broadly individuals can privilege one modality over the others when practicing multimodal literacies, considering the preferred modality more *reliable* in their reading process (Jewitt, 2006). In particular, Jewitt (2006) specified that particular groups of individuals with certain kinds of skills such as young children, or digital literate individuals may privilege colour and images over writing while reading digital multimodal texts.

The concept of VL was first proposed in the '60s. However, today a definition and structured theory on VL does not exist (Braden, 1996). This is probably due to the fact that VL is defined in different ways in different disciplines, for example in linguistics and psycholinguistics, art, aesthetics, philosophy, communication theory, educational technology and so on (Avgerinou and Pettersson, 2011). Many models have been proposed to structure a theory of VL (Flory, 1978; Griffin and Whiteside, 1984; Reynold-Myers, 1985; Seels, 1994; Avgerinou and Pettersson, 2011). Among these, Avgerinou and Pettersson in 2011 identified several elements constituting VL from an interdisciplinary point of view: visual perception; visual language; visual learning; visual thinking; visual communication.

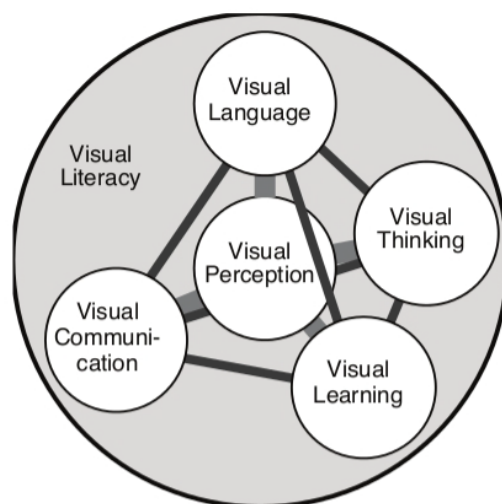


Figure 9. The elements constituting Visual Literacy (from Avgerinou and Pettersson, 2011)

In the interest of the present study, VL can be defined as a group of skills enabling an individual to comprehend and use visuals for intentional communication with others (Ausburn and Ausburn, 2006). Therefore, VL is the ability to make meaning through visual materials.

To the best of our knowledge the opportunities that visual literacy offers for the learning of individuals with dyslexia have not yet been explored. Given the lack of previous literature and the aim of this study to fill the gap through an empirical investigation of learning in MDE, the study narrows down on learning goals, more broadly considered as one fundamental aspect of the learning process (Dickhäuser et al. 2011). In particular, phase II aims to investigate how dyslexic young people practice VL and learn in MDE, by focusing on the interactions between individuals, VL materials and goals in the process of tinkering (Resnick and Rosenbaum, 2013).

Elucidating the interaction between VL, goals and dyslexia can evolve the basic educational idea that visual materials (e.g. videos, images) are apt for learners with dyslexia, to a critical and nuanced understanding of the nature of the literacies used, how the interaction between individuals and literacies materials promotes the setting and achievement of particular kinds of learning goals. In line with this, phase II asks:

RQ1 – What kind of goals emerge while young people with dyslexia tinker with VL materials?

Furthermore, situating learning within MDE recognises the social dynamics through which literacies are learnt and practiced, in particular through *joint meaning making*. Thus, the second goal is to understand:

RQ 2 – How is meaning making through VL accomplished while defining goals within affinity groups?

7.2 Methodology

7.2.1 Participants

Thanks to the support of the Italian Dyslexia Association's section of the province of Venice in Italy, 15 secondary schools were approached. Out of 6 schools responding, 3 of them were selected according to their technical curriculum. This ensured that participants would have the digital skills needed to engage meaningfully in the MDE considered in this study. Then, through the Special Education Needs coordinators working in the schools that participated to the study, Italian native speakers aged 14-17 with a valid diagnosis of dyslexia were approached. Furthermore, it was ensured that participants did not have additional important comorbidities (autism, ADHD) or learning disabilities, allowing to focus on the participants' dyslexia profile and their use of VL in MDE. These 3 criteria (technical skills, age and diagnosis) formed part of a “criterion sampling approach” (Patton, 2002). At the end of the recruiting process, which involved 38 young people and their parents and following informed consent by both, 16 young people took part in the research.

7.2.2 Context and Procedure

The research was organised in after-school workshops. The activities were planned around the construction of a story that was accomplished with the use of MDE. Indeed, the potential of narrative activities to enhance motivation is widely accepted (e.g. Hung et al. 2012), ensuring the engagement of participants in the task. Furthermore, given the aim to shed light to the relationships between VL

and goals, the designed activities drew on the most important characteristics of multimodal literacies in MDE. Specifically:

- the activities fostered participants' choice and learning about one semiotic domain in MDE;
- the activities promoted the development of an affinity group associated with the selected semiotic domain through group-work;
- the activities allowed participants' tinkering with multimodal literacies materials, thanks to their lack of scaffolding and explicit structure, while engaging participants to define their goals and learning paths;
- the activities required the preparation of a multimodal digital artefact to be presented to an audience (other groups and the researcher) at the end of the group-work, reinforcing the relationship between communication and learning.

We organised two 1.5 hour workshops that took place at each of the three schools, and the research involved participants from each school at the same time. Furthermore, workshops were followed by an individual one-hour interview with each participant.

Workshop activities were composed of three parts, each with a different goal. The aim of the **first part** was to promote confidence and motivation amongst participants in the principal theme of the workshop, by creating a familiar environment. This was achieved through sharing interests: the first 30 minutes were dedicated to a preparatory, collaborative activity around teens' favourite stories. The researcher asked each participant to write 5 titles of stories of any kind on a piece of paper (TV series, movies, books, comics...), choosing the ones they particularly enjoyed. Soon after, each participant described their favourite story to the group, classifying the story into a category or domain (e.g.

vampire stories; action movies). Participants continued to categorise collaboratively all their stories into groups on an empty poster.

The **second part** developed the main aims of the research to identify VL actions, and how they interact with learning *goals*. Young people were randomly divided into 6 different groups, each group involving 2-3 participants (see Table 1). The groups were required to develop a story using Web 2.0 technologies in a total of 2 hours split between the two meetings. Each participant was assigned a computer with Internet access, and the Microsoft Office suite installed. Furthermore, they had permission to install other software. It was decided not to give particular directions regarding what tool to use, or the nature of the artefact. This provided young people with the flexibility to approach and manage the assigned task. Indeed, this openness reflected personalisation during the workshops. For instance, in Group 3, P:6 employed Google Images to search for images of animals, while P:7 and P:8 explored the recommended videos in YouTube. After they discussed together a potential topic for their narrative that focused on fish-superheroes within a circus, they continued their work independently using Google Images and downloading different graphics and photos on their agreed theme. Whereas initially their goal was to construct a PowerPoint presentation on the adventures of two fishes with super-powers, later they decided to move to a different production tool, Scratch, where the two participants re-built their narrative, recreating landscapes, characters and their interactions with each other and the environment in a short simulation that was exported in the form of a video.

The aim of the **third part** was to allow participants to share with the other groups and researcher their approach to the story construction and to reflect on the process.



Figure 10. A group of participants in School 1

7.3 Data Collection

Two methods of data collection were employed, promoting the understanding of the issues under investigation in different ways. Screen-recordings of the computers during the workshops allowed to identify and discern critical learning moments, supported by the video-recordings of the whole scene. Furthermore, post-interviews provided participants' first-hand accounts and own perceptions of their learning. This allowed to triangulate the interpretations of the video data.

7.3.1 Videos

The researcher was in the room during the workshops, monitoring the sessions unobtrusively. At times, it happened that the researcher acted as a facilitator to ensure that group-work was proceeding smoothly, and answer possible questions posed by the young people. During this process, each computer screen was recorded to register the interactions with the technology, aligned with emergent discussions within the groups. This method of data collection provided 32 hours of recordings. Moreover, each session was filmed with a portable digital camera secured to a tripod at the corner of

the room. It was placed behind the young people, and all the participants were in the frame. This method of data collection captured the whole scene (for example, computer screens at a distance; non-verbal interactions within each of the groups), supporting researchers in discerning individual and collaborative engagement with MDE, and providing a broader overview of what was happening in the room (see Figure 1). Across the three schools involved, 9 hours of video-recordings were collected.

7.3.2 Interviews

After workshop 2, one semi-structured interview was conducted with each teen participating in the research that lasted up to one hour ($M = 46\text{mins}$; $SD = \pm 6\text{mins}$). The aim of the interviews was to provide additional insight in the video data. In particular, the goal was to understand how each participant interpreted his or her own VL practices according to their goals. The researcher showed 3 video extracts involving breakdowns and breakthroughs to each participant. The extracts were selected from the screen recordings collected during the workshops. Given the open, flexible nature of the narratives developed within each group, the questions were personalised to reflect the learning moments identified for each of the groups taking part.

During the interviews, the role of each participant was considered specifically in the proposed video extract. Furthermore, to avoid socially desirable answers, dyslexia was not discussed directly as well as its impact on the practices in MDE. The 3 video extracts were used as a probe to understand the environments and tools employed, and the learning episodes in relation to VL and its individual and social dimensions (e.g. if social activity was involved in some form; roles of the participants and peer or collaborative learning moments; individual learning episodes). To collect consistent, systematic

data, the same questions were repeated for each of the video extracts discussed with participants. The list of questions can be found in Appendix II.

The 16 interviews were recorded and transcribed for the analysis. This analysis focused on stage 2 (see context and procedure), aiming at understanding how young people with dyslexia construct their literacies and learning in MDE.

7.4 Analysis

Given the focus of phase II on learning, the challenge during analysis was to identify critical incidents of learning within the videos recorded. Previous research suggested that learning can occur after breakdowns, where it is possible to identify a clear event that requires an adjustment (Sharples, 2009). Breakdowns are defined as “*observable critical incidents where a learner is struggling with the technology, asking for help, or appears to be labouring under a clear misunderstanding*” (Sharples, 2009, p. 10). While observing individuals’ attempts to overcome a specific breakdown, breakthroughs emerge identifying learning moments. Breakthroughs are “*observable critical incidents which appear to be initiating productive, new forms of learning or important conceptual change*” (Sharples, 2009, p. 10). Considering the goal of this study to unpack the interactions between learning and VL, I focused on how VL advanced participants’ attempts to overcome a breakdown, namely moments that entailed participants working through choices on the story they were building (e.g. decision about the main topic of the narrative, choices on core elements of the story such as characters, locations, development of the narrative). Adapting this conceptualisation of learning allowed to identify clearly the episodes of literacy actions in the screen-recordings. Furthermore, according to this definition of

learning, the videos were analysed systematically, event by event (Derry et al. 2010) to identify breakdowns and breakthroughs. This analytical process led to the identification of 31 incidents.

Having identified the 31 incidents, the three sources of data were triangulated: screen recordings with integrated audios that captured the discussions, video recordings of the interaction within the groups, and the interviews. This approach ensured that the data interpretation reflected an accurate description of what was happening (Shenton, 2004). More specifically, the screen-recordings with integrated audio promoted the understanding of how VL was acted to overcome the breakdowns, and it represented the main method of data collection. Triangulating these data with the video-recordings of the whole scene fostered a detailed understanding of the context, allowing to record individual interactions with the technology while synchronising peer conversations to specific moments in the screen-recordings. In addition, the post-interviews allowed to collect first-hand accounts of the participants' perceptions of their own learning, supporting researchers in verifying the value of these learning episodes according to the interpretations.

The analytic method of thematic analysis was used to shed light to the relationships between VL and goals in the task. A systematic coding process was adopted (Braun and Clarke, 2006), yielding 12 initial coding categories that were then organised into themes in relation to the two research questions. To ensure that the three themes generated captured the whole data set, two researchers reviewed the iterative analysis of the themes multiple times and discussed the findings repeatedly to also avoid some possible biases while interpreting data. At the end of this process, three themes were agreed, according to the patterns of interactions emerged between VL and goals:

Theme 1: Goals' emergence captures how joint interests explored using similar VL actions within each group promoted a collective goal setting, leading to the construction of an affinity group around the selected semiotic domain.

Theme 2: Refinement of goals shed light to how young people perfected and accomplished their goals through iterative VL actions that were guided by an implicit joint meaning making within each group that was used as a shared evaluative standard.

Theme 3: Communicating learning describes how expressing one's learning to different audiences outside and within affinity groups involved a negotiation of meanings and critical evaluations of the various communicative possibilities of VL materials.

7.5 Findings

Before moving to present the main results, the next paragraph summarises the technical skills and VL of the participants, and their orientation to the present research to frame the main analysis.

The task was identified by all the participants as a novel, fun activity that they could themselves manage and direct. Participants dealt with the task by transferring their technical skills and VL previously acquired both in other contexts both in and outside school. The narrative request invited their free interactions with two different kinds of MDE: (i) online research tools, i.e. web search engines and SNS to research their narrative, and (ii) multimodal production tools, such as presentation software, to construct their story. In particular, when individuals made meanings from visuals accessed through the Internet, they mainly employed open MDE, i.e. YouTube and Google Search; while constructing new meanings required the use of specific tools previously learnt during IT classes

(Scratch, PowerPoint). The table below summarises participants' demographics, the research and production tools employed, and the semiotic domains of interest for each of the narratives.

Participants	Age	Gender	School	Group	Search Environments	Production Tools	Semiotic Domains
P:1	15	M	1	1	YouTube and Google Images	Office PowerPoint	American racing cars
P:2	16	M	1	1	Google Images	Office PowerPoint	
P:3	16	M	1	1	Google Images	Office PowerPoint	
P:4	15	M	1	2	YouTube, Google Images	Office PowerPoint	Racing vehicles
P:5	15	M	1	2	Google Images, YouTube, Google Search	Office PowerPoint	
P:6	16	M	1	3	Google Images, Google Maps, YouTube	Office PowerPoint	Circus
P:7	15	F	1	3	YouTube, Google Images	Office PowerPoint	
P:8	15	M	1	3	YouTube, Google Images	Office PowerPoint	
P:9	16	M	2	4	YouTube, Google Images, Google Search	Office Word, PowerPoint	Parodies of musical videos
P:10	15	M	2	4	YouTube, Google Images, Google Search	Office Word, Office PowerPoint	

P:11	15	M	2	5	Google Images	Office PowerPoint, Scratch	Animals, fishes in particular
P:12	16	F	2	5	Google Images	Office PowerPoint, Scratch	
P:13	16	M	2	6	YouTube	Office PowerPoint	Space missions
P:14	15	M	2	6	YouTube	Office PowerPoint	
P:15	14	F	3	7	Google Images, Google Maps, Google Search	Office Word	Vampires love stories
P:16	15	F	3	7	Google Search, Google Maps, Google Images	Office Word	

Table 2. Participants' demographics and use of multimodal digital environments

7.5.1 Theme 1: Goals' emergence

For many groups, the activities started with very exploratory research without specific purposes, but with the goal to identify a topic of joint interest. For instance, half of the groups taking part to the research synchronized their actions and activity around YouTube recommended videos (i.e. recommended by the YouTube search algorithm), tinkering with the available VL materials. When participants encountered materials of interest, they continued following links to other video websites with the aim to find something similar. For instance, within one the groups, P:9 started his activities online scrolling the recommended videos within the YouTube page for a few minutes, and he watched briefly two videos which attracted his attention among the others. At some point, P:9 noticed a parody

of a football match that he watched entirely. Then, he followed the link from the video to the YouTuber channel who created it. When there, he explored his page searching for similar interesting videos, and he found a musical video parody he watched twice before he involved another peer in the negotiation of a similar goal for their story. Meanwhile, P:10, his peer, started the activities in the same way in YouTube, by watching fun videos. He enthusiastically agreed with his peer's proposal to work on a musical video parody, thus forming a semiotic domain. In particular, it was their joint synchronicity of actions and interest leading to shared goal setting, promoting the development of an affinity group that was built around the semiotic domain of musical parodies.

VL materials were used as a shared "language" for participants. They used VL to explain concepts and ideas by *showing* videos and visuals available online to the other members of their group, without the need to talk or share any kind of verbal or written information. For instance, P:14 and P:13 were searching for videos in YouTube independently, and they sometimes showed one another live videos on space and videogames, i.e. the live streaming on the YouTube NASA channel. In this context, the videos were selected after a long exploration of the resources available, and they were displayed without talking. As explained by P:14, the tacit, joint actions between him and his collaborator were a consequence of their shared interests and practices: "*I've never really reflected upon it, but we are familiar with the same social networks and videogames online... I don't know, we do the same things, therefore we understand*"⁶. Thus, P:13 and P:14 mastered very similar semiotic domains and they

⁶ All the quotes have been translated in English.

can be considered part of an implicit affinity group, in turn fostering the use of joint ways of acting and learning.

P:4 described how approaching the task with practices which were similar to her peers with dyslexia created awareness of others' similar ways of acting and learning, and in turn confidence: *"It was great, I am so happy of this experience! I felt part of something, and they are like me. [...] And the work was easy because we were aligned."* Two additional participants expressed similar positive feelings. For instance, P:15 described her enthusiasm for the social nature of the activities proposed in MDE, allowing her to meet and work with another girl with dyslexia from another class with similar interests: *"In my class I'm the only person with dyslexia, it was fantastic to work with her because we like the same things and we are similar... both of us dyslexic for example... And we follow the same YouTubers... I think we will become friends"*.

7.5.2 Theme 2: The refinement of goals

Once the explorative process led to set a broad goal and semiotic domain of interest for all the groups, within each of them the work was self-organised in a collaborative way. In particular, each member was assigned or self-assigned, upon agreement a goal complementary to the goals of the other participants in the group. As Y.-W. Liao et al. (2015) described, collaboration entails group-work to complete a shared objective through cooperation within the team, with participants acting accordingly with the aim to create a narrative using MDE. In particular, participants engaged with what they considered the most appropriate MDE (YouTube or Google Images) according to the shared goals and shared practices within the affinity group. While they were carrying out these targeted explorations, VL supported them to refine their goals iteratively: the visual outcomes of their searches

were evaluated critically against the group's joint aim, leading young people to perfect their query to achieve their sub-goal. For instance, while P:6 was contributing to his group's re-elaboration of "Fast and Furious", he interrupted his activity because he did not know where to locate the narrative. He opened a Google page in a new window and he typed "Fast and Furious locations" in the search bar of Google Images. He scrolled the results page, lingering on images of cars in the desert. After a while, he edited his search string and he wrote "car races america". He skimmed through the search outputs, then he adopted a similar strategy with his following research "fast and furious", also opening a few related websites. The results of these researches lead P:6 to search "america" in Google Images and to open various images of maps, then "united states" followed by "united states west". After a brief joint evaluation with his group, they decided to locate the story in California.

In a different team, Group 5, P:12 and P:11 were working with Google Images, similarly to the example describe above. The two spent over 35 minutes looking for and choosing images independently. Every time one of them found something considered meaningful in their semiotic domains of a circus, they showed the visual proposal to each other, exchanging immediate feedback such as "maybe"; "no"; or just self-explicative glances. The described iterative comparison and evaluation of VL materials against a joint implicit standard previously created and set through social interaction led young people to refine, and subsequently accomplish their goals. As P:11 pointed out in his interview: *"My intention was to find meaningful, fun images but there are not many options out there. There are just images for little children so at the end we went for that image. It's not saying the right things about our superheroes. I know that Valentina also thought the same, but we had no choice"*.

However, in some learning episodes it happened participants got too involved in studying the details of the visual outputs, losing track of their goals. For instance, as expressed by P:16 while self-assessing the task's results: "*I would have focused more on the story and only at a later stage paid attention to the characters' traits. I have been too concentrated on the details and I got lost. It always happens...*". In addition to this case, three participants described similar episodes, revealing how this shared way of acting and learning through VL may foster the necessity of more scaffolding in goals' management.

Sometimes, when one participant in the group did not agree on the meaning of a selected image, this meaning was negotiated verbally with the other members of the group, in turn leading to the refinement of their shared goals. Through this process each group of participants ensured to convey the *right*, shared meaning through the VL materials jointly considered as the most adapt. For example, P:1 interrupted his group's activities to show two YouTube videos with the aim to align the team's conceptual idea on their work on cars. In this context, the other two participants in his group were observing and comparing VL materials such as big means of transport and tractors, while they previously agreed to create a story around American racing cars, their details and characteristics. Therefore, P:1 shaped his collaborators' view on the main goal through VL actions, generating a *new* joint goal grounded on his interests.

7.5.3 Theme 3: Communicating learning

The task required each group to work on a digital artefact to present to the researcher and class. Thus, a key part of the task was to *communicate* the learning of the team about the semiotic domain by using MDE (e.g. a PowerPoint presentation). In this context, participants adopted two main criteria

while selecting the VL material to communicate their meanings: (i) when meaning making and joint goals within the affinity groups were violated, participants used verbal negotiations that led to new shared goals or their refinement (this process is described in theme 2); (ii) the anticipated meaning making of audiences external to the affinity group shaped the construction of the artefact. Based on these two criteria, P:2 spent 30 minutes observing the visual results of his query “images of 4 racing cars” and other single cars i.e. “old Mercedes” or “racing ford” within Google Images. Sometimes, he searched for new and old car editions, focusing on the aesthetic and physical differences as well as similarities between the images. In doing so, the aim of P:2 was to select visuals that expressed different stages of the evolution of the car in their story inspired by Fast and Furious. As he pointed out during his interview: *“The aesthetics and details of the two images were fundamental because we needed to show that the car was modified by the main character in certain ways.”* Indeed, this comparative process of pictures led him to convey a key point for the narrative not possible otherwise. Moreover, he described the communicative opportunities offered by the contrast of two images with the following words, revealing the objectivity of the meaning communicated:

R: “Why didn’t you describe its features with words like <the motor was... the wheels were...>?”

P2: “Because these two images make you really comprehend, you see them, they are... clear and easier to read. An image alone is too subjective.”

When working on a narrative about automobiles in another group, P:3 performed several queries of very specific cars (e.g. Fiat 500, Ford Popular) and different modified versions of those models. He saved the chosen images in a folder on his computer. Then, he spent 10 minutes comparing the car models and their different versions with the goal to communicate their structure.

R: “Do these images contain meaning?”

P:3: “For the ones who understand cars, they do. For the ones who don’t, they’re just nice”

R: “What kind of meaning?”

P:3: “The wheels, the frame, how they have been transformed...”

R: “Is this clear?”

P:3: “No it’s not. The colour is a clear information, but the muffler and the frame are not clear for everybody. [...] A video would have been a lot more objective!”

As expressed by P:3, “*the ones who (don’t) understand cars*” can make meanings which are different from the ones built by experts in the field. Thus, according to him images are potentially open to multiple interpretations by his audience. Moreover, videos and images were perceived in different ways with regards to their role in communication. Indeed, if not compared to other images, the former were perceived as more open to interpretation; the latter were described as more objective, due to density of their meanings, and clarity.

7.6 Discussion

Phase II is based on the position that teens with dyslexia have strengths that foster their engagements with VL and meaning making which may in turn facilitate learning. In tandem, the more general turn to the visual due to a growing use of MDE within and outside formal education raised the importance of understanding how young people participate and learn in these environments through the new literacies they encourage (Crooks, 2011). In this research, learning was approached from the perspective of *goals*, fundamental in each learning process (e.g. Dickhäuser et al. 2011). The aim was to identify the modalities with which participants engage with goals through VL. In doing so, this provided a new perspective to the increasing body of literature in the field of multimodal literacies that has generally taken a limited view on learning goals in line with a “composing” orientation and analysis of multimodal texts and their production (Smith, 2018). Furthermore, in situating learning in

MDE, the social ways in which learning is defined and informed through joint meaning making were recognised. Therefore, the second aim was to understand how meaning making through VL is performed while defining goals within the affinity groups existing in these spaces. The research goals were achieved through an empirical qualitative study with 16 dyslexic young people where participants used MDE to construct a narrative within affinity groups.

7.6.1 Goals emerge while tinkering with VL materials and social engagements

Based on two case studies involving physical computing, visual programming and physical materials (e.g. LEGO bricks), Resnick and Rosenbaum (2013) describe how learning occurs through experimental, playful engagement with materials while *making things*. Tinkering can be defined as an “*iterative style of engagement*” (Resnick and Rosenbaum, 2013, p.164) in which goals are first discovered, and then they are continually reassessed while exploring new paths. The findings provide empirical evidence that tinkering can be extended to VL materials when the learner’s aim is to create a digital artefact by using VL actions. Indeed, participants discovered and set their goals through an explorative use of VL actions, and then they repeatedly refined their goals in iterative micro cycles.

In addition, the results shed light on how participants with dyslexia engage in a form of *non-scaffolded learning through VL in MDE*. While drawing out potential implications for new pedagogies, it was described how goals were sometimes lost due to participants’ immersive explorations of the VL materials available. More specifically, a few participants engaged deeply in the details of the images they found, consequently losing track of their goals. Whilst the choice was not to provide active scaffolding in the task to reflect the lack of structure and openness of the learning occurring in MDE, future research may seek to develop meaningful scaffolds that on the one hand foster a closer

alignment between exploration and goals (Wood et al. 1976), and on the other do not undermine the process of tinkering.

MDE involve participatory culture dynamics where individuals who have common interests come together to form “affinity groups” while making new meanings (Jenkins, 2006; Gee, 2007). The methodological approach of phase II was designed to develop an affinity group around a shared interest, allowing young people to mould their own practices. Therefore, it is not surprising that tinkering was shaped by these social dynamics promoted by group-work in MDE. As pointed out by Mills (2013), engaging with literacies within MDE involves the abilities to make meaning from and through multimodal digital texts, and to *purposefully engage with these texts with others* (Mills, 2013).

Initially, participants employed exploratory VL actions involving interacting with the VL materials available mainly in YouTube (i.e. recommended videos according to the YouTube search algorithm). Participants synchronised their explorations with the other members of the group by verbally reinstating and redefining their joint interests, in turn leading to the choice of a semiotic domain for their story, and consequently a first shared goal. Then, following their decision and according to a collaborative organisation of the work, participants used VL actions to learn about their semiotic domain of interest by exploring new paths in MDE. Their VL actions involved written search queries leading to visual results, mainly using the Google Images search engine. This resulted in an iterative refinement, and then accomplishment of the sub-goals (e.g. set a location for the story) working within the semiotic domain selected by the group (e.g. American racing cars). They continuously evaluated the outcomes of their VL actions against the team’s joint goal, which acted as a criterion

for choosing which VL outputs to keep, i.e. the most adapt image. Given the exploratory nature of their VL actions, however, a few participants' paths led to their individual reconstructions of their own goals, that deviated from the team's objective resulting in collaborative verbal re-negotiations of meanings and goals. Thus, in this study, it can be argued that affinity groups were built through the dynamic process of collaborative goal setting and meaning making of the VL outcomes encountered by each participant.

7.6.2 Affinity groups promote confidence

Hymphrey (2002, p.30) points out that self-development is mainly a “social learning activity”. Given their struggles in aligning with normative learning trajectories, adolescents with dyslexia and other special education needs are at risk, both in dealing with formal school expectations and, consequently, in becoming confident in their learning (Burden, 2005; Vezzoli et al. 2017). In the present research, affinity groups were constructed not only on their shared goal to develop a story, but also on the practices employed to achieve this aim. In this context, all the participants showed similar strengths in their use of VL, supporting the neurodiversity conceptualisation guiding this study. In working together synchronously, young people were able to observe and align their VL actions with one another, therefore recognising the prevalence of VL practices within their group. As shown within theme 1, in some cases this promoted a sense of social identity and confidence in one's skills.

Thus, whereas VL actions may have facilitated participants' meaning making and their process of goal setting while learning, findings suggest that such practices may ameliorate psycho-social outcomes such as their self-concept and self-confidence. This view is supported by other research with dyslexic populations: Barden (2014) showed how SNS can be an inclusive technology for the

learning of dyslexic youth, reporting a renewed *confidence* among his participants; in the multimodal context of videogames, Vasalou et al. (2017) concluded that group play by disaffected dyslexic children promoted their confidence in articulating participants' learning performances. Future research in this direction may seek to investigate systematically if and how using VL for learning plays a role in promoting psycho-social outcomes in youth at risk of exclusion. Such work may situate this question in the context of mixed groups to explore how the broader, accepted use of VL by young people interacts with young people's experience of their own learning difficulties. Previous research suggests a complex, social construction of disability in these environments. For instance, in the context of SNS communities, whereas VL was found to enable the equitable participation of adolescents with dyslexia, such spaces also provided new forums for their identity constructions as young people asserted themselves over their peers to reclaim status and power (Vezzoli et al. 2017).

7.6.3 Audiences shape VL actions in communication

Alongside their opportunities for learning, MDE mainly have a primary communicative role. The methodological design reflected this by including a final phase in the task in which all the teams presented their multimodal artefact to the other research participants in their school and researcher. It is during this stage that VL shifted away from tinkering with materials to communicating the results of this tinkering process to an audience. Both while preparing the artefact, and sharing it with an audience, young people engaged with self-presentation, i.e. "*the process by which people convey to others that they are a certain kind of person or possess certain characteristics*" (Leary 1996, p. 17). The success of this self-presentation in digital or physical social situations depends on self-efficacy perceptions (Bandura, 1997), with participants performing well thanks to their control (Krämer and

Winter, 2008) over both the tinkering process and the preparation of the artefact, in turn contributing more generally to their impression management.

Multimodality theory scholars have widely recognised the role of audiences in shaping multimodal compositions (e.g. Kress, 1996; Jewitt, 2008; Bezemer and Kress, 2016). As noted by Lemke (1998), multimodal texts involve complex messages that are open to multiple interpretations for audiences. However, in the present study and more broadly in formal education these multiple interpretations can also promote formative feedback managed by peers in the group. In particular, peer assessment has been valued during group presentations (Northcliffe, 2012), with adolescents reporting to be more engaged when they received feedback from their peers than from their teachers (Logan, 2009). Furthermore, research suggested that this sort of assessment impacts more broadly on the development of the learning process, also fostering students' perception of a transparent and clear assessment process (Northcliffe, 2012).

While preparing the final digital artefact, possible audience's interpretations and feedback were of primary importance to the groups of participants, who perceived the audience as an out-group, namely individuals not "belonging" to their own affinity group and not necessarily sharing similar interests, practices and goals. VL outcomes that had promoted joint meanings among participants and supported the refinement of their goals during the tinkering phase at the beginning were now rejected by recognising that meaning construction occurs in different ways outside affinity groups. Thus, if on the one hand tinkering was based on playful iterative explorations with the objective to first define and then *learn* about an agreed semiotic domain, on the other hand the practical construction of the multimodal digital artefact shifted to a goal concerned about *communication* of the semiotic domain of interest to an external audience. More specifically, supporting the findings of phase 1, participants

prioritised dynamic visual materials, such as videos. Compared to static images, videos were perceived as an information rich mode with preserved objectivity that promoted joint meaning between the affinity group and out-groups, bridging their interpretations.

7.7 Implications

This chapter reported on a qualitative study on how young people with dyslexia learn through VL in multimodal digital environments. The first aim was to understand how young people set and accomplish learning goals through VL. The second aim was to explore the ways in which meaning making through VL is performed while defining goals within the affinity groups constructed around the semiotic domain of interest. The findings revealed the potential to engage with VL engendering shared meaning making for youth with dyslexia, fostering the emergence and accomplishment of goals. Indeed, the identified joint actions by participants based on their shared interests and strengths fostered control over the learning process and confidence, in turn impacting positively young people's self-concept and self-efficacy alongside their learning.

More broadly, the analysis allowed to illuminate different forms of experimental playful learning based on tinkering with digital material. An interesting question for future research is if these findings may extend to the broader population of individuals who engage with new literacies, given the more general shift to the visual fostered by contemporary social platforms.

To summarise the implications: first, findings support the *design of new pedagogies* by shedding light to the value to engage with VL which engenders joint meaning making for teens with dyslexia, in turn fostering autonomy in their learning goals' setting, refinement and accomplishment; secondly, results *contribute to the neurodiversity agenda* by revealing how joint actions based on shared strengths and interests promoted participants' confidence and control over their learning occurring in MDE; third, *findings extend the tinkering approach to multimodal literacies*, showing how tinkering supports goals and how it is shaped by the social dynamics involved in MDE; last but not least, results

suggest that the outcomes of this research can *inform broader debates about the literacies and learning of youth in MDE*, considered the more general shift to the visual promoted by media sharing platforms (Mascheroni & Ólafsson, 2018).

Chapter 8.

Phase III:

Design Principles: Development and Transformation

This Chapter is divided into two main sections. The first one illustrates how theories and empirical findings from Phase I and II were used through Design-Based Research to develop a set of actionable learning design principles. Following this, the second section describes the theoretical underpinning, methods and results of the last empirical study that aimed to understand what kind of educational ‘transcendence’ secondary school teachers envisioned in the proposed principles. The principles were used during the participatory design sessions aiming to create inclusive didactic activities.

Phase III was designed in Autumn 2017, and it was carried out in January-February 2018 in Veneto, Italy. The nature of this last empirical study is exploratory, thus representing the first stage of the concatenation process typical of ‘exploratory research’ (Stebbin, 2001).

8.1 Sub-phase 1: development of learning design principles

8.1.1. Motivation

DBR allows to connect research, theory and practice through design principles (Eldeson, 2002) with the aim to improve learning or teaching (Herrington et al., 2012). Design principles emerge from previous research, and they can be theoretically, empirically or practically informed (Scardamalia, 2002; Kali et al., 2009). Traditionally, their main aim is to inform design activities (Bell et al., 2004) of both technologies and pedagogies, but it is nowadays accepted that they should iteratively develop also theories (Bell, 2004). As Barab and Squire pointed out (2004): *“Design-based research requires more than simply showing a particular design works but demands that the researcher (move beyond a particular design exemplar to) generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field”* (p. 5-6). More broadly, design principles are considered as an effective way to bridge theoretical and pragmatic aspects of learning (Herrington et al., 2009).

An important aspect of DBR is the presentation of design principles in a form that aims to be transferable in other contexts, by adapting the principles (Reeves, 2006). In practice, these principles can refer to different aspects of learning design such as its planning and development (van den Akker, 1999). Therefore, they should be expressed in a form of language that can concretely inform practitioners, to be usable by teachers and designers in real-world situations. (Wang & Hannafin, 2005). Pragmatically speaking, design principles are usually presented in a form that lists aspects and features of particular learning environments, and their outcomes (Herrington et al., 2009).

To support the development of their design principles for mobile pedagogies, Herrington et al. (2009) analysed several projects, listing the *characteristics* of each pedagogy, and the *method* used while instantiating that pedagogy into the concrete activities in the classroom. Based on this second category of analysis, the authors identified the roles of both teacher and learners in the learning environment. The figure below provides one example from Harrington and collaborators' table (2009, p.132).

Purpose of mobile pedagogy	Substantive emphasis CHARACTERISTICS	Procedural emphasis METHOD
Second year primary preservice teachers investigated the use of Smart phones to facilitate interactions and reflections about K-6 mathematics concepts and the teaching of these concepts in the classroom (described in CHAPTER 8: Chinnappan, M.)	<ul style="list-style-type: none"> • Professional development • Collaboration • Reflection • Modelling of processes 	The teacher: <ul style="list-style-type: none"> • Introduces an authentic curriculum development task The students: <ul style="list-style-type: none"> • Discuss and negotiate a focus topic, resources and activities • Capture images and video for teaching purposes using a mobile phone • Share and reflect on content and pedagogical content knowledge • Modify understandings emerging from reflection and discussion

Figure 11. Example from the analysis of the pedagogies (from Herrington et al., 2009)

Using a similar approach, the pedagogy used with young people with dyslexia in phase II was analysed, in turn based on phase I and the discussed theoretical ideas funding this work. The aim of this work was to develop a set of pedagogical design principles.

8.1.2 Development process of the design principles

Pedagogy:

Secondary school students with dyslexia used multimodal digital environments (social network sites and Web 2.0) and their multimodal literacies to learn about a semiotic domain in small groups,

developing an affinity group around shared interests and practices. They tinkered with the materials available, setting and accomplishing their goals, and they communicated their learning to an external audience in the form of a story through multimodal tools.

Characteristics:

- Use of multimodal digital environments and their technical and multimodal literacies;
- Students' control over the tools and literacies used;
- Group work;
- Shared interest in one semiotic domain within groups;
- Collaboration and development of an affinity group around the semiotic domain;
- Communication of the learning to an audience;
- Control over the communication of the learning occurring;
- Need of scaffolding with goals' management;
- Peer tutoring and assessment.

Methods

The teachers:

- Set an open task, allowing the use of multimodal digital environments and requiring the preparation of a multimodal digital artefact around a general theme;
- Divide students in small groups;
- Monitor students in their own goals' management and accomplishment, supporting when needed;
- Organise a final presentation of the students' work.

The students:

- Work together in small groups to negotiate a semiotic domain of interest, and a goal;
- Learn about the semiotic domain in multimodal digital environments, appropriating technologies through their own literacies to accomplish the goals;
- Reorganise their own learning in the form of a digital artefact;
- Communicate their learning to an external audience.

8.1.3 Design principles for learning through visual literacy in multimodal digital environments

The analysis led to the identification of five main characteristics that represent recommendations for the integration of this form of learning into a secondary school context. Each of the principles is presented with a short title and a brief concrete description for teachers that supports the principles' "actionability". Following this, a more detailed theoretical motivation for each principle is provided, summarising their role in supporting learning through visual literacy in multimodal digital environments.

1. Organising an open task:

Tasks should be open in design, establishing only temporal limits, requiring the preparation of a digital artefact in multimodal digital environments around a general theme. Scaffolding through monitoring should only support students in their own goal management and accomplishment when needed.

Motivation: Learning through visual literacy occurs in open multimodal digital environments, i.e. open-ended spaces such as social network sites and other Web 2.0 technologies, in which individuals

construct and manage their communication and learning. This openness reflects self-management of time and personalisation of pathways; however, it involves the absence of scaffolding throughout the learning process.

2. Allowing the use of different digital multimodal materials and tools:

Students can work with their existing technical digital literacy skills, and multimodal literacies skills in multimodal digital environments.

Motivation: This form of learning develops through multimodal literacy skills that are shaped and acquired in the digital social spaces offered by multimodal digital environments. In particular, a prerequisite for engaging with this form of learning is basic technical digital literacy, such as accessing and using the Internet; subscribing and employing social network sites. As reported in another chapter of this dissertation, these practices are mainstream among European youth, as evidenced by recent statistics on the access and use of the Internet by teens. Following the mastery of these basic skills, engaging with multimodal digital environments promotes the social development and use of multimodal literacies, providing means for higher-level learning.

3. Promoting work in small groups using open multimodal digital environments:

Group-work using multimodal digital environments fosters the development of affinity groups around one semiotic domain of interest, promoting social identity dynamics and confidence through a shared set of practices and goals within the group.

Motivation: Multimodal digital environments promote multimodal literacy practices as a means to promote specific, active and situated learning within semiotic domains. Semiotic domains are a set

of practices which recruit one or more modalities (e.g. written or oral language, symbols, images) to communicate distinctive types of meaning. The mastery of semiotic domains through participatory culture dynamics allow individuals who have common interests to come together to form “affinity groups”, i.e. groups of individuals who share goals, interests and practices in these spaces. This shared set of practices and goals within the group promote social identity dynamics and confidence.

4. Fostering groups’ self-organisation of the task:

It allows students’ tinkering with the digital multimodal materials, and the emergence of goals and accordingly, their refinement. Furthermore, it promotes students’ control over the learning path.

Motivation: The approach of tinkering to learning recognises a playful, experimental, iterative style of engagement in which people discover and continuously reassess and refine their goals through experimental interactions with materials. In the context of multimodal digital environments, tinkering with visual literacy materials occurs when the learner’s aim is to create a digital artefact by using visual literacy actions. Indeed, goals are discovered and set through an exploratory use of visual literacy actions, and then repeatedly refined in iterative micro cycles. This promotes the students’ individual control over their learning path, while being shaped by the social dynamics promoted by group-work in multimodal digital environments. Indeed, engaging with multimodal literacies within multimodal digital environments involves the ability to make meaning from and through multimodal digital texts, and to purposefully engage with these texts with others.

5. Require a final presentation of the digital artefact to the class

This can contribute to young people’s self-efficacy and impression management in social contexts, and it promotes peers’ feedbacks and assessment.

Motivation: While *pro-suming* a multimodal text online in multimodal digital environments, young people engage with self-presentation. Thanks to teens' control over the learning process and the request to prepare a multimodal digital artefact, this work can contribute positively to their impression management. Furthermore, the presentation can also promote formative feedback managed by peers in the group. In particular, peer assessment is valued during group presentations, with adolescents reporting to be more engaged when they received feedback from their peers than from their teachers. Furthermore, research suggested that this sort of assessment impacts more broadly on the development of the learning process, also fostering students' perception of a transparent and clear assessment process.

The development of these design principles is based on a theoretical conceptualisation of the relationship between multimodal literacies and learning that connects fragmented literature. Therefore, the empirical research considered for their development is limited to phase I and II of the present dissertation, Barden's studies (Barden, 2014; Barden, 2016; Barden, 2012) and Gee's work (Gee, 2001; Gee, 2007). These lines are written to express the awareness of this limit, hoping that this work will inspire further confirmatory research in this direction.

8.2 Sub-phase 2: transcendence in learning design

The present dissertation investigates learning taking the context into account (Barab et Squire, 2004), in line with the educational research approach that considers lab studies' findings or mere theoretical developments as arid data. Adopting a similar approach, DBR requires the validation of research results through the consequences of their use, providing "consequential validity" for the principles developed (Messick, 1992). In addition to the specific research questions guiding the research, a

broader aim of the work is to provide a first contribution to the “consequential validity” of the set of design principles described above. To achieve this, the principles were used in participatory design (PD) workshops with secondary school teachers aiming to co-design learning activities. Among the other contributions, this work generated a set of learning activities that future research may test in the classroom to contribute further to testing the “consequential validity” of the principles.

PD aims to involve users and stakeholders as co-designer, promoting the consideration of individuals’ needs, values, and experiences through mutual learning dynamics among participants (Benton et al., 2012). PD traditionally achieves this through a dialogic and collaborative process whereby users play an important role in sharing expertise and local knowledge, and designers mediate and scaffold the process of crafting new possibilities for alternative futures that oscillate between “tradition” on the one end (i.e., design supporting current practices and needs) and “transcendence” on the other (i.e., design generating new critical possibilities that challenge the status quo) (Vines et al., 2013). Based on the conceptualization of “transcendence” in the context of ubiquitous computing, Hornecker et al. (2006) theorised the existence of “opportunity spaces”, where there are not urgent problems to be solved, but potential to generate new ways to enhance practices. To expose these spaces in the context of a Ubiquitous Computing Technology for museums, they orchestrated a PD approach by first articulating current practice to scaffold their novice technology users, and then moved beyond this practice to create new possibilities for digitally-mediated experiences.

PD is usually adopted with the aim to design new technologies or objects. However, Hornecker et al. (2006) explored and discussed participants’ current practices with the aim to ‘transcend’ them. Their work identifies a barrier to the realisation of ‘opportunity spaces’ in the users’ lack of previous

experience with the technology considered. However, the authors recognise that the paths leading to ‘transcendence’ are different in each of the group considered (Hornecker et al., 2006). In the field of education, this design space has also been identified in the domain of technology for higher education by Kirkwood and Price (2013) through a meta review of existing learning technologies. The present research takes this view on ‘opportunity spaces’ as possibilities to generate enhanced practices through design methods. In particular, the aim of the empirical work is to explore *what forms of transcendence* are generated in PD sessions involving two groups of secondary school teachers to co-design learning activities on the basis of the design principles. In other words, the interest is to understand if and how teachers appropriated the principles to ‘transcend’ their current practices, and *what form of change* this generated. Furthermore, in exploring how teachers co-constructed their pedagogies, possible barriers to transcendence might emerge. Thus, the second research question investigates *the barriers to ‘transcendence’* emerged when envisioning new didactic activities based on the design principles.

8.2.1 Participants

We contacted the two technical secondary schools that had agreed to take part in phase II, proposing a free professional training course on inclusive learning design with the support of CISRE Lab (International Centre of Studies for Educational Research) at Ca’ Foscari University of Venice. Both the schools agreed to share the flyer of the course with their teachers. Furthermore, the school in Portogruaro acts as an “inclusion centre” for its region, i.e. it organises multiple training courses for secondary school teachers. Thanks to their existing network, they kindly forwarded the information to several schools in the Italian regions of Veneto and Friuli-Venezia Giulia.

Our recruitment followed a “criterion sampling approach” (Patton, 2002), involving:

- Secondary school teachers working in the first and second year (teaching to students aged 14-16 old in Italy);
- Teachers who work in one of the following teaching areas: technical/scientific (this includes work with software, in particular drawing and designing. It is considered a ‘high-visualization’ area) and historical-social (pure knowledge acquisition, thus a ‘low-visualization’ area).

At the end of the recruitment process and following informed consent form, 9 teachers in each school agreed to voluntary participate in the research, for a total of 18 participants. The following table provides a summary of participants’ demographics:

Participant	School	Teaching area and assigned groups	Assigned groups	Age
P:1	1	Design, Technical drawing	1	64
P:2	1	Mathematics and physics	1	46
P:3	1	Assistant teacher	1	58
P:4	1	Italian and history	2	51
P:5	1	English	2	56
P:6	1	Assistant teacher	2	53
P:12	1	English	3	55
P:8	1	History	3	39
P:9	1	Assistant teacher	3	46
P:10	1	Assistant teacher	3	38
P:11	2	Literature	4	40
P:7	2	Law and economy	4	53
P:13	2	Assistant teacher (background in Maths)	4	59
P:14	2	Chemistry	5	58
P:15	2	Mathematics	5	52
P:16	2	Physics	5	47
P:17	2	Mathematics	6	42
P:18	2	Mathematics	6	44

Table 3. Teachers' demographics

8.2.2 Context and Procedure

The research was organised in after-school meetings, taking place once a week in the digital lab of the two schools that agreed to organise the course. The activities were planned around the main task of designing learning activities in small groups, according to the area of teaching. However, designing for teaching and learning requires to consider multiple contextual aspects that go beyond learning and teaching themselves, such as normative and environmental aspects (Tessaro, 2002; Tessaro, 2014; Laurillard, 2013). In line with this view, the co-design activities were situated in the existing normative context in Europe and Italy. Furthermore, the specific school and class contexts were taken into account, exploring them through a collective discussion of the teaching practices utilised by participants. The four 1.5h meetings carried out in each of the two schools involved the following activities:

Meeting 1 - Policies and current practices of teaching and assessment: brief descriptive questionnaire collecting teachers' demographics, current opinion on dyslexia, self-assessment of their technical digital literacy, and how they usually design teaching and learning for their class, and in particular for their students with dyslexia; collective discussion about current practices of teaching and assessment, using the European and Italian competences frameworks as guiding document; presentation of the research results from phase I and II, and collective discussion of the design principles.

Meeting 2 – Learning design: participants worked in groups of 2-3, divided according to their area of teaching. Each group was given a guiding table that was designed following the competence-

oriented learning design approach by Fiorino Tessaro (e.g. Baschiera et al., 2016; Tessaro, 2014).

The following table reports the first line in Italian and English:

Italian:	COMPETENZA CHIAVE	COMPETENZE DISCIPLINARI	EVIDENZE	PIANO DI MONITORAGGIO	LIVELLO DI PADRONANZA (Iniziale, base, intermedio, avanzato)
English:	KEY COMPETENCE	DISCIPLINARY COMPETENCES	EVIDENCES	MONITORING PLAN	MASTERY LEVEL (Initial, basic, intermediate, advanced)

Table 4. Learning design

Furthermore, after the collective discussion of the principles, each group was provided a written summary of the principles. The researcher acted as facilitator, ensuring that each group had a shared understanding of the meaning and potential concrete applications of the principles. In particular, teachers negotiated a set of key and disciplinary competences to focus on, and then they defined the specific ‘learning objectives’ and ‘knowledge’ involved while designing the activity based on the design principles. They described the learning activities and methodologies in detail within their digital artefact.

Meeting 3 - Assessment design: teachers continued their work within the group, constructing an appropriate assessment rubric for the learning activities designed in the previous meeting. Coherently

to meeting 2, they received a guiding table for the work that required the development of a *descriptive* assessment framework. This involved the negotiation of a monitoring plan and a qualitative index to assess the collected evidences during the students' work (Baschiera et al., 2016; Tessaro, 2014).

Italian:	COMPETENZA CHIAVE	COMPETENZE DISCIPLINARI	OBIETTIVI DI APPRENDIMENTO	CONOSCENZE COINVOLTE
English:	KEY COMPETENCE	DISCIPLINARY COMPETENCES	LEARNING OBJECTIVES	KNOWLEDGE INVOLVED

Table 5. Assessment design

Meeting 4 – Presentation and final discussion

During the last meeting, each group presented the designed didactic activity to the other groups and researcher. Peers' feedback and discussion on their use of the design principles were encouraged around the following issues: limitations and problems; strengths and potential; feasibility.

8.2.3 Data collection

The initial intention was to video-record the activities. However, 7 participants did not agree to be video recorded during the activities, limiting the data collection to audio data as main method for data collection. The first and last meeting provided 6 hours of collective discussions audio recorded, while the design sessions were recorded using one audio recorder per group, for a total of 18 hours of audio data. This allowed to capture the dynamics and negotiations within each group of teachers.

Furthermore, the digital artefacts created by participants were collected at the end of meeting 2 and meeting 3. In addition, short questionnaires provided participants' demographics and descriptive data on their teaching practices, and their everyday use of multimodal digital environments.

The described methods of data collection promoted the understanding of the problems investigated in different ways. Audio data during the first session provided a shared overview of their current teaching and assessment practices, taking policies and contexts into account. Audio data during the two design sessions allowed to understand the existence of design orientation for learning design, and how they were constructed while designing new pedagogies based on the design principles. Furthermore, the digital artefacts provided insights into the number of the principles used within each group, and how they were adapted by teachers. This allowed triangulating the interpretations of the audio data.

8.2.4 Analysis

Considering the focus of the investigation on forms of transcendence generated using the design principles and possible barriers to it, the main analysis focused on the audio data collected. In particular, it was explored how teachers constructed the principles-driven pedagogies, taking their current practices into account. Furthermore, the artefacts allowed to verify if and how principles were considered in the design process.

Following Derry et al. (2010), each video was broken down into segments representing (i) participants' existing teaching practices, (ii) each new pedagogy envisioned through the principles. Next, thematic analysis was employed to shed light on the ways in which the new pedagogies were

constructed. Specific attention was given to participants' existing practices and whether they moved from current practice to new opportunities. In particular, the 6 step method proposed by Braun and Clarke (2006) was followed: (i) the researcher watched the video recordings multiple times, transcribing part of the data to note down initial ideas; (ii) coded the entire dataset systematically in a 'data-driven' way; (iii) collated an initial 23 coding categories into themes; (iv) reviewed the themes iteratively, discussing possible biases in the interpretation, checking their expression of the full dataset; (v) refined the specifics and details for each theme, their title and the overall narrative of the analysis; (vi) selected meaningful extracts, relating back to the research question, literature and analysis. At the end of this process, three themes emerged, illuminating three different forms of transcendence generated during the design of the principles-driven learning activities:

Theme 1: 'Transcendence' as collaborative pedagogies using multimodal production tools

describes how the perceived differences between established teaching practices and students digital learning practices influenced the construction of pedagogies that avoided the use of the principles associated to the use of multimodal digital environments for learning, in favour of real-life collaboration.

Theme 2: 'Transcendence' as opportunity spaces illuminates how teachers' positive consideration

of the use of multimodal digital environments for learning and a more general openness toward pedagogical innovation promoted the construction of pedagogies that considered the whole set of principles, although participants self-assessed themselves very differently in their technical digital literacy.

Theme 3: ‘Transcendence’ as expansion of the modalities of expression captures how some disciplines require specific teaching methodologies in which the proposed set of design principles cannot generate new practices and pedagogies, limiting transcendence to the expansion of the modalities of expression.

8.2.5 Results

Before moving to the main findings, the following table provides an overview of participants’ self-assessed technical digital literacy and established teaching practices. These data were used to contextualise the thematic analysis and findings. Participants’ answers were translated in English.

	How good are you with technology?	How often do you use Internet outside school?	For what purpose? (open question)	How often do you use SNS outside school? Which ones?	How much do you work with technologies in your class? Which software or environments do you use?	And with the students with dyslexia in particular? How do you work with them?
P:1	Very good	Every day	For work	I do not use them	A lot: AutoCad, software to design security plans, writing systems	No answer
P:2	Average	2-3 times per day	To search for news, sometimes also to find new ideas for classes	Everyday, 2-3 times per day (YT)	Little: Geogebra and excel	Not at all: I prepare schemes and 'guided exercises'
P:3	Very good	2-3 times per day	For school, photography, travels, news	I do not use them	Little	Quite a lot: summaries, maps to re-elaborate
P:4	Not very good	Every day	To look for dates and facts, videos, tests, didactic materials (tests, maps, schemes)	Once a week (YT)	Little: mainly to display materials, YT (videos, video-lectures)	Quite a lot: simplified materials, selected information, colours-friends, synthesis close to the text, summaries through post-it.
P:5	Average	2-3 times per day	To search for new didactic materials, to read newspapers, listen to the radio and watch TV	I do not use them	Quite a lot: Internet but no particular software	Quite a lot: I use images, graphs, maps, schemes and more
P:6	Average	Everyday	To find materials for classes	I do not use them	Little	No answer
P:12	Not very good	Everyday	To search for songs, pictionary, news, schemes	I do not use them	Little: I use the DVD attached to the school books. They usually provide videos of the written dialogues in the text.	Little: they follow the book with us, but I prepare some pictionaries and spidergrams with a maximum of 10 words to learn, and they have differentiated tests with less items and more time
P:8	Very good	2-3 times per day	To study, to spend my free time	2-3 times a week (FB, YT, LN)	Quite a lot: Google, YT	Quite a lot: I support them with maps, conceptual schemes, technological help.
P:9	Not very good	Everyday	To prepare maps, schemes, materials	Everyday (FB)	Little	No answer
P:10	Average	2-3 times per day	To search for words and meanings, research in general, explore websites for personal or work reasons	I do not use them	Little: my work depends on the choices of the main teacher	Little

P:11	Average	Everyday	Social network sites, research	Everyday (FB, YT)	Little	Little: they can choose the day of the text, I promote collaborative work, I value their personal strengths and talents
P:7	Average	2-3 times per day	For research	Every day, 2-3 times per day (FB, IG, TW)	Little: mainly to visualise materials from my pen drive	Little: simplified texts, schemes and conceptual maps
P:13	Not very good	2-3 times per day	Research, news, free time	2-3 times a week (YT)	A lot: Google Classroom in particular. GSUITE in general, GeoGebra, cMap, Scratch for storytelling	Quite a lot
P:14	Not very good	Everyday	Email, social, research, buying tickets, booking travels	Everyday (FB, YT, LN, TW)	Little: Google Classroom, I use the LIM to display images on the topic we are working on	Little: I emphasise the practical work in lab (according to the idea of learning by doing), in general I prefer to use this way of working with all the class
P:15	Not very good	Everyday	Didactics, social network sites, news	2-3 times a week (FB, IG, LN)	Little: Google Classroom, YT	Little: I use more images and dispensatory tools
P:16	Not very good	2-3 times per day	News, didactics, culture, shows	I do not use them	I do not use it	Not at all: I do not work differently. I try to support him and check what he writes more often
P:17	Average	2-3 times per day	To search for words, events	Everyday (FB)	Little: YT, Google Classroom	Little: through compensation (calculator, their schemes), I constantly ask them to participate to summarise what explained so far, and summarise the previous class at the beginning of the next one
P:18	Average	2-3 times per day	Social network sites, news, music, cooking, updates on my kids' school	Everyday (FB, IG, YT)	Little: GeoGebra	Not at all: I regularly monitor their approach to the contents and topics explained

Table 6. Insights form the initial questionnaire

(FB = Facebook; IG = Instagram; TW: Twitter; LN = LinkedIn)

Use of the principles: descriptive results

Based on the artefacts created by each group of teachers, it was verified if and how participants used the proposed principles. The following table illustrates the principles used in each of the groups, and it provides initial descriptive insights on the ways in which each group of teachers appropriated and adapted the principles while designing their learning activity.

Group	Number of principles considered	Principles used	Brief description of the activity	Adaptation of the principles
1	1 out of 5	<ul style="list-style-type: none"> 4. Fostering groups' self-organisation of the task 5. Require a final presentation of the digital artefact to the class 	<p>"Designing a uni-familiar house with a linear supporting structure."</p>	<p>The learning activity only involves multimodal production tools, avoiding the use of MDE and their literacies.</p>
2	5 out of 5	<ul style="list-style-type: none"> 1. Organising an open task 2. Allowing the use of different digital multimodal materials and tools 3. Promoting work in small groups using multimodal digital environments 4. Fostering groups' self-organisation of the task 5. Require a final presentation of the digital artefact to the class 	<p>"Title: Watch out! It's fake news</p> <p>Description: Realising a blog in which pupils can express and share their reflections about fake news, after an analysis of a set of fake news both in Italian and English.</p> <p>The work will be organised in 4 groups within each class, at the end one collective blog per class will be realised."</p>	<p>The task is guided by a common, collaborative goal shared among the groups (creating a blog at a class level), then self-organised and managed differently within each group;</p> <p>The final presentation is intended as "digital" presentation within the blog.</p>
3	3 out of 5	<ul style="list-style-type: none"> 1. Organising an open task 4. Fostering groups' self-organisation of the task 5. Require a final presentation of the digital artefact to the class 	<p>"Each group of students will interview in English the "new" pupils coming from other countries for 2 weeks of cultural exchange. Following this, students will organise the contents in a digital artefact to be presented to the class. At the end we will discuss together the cultural differences between the countries."</p>	<p>The learning activity only involves multimodal production tools, avoiding the use of MDE and their literacies.</p>
4	4 out of 5	<ul style="list-style-type: none"> 2. Allowing the use of different digital multimodal materials and tools 3. Promoting work in small groups using multimodal digital environments 	<p>"Title: <i>Femicinism</i>: confronting the numbers of violence</p> <p>Description: Creation of a power point in which pupils analyse the article 21 of the Constitution by linking it with the problem of violence against women with its data at a national and European level. The presentation will be shared with the class."</p>	<p>"Organising an open task" was interpreted as openness in the methods (principle 2), not in the task's outcomes.</p>

		<p>4. Fostering groups' self-organisation of the task</p> <p>5. Require a final presentation of the digital artefact to the class</p>		
5	3 out of 5	<p>1. Organising an open task</p> <p>4. Fostering groups' self-organisation of the task</p> <p>5. Require a final presentation of the digital artefact to the class</p>	<p>"Pupils are organised in groups of 3. They will go to the supermarket and buy the necessary materials for the lab experience on measuring the density of different solid and liquid substances. In particular, they will buy water, olive oil, alcohol, sugar, salt (...). After the 2h experience at the lab, they will use digital software to create the data representations. Throughout the activity, they will take pictures or videos of the learning experience, re-elaborating the content in a video or Power Point presentation to be presented in 15 minutes to the class."</p>	<p>The learning activity only involves multimodal production tools, avoiding the use of MDE and their literacies.</p>
6	5 out of 5	<p>1. Organising an open task</p> <p>2. Allowing the use of different digital multimodal materials and tools</p> <p>3. Promoting work in small groups using multimodal digital environments</p> <p>4. Fostering groups' self-organisation of the task</p> <p>5. Require a final presentation of the digital artefact to the class</p>	<p>"TASK FOR THE STUDENTS</p> <p>Situation: On the 25th of January 2018, a train derailed, causing the death of some people.</p> <p>What to do: Starting from this fact and using the Internet and software that can support you:</p> <ol style="list-style-type: none"> 1) Describe the fact, also using images, videos and graphic representations; 2) Identify the physical quantities involved in the derailment; 3) Design at least one graphic showing the interaction between the two physical quantities considered; 4) Based on the physical quantities represented, create the text of a problem that the other groups will solve; 5) Produce a digital presentation to explain your work to your peers (10 mins). You can use the LIM." 	

Table 7. Participants' use of the design principles

Theme 1: 'Transcendence' as collaborative pedagogies using multimodal production tools

During the discussion of the competences framework in meeting 1, five participants shared their concerns about students' digital learning practices, revealing marked differences between the perspectives of teachers on the learning dynamics occurring in multimodal digital environments and teens' learning practices online. For example, P:15 attributed her difficulty to promote autonomy and responsibility in her students to the "passive" way of living a digital life that characterises young

people: *“If competences involve autonomy and responsibility, they should also say how to do it! It’s impossible to foster these dimensions because young people live with a continuous, incessant control by adults and teachers. They live passively with their phone in the hands. 10 years ago it was easier, but now it’s impossible for teens, in particular within the Italian culture.”* More broadly, the digital dimension of young people’s lives emerged as a strong factor of influence on teachers’ perceived detachment from their students. Indeed, as P:14 expressed, it is difficult to really *know* them, leading her to question the existence of some values in their life because they spend much time in multimodal digital environments: *“Sincerely, I don’t know if nowadays there are solid values in pupils of 14-15 years old. It’s difficult to know, they are always with their phone...”*

Other participants complained about their difficulty to organise “innovative” teaching sessions in the last years. For instance, P:7 described her failing attempts to plan and realise group-work with her students due to her and her colleagues’ struggles with more basic aspects of teaching such as students’ presence and participation in the classroom. This teacher motivated the presence of this behaviour with young people’s interest in social network sites: *“We can’t propose collaborative work to our students, we can barely keep them in class. They are always thinking of what is happening in Facebook”*.

Teachers’ perceived detachment to their students and their negative interpretation of young people’s use of MDE impacted the use of principles. These participants promoted their group’s *avoidance* of the principles involving work in MDE, namely principle 3 (allowing the use of different digital multimodal materials and tools) and 4 (promoting work in small groups using multimodal digital

environments). In particular, in group 3 these principles were negotiated through a discussion between P:7 and P:8 on the potential of MDE for learning compared to formal methods:

P:7: *“I do use social network sites, but I’ve never found conceptual maps on a relevant topic. How can you learn in there?”*

P:8: *“I do not even use them. They just make you lose time... I understand a PowerPoint presentation!”*

As a result, their group created a learning activity on an inter-cultural exchange that involved multimodal *production* tools; whilst within group 5, involving both P:15 and P:16, the two principles connected to the use of MDE for learning were not even considered and discussed, resulting in an educational activity limited to multimodal production tools, similarly to group 3.

Theme 2: opportunity spaces

Six participants interpreted the new forms of learning occurring in MDE more positively. Their openness emerged despite their different levels of self-assessed technical digital literacy. Indeed, teachers’ consideration of the principles as “opportunities” to innovate pedagogy was justified with the *necessity* of a change in teaching methods, aiming to promote students’ learning according to a learner-centred approach. For example, P:4 recognised her students’ differences without stigmatising their digital practices. Instead, she pointed out that the crystallised teaching practices guiding formal education do not work with this generation of students: *“I know they are smart, but I do not understand why they do not learn. Some years ago pupils were different. Maybe we should change something, too?”*. In particular, her emerging openness toward innovation and change was not influenced by her low self-assessed technical digital literacy. Supporting her self-assessment, during the last meeting of the training course she asked basic questions such as how to download an image

from Google Images to share it with her students. In another group, P:17 self-assessed herself as “average” in the level of use of technologies, and she described herself as a daily user of social network sites. During the design sessions, she expressed her willingness to innovate her school’s approach, promoting the use of new tools for teaching and learning, and the organisation of training courses involving collaborative work: *“We should try, why not? I mean, pragmatically speaking, our methods do not work anymore... And if we want at least to keep pupils at school we should innovate... Buy tools... Organise teachers’ training... definitely working more together.”* Soon after, she addressed me: *“Yvonne, what are your plans for next year?”*

Thus, two factors influenced the creation of new pedagogies. On the one hand, teachers’ non-negative interpretation of the new literacies and use of MDE of their students recognised a “difference” without stigmatising it as “inferior”. On the other hand, this reflected openness toward pedagogical innovation and change in education. The two factors impacted these teachers’ use of design principles in their learning activities. Indeed, the designed tasks involved all the five principles proposed both within group 2 and 6, as shown in table 4.

Theme 3: ‘Transcendence’ as expansion in the modalities of expression

A few participants did not express concerns about the principles or their students’ digital practices throughout the meetings, and they highlighted the effectiveness and their satisfaction with the teaching practices in use. These teachers work in technical areas where the curriculum requires the use of specific software or technical knowledge about rules and laws. For instance, one of the participants, P:1, described the technical orientation of his subject, and he pointed out how the principles proposed are not useful to innovate his teaching methods: *“I have to teach them (the*

students) *how to use Autocad to design systems and security plans... It's a very technical subject, and I do not understand how this can fit...*”

Similar concerns were expressed in other groups. For instance, in one of them P:7 participated as teacher of ‘Law’. During group-work, she described how the requirements of the curriculum impose precise teaching methods and assessment plans for her area. Furthermore, this participant identified possible problems with the information available on the Internet, pointing out how using the Web 2.0 technologies proposed can be “dangerous” due to the lack of reliability of the fonts. During the discussion with her group, she motivated her doubts with the following words: *“My students must study the Italian Constitution and European regulations... how can I do this, I have strict rules to follow and the material available online is not always the official one. It's dangerous, I prefer to use my books and check what they do.”*

As a result of the discussions around these issues, both the groups involving P:1 and P:7 designed pedagogies based partially on the proposed principles. They renewed their existing teaching methods, involving more flexibility regarding the modalities of expression and tools that students are allowed to use to re-organise the information. For example, group 4 designed a learning activity in which pupils are asked to analyse the article 21 of the Italian Constitution, problematising it critically by discussing the contemporary problem, and available data, on violence against the female gender. According to teachers' final presentation of the activity, the material and information collected by students must be re-organised into a Power Point presentation, that must be shared and discussed with the other pupils in the classroom. In the other team, group 1, participants designed a standard learning task that students will complete in Autocad, involving self-organised group work.

8.2.6 Preliminary discussion

Forms of transcendence in learning design

“Opportunity spaces” are defined by Hornecker et al. (2006) as spaces in which there is much potential to enhance current practices, in the absence of urgent problems to be solved. By applying their conceptualisation to educational practices, it is possible to consider “transcendence” as *change* and *enhancement* in learning and teaching. Talking back to the research question on the form of this transcendence in learning design involving the principles, the analysis led to the emergence of three different forms of transcendence:

- 1) **‘Transcendence’ as collaborative pedagogies using multimodal production tools** describes the shift of learning methods from individual to collaborative, and the involvement of some multimodal production tools such as PowerPoint in the designed pedagogy;
- 2) **‘Transcendence’ as opportunity spaces** represents ‘enhanced practices’ involving all the principles to promote learning through visual literacy in multimodal digital environments;
- 3) **‘Transcendence’ as expansion of the modalities of expression** describes a form of change limited to the enrichment of the modalities of expressions allowed to students in their learning tasks.

In contrast to Hornecker et al. (2006) who recognised a barrier to ‘opportunity spaces’ and transcendence in the users’ lack of previous experience with the technology considered, the results provide evidence that other factors come into play in the complex dynamic of generating change and enhancement in education. Indeed, results show how teachers’ self-assessed technical digital literacy and experience with multimodal digital environments do not represent a variable of influence for a realised transcendence. Instead, this first exploratory study showed how the creation of opportunity

spaces depended on two main factors: (i) the consideration of MDE for learning as opportunities; (ii) the perceived need of pedagogical change and innovation. In particular, when the analysis identified the presence of both, the findings showed teachers' use of all the principles, and a transcendent design in the form of innovative pedagogies with the potential to foster learning through visual literacy. This was often followed by teachers' willingness to test the activities in their class. In contrast, when findings identified a barrier toward the the use of MDE for learning, teachers engaged partially with the principles, avoiding the design of pedagogies around the use of open MDE in favour of real-life collaboration among students. Finally, in the case teachers did not express the necessity to innovate their pedagogy, transcendence occurred only as 'expansion' of the modalities of expression.

The first barrier to transcendence might be motivated by teachers' perception and awareness of the different expectations and ambitions associated with out-of-school culture and in-school culture (Crook, 2012) which results in tensions in the transferability of these practices and ways of learning into formal education. The second barrier depends on the specific nature of the subject of teaching: technical drawing and law seemed to necessitate exactly the teaching methods in use. Consequently, teachers expand their methodologies partially in their designed activities, promoting more group-work and different modalities of expressions for knowledge construction. The following table provides a summary of how the two factors influenced the realisation of transcendence.

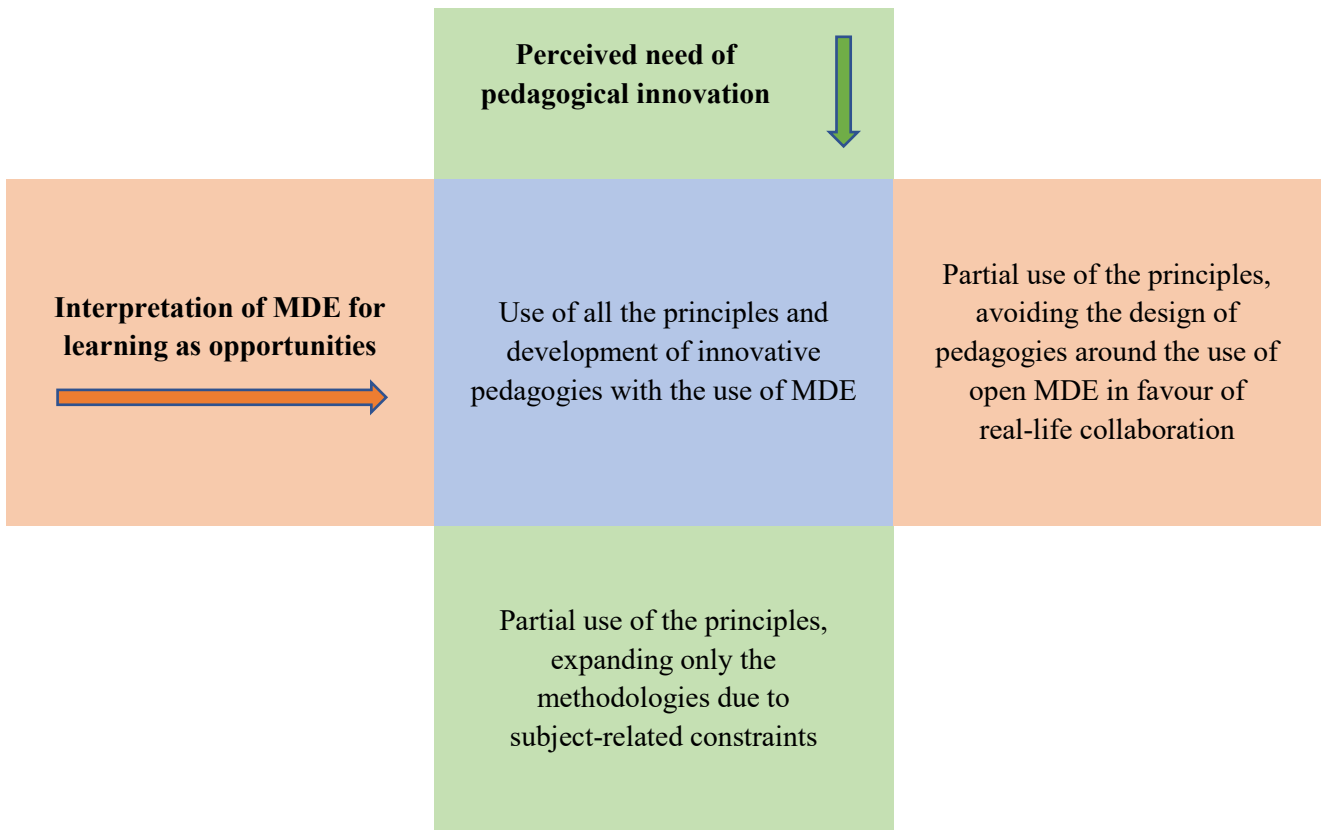


Figure 12. Forms of transcendence in education, and their factors of influence

This study took a ‘design oriented’ view on the possibilities for change and innovation in education, considering learning design as one of the many existing forms of design. The approach represents a novel perspective in the field of learning design. Indeed, this is the first attempt to use design methods with the explicit aim to prompt the creation of transcendent learning activities. Thus, the work theorised ‘transcendence’ as ‘altered (pedagogical) practice’, also identifying three forms of transcendence and two external barriers to the possibilities to enhance teaching and learning involving the design principles.

The main focus of the approach adopted is on the 'practice', with the aim to innovate it. Outside the field of design, the fundamental focus of the research on change and innovation involving technology in educational contexts has taken a psycho-pedagogical perspective. The research from this perspective has mainly investigated the personal qualities and characteristics that enable teachers to integrate technology meaningfully in their classroom (e.g. Ertmer and Ottenbreit-Leftwich, 2010; Hew and Brush, 2007). For instance, Ertmer and Ottenbreit discussed the role of knowledge, pedagogical beliefs, self-efficacy, school and subject culture, proposing that teachers' *mindset* should change to include technology in meaningful ways. In particular, they proposed that a specific idea should be included in this 'existing mindset': "*teaching is not effective without the appropriate use of information and communication technologies (ICT) resources to facilitate student learning.*" (Ertmer and Ottenbreit-Leftwich, 2010, p.255). Other models and solutions have focused on possible constraints to the integration of technology for teaching and learning, such as the one by Hew and Brush (2007). The authors identified a range of barriers encountered by K-12 teachers in various countries while integrating technology meaningfully in their classrooms, and in particular: resources; institution; subject culture; attitudes and beliefs; knowledge and skills; assessment. Their strategies to overcome these barriers encompass (i) the need to have a shared vision on technology and a joint technology integration plan; (ii) the necessity to overcome a lack of resources; (iii) changing beliefs and attitudes; (iv) participating to professional development activities; (v) re-design assessment.

Narrowing on multimodal digital environments, previous research on the integration of social network sites into formal schooling has argued that this possibility may help educators to re-think the forms of interaction that are familiar to young people (Grion and Bianco, 2016), such as the

participatory culture dynamics guiding the use of the environments (Manca and Grion, 2017). However, as demonstrated in the analysis, the integration of these ‘third spaces’ (Aaen and Dalsagar, 2016; Potter, 2018) at the intersection between leisure and social, non-school context and school contexts do come with tensions, reinforcing the findings by Crook et al. (2012). More recent research by Manca and Ranieri (2015) in the Italian context explored quantitatively teachers’ view of social network sites for learning. Their work demonstrated how educators *are not keen* to integrate the tools into their teaching practices. Among the reasons, Manca and Ranieri (2015) identified (i) institutional constraints; (ii) pedagogical issues; and (iii) cultural resistance. In particular, the differences in the views of academics depended on the discipline of teaching (Manca and Ranieri, 2015), confirming one of the identified barriers to transcendence.

8.3 Implications

Phase III aimed to develop a set of innovative learning design principles based on the guiding theories and findings distilled from Phase I and II. As a final step, the principles were used by their end users, namely secondary school teachers. The goal of the empirical work was to investigate what form of transcendence teachers envisioned in the principles. The findings illuminated three forms of transcendence and two ‘conditions’ for transcendence.

Given the exploratory nature of this last empirical study, the preliminary discussion suggests further research in this direction that will expand the inquiry to identify the most effective form of transcendence in learning design involving the principles. This work could lead to a deeper understanding of the possibilities and constraints connected to the integration of the new forms of learning developed in multimodal digital environments into the classroom.

Chapter 9.

Conclusions

This thesis aimed to investigate the learning opportunities offered by multimodal literacies for young people with dyslexia in open multimodal digital environments (MDE). In particular, the research started from the critical position that individuals with dyslexia develop different preferences in learning, overcoming their difficulties with literacy. Given the lack of research on the issue, the research started with an exploratory study of teens' multimodal literacy practices in open MDE that identified visual literacy as the main skill to construct their participation and communication in these social spaces. Based on these findings, the second phase focused on learning processes in open MDE, narrowing on how the identified visual literacy skills promote participants' own goal setting and accomplishment during non-scaffolded collaborative activities. This second study reflected the main characteristics of communication and learning in open MDE. In phase III, the guiding theories and results have been re-elaborated in the form of design principles according to Design-Based Research. The last empirical investigation explored how these principles were appropriated and used by secondary school teachers during participatory design sessions of learning activities. The main contributions that resulted from the three empirical studies are described in this concluding chapter.

9.1 Contributions

9.1.1 Learning through multimodal literacies

The first contribution of the dissertation is an interdisciplinary model of learning that encompasses a new role for multimodal literacies, developed from fragmented literature. As discussed in Chapter 3, a major part of research has focused on how multimodal literacies are developed online through social interactions, and their role in communication. The remaining research has investigated how to teach these 21st century skills in educational contexts. However, the role of multimodal literacies in the learning dynamics occurring in multimodal digital environments has not been a direct object of investigation so far. The theoretical and empirical work of the present dissertation has led to the definition of a new relationship among multimodal materials, multimodal literacies and learning goals. The following image summarises the relationship among the concepts and it recognises tinkering as a “style of interaction” that connects the three layers:

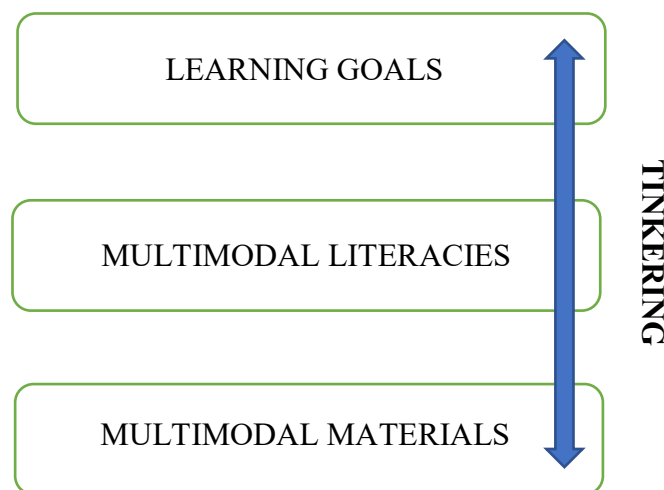


Figure 13. Learning through multimodal literacies

This conceptualisation suggests a new agenda for researchers who are interested in the opportunities of multimodal literacies for learning. Instead of focusing on how these literacies are used by students, and how to teach them, some of the questions that the model proposes are: how are multimodal literacies practiced to achieve learning goals? How can tinkering with multimodal materials promote goal setting and accomplishment during particular learning tasks? What is the most appropriate level of scaffolding to support this sort of active, situated learning without undermining tinkering?

9.1.2 Learning through visual literacy

The neurodiversity paradigm and learner-centred perspective adopted allowed to identify visual literacy as a preference in self-constructed communication and learning for young people with dyslexia in multimodal digital environments. This emerged from the exploratory Phase I and it was confirmed in Phase II, engaging in what Stebbin calls ‘concatenated exploration’ whereby theory is incrementally developed across multiple studies (Stebbin, 2001). The findings extend Jenkins’ work on multimodal literacies (Jenkins, 2006), supporting the view that specific groups of individuals may have preferences toward visual practices while interacting with multimodal artefacts. Consequently, this analysis indicates the emergence of forms of visual literacies. As Kress pointed out (1998), this shift toward the visual may lead to the “*the full development of all kinds of human potentials*” (Kress, 1998, p.75), promoting a more extended and fuller expression of individuals’ personal strengths.

Phase II focused on how individuals with dyslexia use visual materials and their visual literacy skills to make meanings with the aim to construct and accomplish their own learning goals through tinkering. The empirical study provided specific evidence on the learning processes that occur in multimodal digital environments for young people with dyslexia. Participants discovered their goals

through the explorative use of visual literacy actions, and iteratively refined these goals in repeated micro cycles.

Alongside describing specifically how the learning dynamic develops, the results suggest that tinkering also extends to multimodal materials where the user's aim is to create a digital artefact through visual literacy actions. Furthermore, the study illuminated on how young people with dyslexia engage in non-scaffolded learning through visual literacy in MDE. In particular, it was observed that goals were sometimes lost given participants' immersive exploration of the materials. A few participants engaged in the details of the visuals they found, and as a result lost track of their goals.

Finally, the analysis revealed the relationship between affinity groups in participatory culture dynamics and participants' confidence in learning. Indeed, in working together synchronously, teens aligned their visual literacy actions with one another, allowing to recognise the prevalence of these practices in their group. For some participants this fostered a sense of social identity and confidence in their own skills, impacting self-concept, and in turn facilitating learning.

9.1.3 Informing theories of disabilities and related principles of inclusive design

The dissertation adopted a moderate position on disabilities that accepts the objective existence of disorders at a neurological level such as the conditions associated with dyslexia. However, at the same time, this view recognises the existence of patterns of strengths and weaknesses in individuals, promoting a strength-focused view of dyslexia. Confirming this theoretical position, the findings of Phase I showed how the open MDE *designed* environment were considered a "*safe space*", which did

not promote a “normalising” view of dyslexia in favour of a “neurodiverse” one. Indeed, participants’ perceived sense of safety was the result of their agency and control in carefully orchestrating their communication and their identity statements. For these reasons, the findings inform the design of similar socio-technical contexts by showing the value to include multimodal affordances, allowing individuals’ own construction of their space online to facilitate their control over communication and learning. Furthermore, findings suggest the importance of giving value to the *learning preferences and differences* explained in the previous section when designing inclusive environments.

The analysis contributes to the universal design agenda by revealing how young people with dyslexia experience both vulnerabilities and opportunities in socially situated, constructed ways. Indeed, in Phase I, results suggested that the impairments associated with dyslexia are *different* and *weaker* in digital social spaces that privilege interactions in multimodal forms. However, the analysis also provided insights into how teens with dyslexia “*expressed, re-created or even confronted their differences in SNS*” (Vezzoli et al., 2017). Young people’s evaluation of both the environment and themselves fostered complex experiences, i.e. in their use of metacognitive skills to choose the most appropriate affordances of the *designed* environment, and in identifying the purposes they served. This metacognitive aspect was explored further in Phase II that showed how multimodal literacies skills and materials are used by participants to construct and accomplish learning goals.

9.1.4 Implication for educators and learning designers

The first part of Phase III developed a set of principles that can support the design of new inclusive pedagogies based on the learning dynamics that occur in multimodal digital environments. The principles represent ‘actionable’ pedagogical dimensions that provide concrete indications for

practitioners, and research-informed motivations for each of them. The five principles developed are described in the previous chapter.

9.1.5 Implications for teachers' training

In the second part of Phase III it was explored how the design principles were appropriated by secondary school teachers while designing new pedagogies based on the principles. The analysis revealed three forms of transcendence:

- 1) *'Transcendence' as collaborative pedagogies using multimodal production tools* describes the shift of learning methods from individual to collaborative, and the involvement of some multimodal *production* tools such as PowerPoint in the designed pedagogy;
- 2) *'Transcendence' as opportunity spaces* represents 'enhanced practices' involving all the principles to promote learning through visual literacy in multimodal digital environments;
- 3) *'Transcendence' as expansion of the modalities of expression* describes a form of change limited to the enrichment of the modalities of expressions allowed to students in their learning tasks.

In addition, two 'conditions' for transcendence were identified: teachers' openness toward the use of MDE for learning, and their perceived need of a change in their pedagogical practices. The presence of both the conditions led teachers to consider all the proposed principles, generating pedagogies with the potential to foster learning through visual literacy.

9.2 Limitations and future research directions

This research started with a critical perspective on the normative view on the mind, dyslexia and their influence on the design of learning technologies and pedagogies. Given this starting point and the little available research taking this perspective, the empirical work adopted an exploratory approach

(Stebbin, 2001). The two studies confirmed and informed each other, leading to the development of a new set of design principles based on theories and findings. In particular, the development of the design principles is based on a conceptualisation of the relationship between multimodal literacies and learning that connects fragmented literature. The empirical research considered for the development of design principles was limited to Phase I and II of the present dissertation, and the theory included reflected their background literature. Furthermore, Phase I and II included a limited number of participants. Although both the exploratory approach adopted, and the small number of participants involved in the study are common in qualitative research, future research may move toward a confirmatory direction. Thus, mixed methods will help to broad and refine the qualitative findings of Phase II, and in turn the principles.

However, the research also provides different starting points for future projects. By linking linguistic theories to the learning domain it was demonstrated how multimodal literacies are not only an end in themselves, but they mediate higher-level metacognitive processes. Thus, Phase I and II revealed how multimodal literacies are part of a more complex picture of how learning occurs in digital social spaces. In particular, Phase II narrowed in on how own learning goals are constructed and accomplished using these skills during collaboration, reflecting the learning dynamics of MDE. This choice was informed by research, with a focus on the fundamental importance of goals in every learning process. However, the theoretical model guiding the work can promote further investigations exploring the three-levels of interaction between digital materials, multimodal literacies skills and metacognitive aspects related to learning goals. For example, considering the self-constructed, exploratory dynamics afforded by digital materials that guide learning in open multimodal digital environments, future work can involve self-regulation processes:

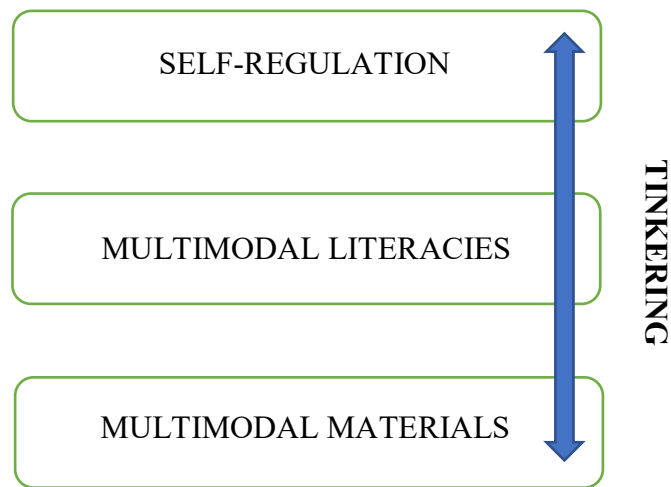


Figure 14. The relationship between multimodal materials, multimodal literacies and self-regulation

Furthermore, the findings in Phase II revealed how participants sometimes lost track of their main goals due to an immersive exploration of the materials. Despite this negative aspect associated with MDE, the findings reflect the learning dynamics occurring in MDE. However, existing research in exploratory learning provides clear indications on the important role of feedback in learning (e.g. Sharma and Hannafin, 2007). Subsequent research should consider this literature to design the most appropriate form of scaffolding to promote learning while not undermining the process of tinkering with multimodal materials.

Another question that this research throws up for future investigation concerns how the findings relate to the practices and learning of non-dyslexic teens. Indeed, though the aim was to understand how dyslexic young people participate and learn in multimodal digital environments, future investigations might seek to compare systematically the two groups. Given the more general shift to the use of visual

aids promoted by contemporary media sharing platforms, the findings might extend to the broader population.

Finally, Phase III explored what form of ‘change’ the design principles can promote in established educational contexts. The exploratory study opens to further research involving teachers aiming to understand deeper the potential of adopting these new forms of learning into formal education, as well as to understand the constraints. In addition, the use of participatory design methods to promote ‘transcendence’ in learning design represents an innovation in education. Following on this study, future investigations may focus on the potential and tradeoffs of participatory design techniques to enhance educational practices through further empirical research.

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Appendix 1.

Research briefs, information sheets and consent forms

Phase I: Research brief; information sheets for young people and their parents; consent forms for participants and their parents.

**An exploratory study to understand the use of Facebook
by 14-16 year old students with Dyslexia**

We are now recruiting secondary schools to take part!




Università
Ca' Foscari
Venezia

This research study aims to understand the opportunities offered by the multimodal nature of Facebook (e.g. images, videos, text etc.) for participation in social life and learning of adolescent students with Dyslexia or those suspected of having Dyslexia.


RESEARCH FEATURES


- We are currently looking for schools who are interested in participating in the exploratory study that will take place **between October and December 2016**.
- We would like to involve adolescent students with **Dyslexia**, or those suspected of having Dyslexia, who are aged between **14 and 16 years old**, and who are **experienced users of social networks**.
- Participants will be invited to take part in **up to three interviews**, during which we will:
 - 1) Ask students to show us their Facebook profile, and walk us through the **construction process** of specific posts
 - 2) Discuss the **strategies** the participants are using to construct the post
 - 3) Conduct a **working memory test** to assess if and how memory might affect the use of multimodal resources.



WHAT DO WE WANT TO FIND OUT THROUGH THIS RESEARCH?

- We hope to identify whether there are any effective strategies that could be used to design and build more intuitive digital educational environments able to support innovative approaches to learning.
- Participating in the interviews may help children to reflect on the strategies used and on their habits in online social contexts.
- Upon their request, students' families can receive the outcomes of the memory tests, which could support a better understanding of the particular strengths and weaknesses of their child.





Get in touch!
If your school is interested in participating or if you have any questions, please email Asimina Vasalou at a.vasalou@ucl.ac.uk



**AN EXPLORATORY STUDY ABOUT THE USE OF
FACEBOOK BY 14-16 YEAR OLD STUDENTS**

WE ARE A TEAM OF RESEARCHERS FROM THE UNIVERSITY COLLEGE LONDON, AND CA' FOSCARI UNIVERSITY OF VENICE. WE WOULD LIKE TO INVOLVE YOU IN OUR RESEARCH STUDY, THAT WILL TAKE PLACE BETWEEN SEPTEMBER AND DECEMBER 2016.

THIS LEAFLET ANSWERS TO SOME QUESTIONS ABOUT OUR PROJECT, AND WE HOPE IT WILL BE USEFUL. IF YOU HAVE ANY ADDITIONAL DOUBTS, PLEASE CONTACT US!

WHAT DO WE WANT TO FIND OUT?

WE ARE INTERESTED IN THE USE OF SOCIAL NETWORKS BY ADOLESCENT STUDENTS WITH DYSLEXIA OR SUSPECTED TO HAVE DYSLEXIA. WE WOULD LIKE TO UNDERSTAND HOW YOU USE THE MULTIMODAL RESOURCES (E.G. IMAGES, VIDEOS, TEXT ETC.) OFFERED BY SOCIAL NETWORK SITES, TO UNDERSTAND HOW YOU MANAGE YOUR COMMUNICATION WITH YOU SOCIAL NETWORKS' FRIENDS. BY LEARNING HOW YOU USE MULTIMODALITY TO COMMUNICATE, WE CAN DESIGN AND BUILD MORE INTUITIVE EDUCATIONAL ENVIRONMENTS.

AM I ELIGIBLE?

IF YOU ARE AFFECTED WITH DYSLEXIA OR SUSPECTED TO HAVE DYSLEXIA, YOU ARE BETWEEN 14 AND 16 YEARS OLD, AND YOU ARE EXPERIENCED WITH SOCIAL NETWORKS' USE, YOU COULD PARTICIPATE TO THE STUDY.

WHAT WILL HAPPEN DURING THE RESEARCH?

WE WILL INVITE YOU TO PARTICIPATE IN THREE INTERVIEWS. 2-3 PEOPLE FROM OUR TEAM WILL BE PRESENT. DURING THE INTERVIEWS WE WILL 1) ASK YOU IF YOU WANT TO SHOW US YOUR SOCIAL NETWORK PROFILE, AND ANSWER SOME QUESTIONS ABOUT HOW YOU CONSTRUCT SOME SPECIFIC POSTS 2) DISCUSS THE SOCIAL PURPOSE OF THE POSTS 3) CONDUCT A WORKING MEMORY TEST TO ASSESS HOW MEMORY MIGHT AFFECT THE WAY YOU USE MULTIMODAL RESOURCES.

WHAT WILL HAPPEN IF I TAKE PART IN YOUR RESEARCH STUDY?

IF YOU AND YOUR PARENTS AGREE TO YOUR PARTICIPATION IN THE STUDY, WE WILL AUDIO RECORD THE THREE INTERVIEWS, AND TAKE SCREENSHOTS OF THE SOCIAL NETWORKS' POSTS. WE COULD ALSO TAKE SOME WRITTEN NOTES.

WHAT ABOUT PRIVACY?

WE WILL OBFUSCATE ANY PERSONAL DATA (NAMES, SCHOOL NAME, BLURRING FACES IN PHOTOS) OF YOUR SOCIAL NETWORKS PROFILES, AS WELL AS YOUR FACEBOOK FRIENDS' PERSONAL INFORMATION. WE WILL ASSIGN YOU A

NUMERICAL ID, SO THAT NO ONE KNOWS WHO SAID WHAT. WE WILL KEEP THE RECORDINGS IN A SAFE PLACE, AND ONLY SHARE THEM WITH OUR TEAM.

...AND IF I DON'T WANT TO ANSWER TO SOME QUESTIONS?

WE HOPE YOUR WILL ENJOY TALKING TO US, BUT IF YOU DO NOT WANT TO ANSWER ONE OF OUR QUESTIONS OR WANT TO STOP AT ANY POINT THEN PLEASE JUST LET US KNOW. THE PARTICIPATION IS VOLUNTARY, AND YOU WILL BE FREE TO WITHDRAW AT ANY TIME WITHOUT GIVING ANY REASONS, WITHOUT ANY CONSEQUENCES. IN THIS CASE, ALL DATA WILL BE DELETED.

THANK YOU FOR READING THIS LEAFLET!

Yvonne Vezzoli

PhD student

Ca' Foscari University of Venice

Asimina Vasalou

Senior Lecturer

UCL Knowledge Lab

Kaska Porayska-Pomsta

Reader

UCL Knowledge Lab



**An exploratory study about the use of
Facebook by 14-16 years old students**

We are a team of researchers from the Institute of Education of the University College London (UCL), and Ca' Foscari University of Venice. We are contacting you to permit your child to take part in our research study, that will takes place between September and December 2016.

This leaflet informs you about our project, which we hope will be useful, and we would be pleased to answer any further questions you have.

Which are the aims of the research project?

We are interested in the use of social networks by adolescent students affected with Developmental Dyslexia or suspected to have Dyslexia. The study aims to understand the opportunities offered by the multimodal (e.g. images, videos, text etc.) nature of social network sites to students' participation in social life and learning. We hope to identify if there are effective cognitive strategies used by adolescents in these environments that could be used in future education applications. More broadly we want to understand how young people use multimodal resources to orchestrate their communication with their peers.

Who will be involved in the research project?

We are hoping to involve adolescent students affected with Developmental Dyslexia or suspected to have Dyslexia, with an age between 14 and 16 years old, and experienced with social networks' use in our study.

What will happen during the research?

Your child will be invited to participate in three interviews. 2-3 people of our team will be present. During the interviews we will 1) ask your child to show us their social network site profile, and walk us through the construction process of specific posts 2) decompose the cognitive strategies your child is sharing or discuss the social purpose of the post 3) conduct a working memory test to assess how the structures and processes of memory used for temporarily storing and manipulating information might affect the use of multimodal resources.

What will happen to your child if he takes part in our research?

If you and your child agree to participate in the study, we will audio record the three interviews, and take screenshots of the social networks' posts. Moreover, we could take written notes during the interviews.

How we will protect your child's privacy?

We will obfuscate any personal data (names, school name, blurring faces in photos) of participants' social networks profiles, as well as and their Facebook friends personal information when storing the data. We will assign each participant a pseudonym, so that no one knows who said what. We will keep the recordings and notes in a safe place, and only share them with our team.

Could there be problems for your child if he takes part in the study?

We hope your child will enjoy talking to us, but if he/she does not want to answer one of our questions or wants to stop at any point then please just let us know. The participation is voluntary, and your child will be free to withdraw at any time without giving any reasons, without any consequences. In this case, all data will be deleted.

Will doing the research help your child?

The research will mainly inform us about the opportunities offered by the multimodal nature of social network sites to participation in social life and learning of students with Dyslexia. We hope that our study could also help your child to reflect on the cognitive strategies used in order to facilitate learning in the future, and on their habits in online social contexts. Moreover, you will receive feedback of the working memory tests, useful to identify possible deficits and outline effective learning strategies.

Will you know about the research results?

If you would like to find out what happens at the end of the project then please share your email address with us, and we will send you our final report at the end of the study.

Please write here your email address: _____

Thank you for reading this leaflet!

Yvonne Vezzoli

PhD student

Ca' Foscari University of Venice

Asimina Vasalou

Senior Lecturer

UCL Knowledge Lab

Kaska Porayska-Pomsta

Reader

UCL Knowledge Lab



CONSENT FORM FOR YOUNG PEOPLE

TITLE OF PROJECT: AN EXPLORATORY STUDY ABOUT THE USE OF FACEBOOK BY 14-16 YEARS OLD STUDENTS

RESEARCHERS: YVONNE VEZZOLI, ASIMINA VASALOU, KASKA PORAYSKA-POMSTA

1. I CONFIRM THAT I HAVE READ AND UNDERSTAND THE INFORMATION SHEET

2. I UNDERSTAND THAT PARTICIPATION IS VOLUNTARY AND THAT I AM FREE
TO WITHDRAW AT ANY TIME WITHOUT GIVING ANY REASON, WITHOUT
CONSEQUENCES. IN THIS CASE, ALL DATA WILL BE DELETED.

3. I UNDERSTAND THAT PERSONAL DATA WILL BE OBFUSCATED, AND
ANONYMITY WILL BE GUARANTEED IN EVERY STEP OF THE STUDY.

4. I GIVE PERMISSION TO YVONNE VEZZOLI, ASIMINA VASALOU, AND KASKA
PORAYSKA-POMSTA TO HAVE ACCESS TO THE DATA COLLECTED IN THE
RESEARCH.

5. I AGREE TO:

- TAKE PART IN UP TO THREE INTERVIEWS
- PARTICIPATE IN THE WORKING MEMORY TEST
- BE AUDIO RECORDED DURING THE INTERVIEWS
- SHARE A SMALL SET OF SOCIAL NETWORKS POSTS WITH THE RESEARCHERS

NAME

DATE

SIGNATURE



PARENTAL CONSENT FORM

Title of Project: An exploratory study about the use of Facebook by 14-16 years old students

Researchers: Yvonne Vezzoli, Asimina Vasalou, Kaska Porayska-Pomsta

1. I confirm that I have read and understand the information sheet

2. I understand that participation is voluntary and that I am free to withdraw at any time without giving any reason, without consequences. In this case, all data will be deleted.

3. I understand that personal data will be obfuscated, and anonymity will be guaranteed in every step of the study.

3. I give permission to Yvonne Vezzoli, Asimina Vasalou, and Kaska Porayska-Pomsta to have access to the data collected in the research.

4. I agree that my child (name of the child: _____)

- takes part in up to three interviews

- participates in the working memory test

- is audio recorded during the interviews

- shares a small set of social networks posts with the researchers

Name

Date

Signature



LE VISUAL LITERACIES DIGITALI NELLE SCUOLE SUPERIORI



Università
Ca' Foscari
Venezia



Visual literacies è un progetto di ricerca di dottorato triennale creato in collaborazione fra l'Università Ca' Foscari di Venezia e lo University College London.

Lo scopo del progetto è quello di investigare e comprendere lo sviluppo spontaneo delle visual literacies in contesti di apprendimento digitali non formali, come ad esempio i social network o i videogames, e valutarne le potenzialità e le possibili applicazioni in situazioni informali e formali di apprendimento, come ad esempio la realtà scolastica.

Le visual literacies potrebbero essere di grande valore per studenti con dislessia o con scarse capacità verbali. Inoltre, esse potrebbero contribuire a creare materiali didattici digitali inclusivi con potenzialità applicative per l'intera classe.

Siamo alla ricerca di docenti del primo e secondo anno di scuola superiore disposti a collaborare al progetto insieme agli studenti diagnosticati come dislessici o sospettati/in attesa di diagnosi delle classi in cui insegnano. In particolare, siamo alla ricerca di partecipanti per le seguenti fasi del progetto:

FASE 2: aprile-giugno 2017

Durante questa fase del progetto, gli studenti partecipanti lavoreranno in gruppo con un ricercatore in contesto laboratoriale sulle visual literacies digitali. Saranno richiesti 4 incontri di massimo un'ora e mezza che potranno avere luogo in orario scolastico o extra-scolastico a seconda della disponibilità di tempo e strumenti digitali da parte della scuola. Durante questa fase, non sarà espressamente richiesto il coinvolgimento dell'insegnante.

Con il consenso di genitori e studenti, gli incontri saranno audio e/o video registrati a fini di ricerca.

FASE 3: settembre-dicembre 2017

La terza fase del progetto prevede un coinvolgimento attivo di insegnanti e studenti nel ripensare in modo partecipativo i materiali educativi della materia insegnata secondo i principi delle visual literacies digitali. Il risultato di questo lavoro rimarrà a disposizione dell'insegnante per gli anni futuri e potrà, secondo disponibilità, essere testato in un'eventuale quarta fase.

Con il consenso di genitori, studenti e insegnanti, gli incontri saranno audio e/o video registrati a fini di ricerca.



UN PICCOLO APPROFONDIMENTO

COSA SONO LE VISUAL LITERACIES?

Le visual literacies sono definite come le abilità di comprendere, interpretare, valutare e creare i messaggi visivi, come ad esempio le immagini, i video, i grafici o le infografiche.

PERCHÉ LE VISUAL LITERACIES POTREBBERO ESSERE UTILI IN CASI DI DISLESSIA?

La ricerca ha mostrato che le difficoltà di lettura e scrittura potrebbero essere in molti casi associate a potenzialità nel pensiero visivo. I tratti individuati, tutti riconducibili all'emisfero cerebrale destro, sono: le abilità visuo-spaziali, come il pensiero globale e le capacità di astrazione, e le capacità di risoluzione dei problemi e creatività associate a queste abilità. La nostra intenzione è promuovere questi punti di forza, spesso associati alle difficoltà verbali, attraverso le visual literacies nella realtà didattica.



QUAL È IL POTENZIALE INCLUSIVO DELLE VISUAL LITERACIES?

Durante le due fasi della ricerca, gli insegnanti coinvolti potranno partecipare attivamente alle attività proposte. Le competenze acquisite potranno essere utili per progettare e realizzare materiali educativi visuali da integrare a quelli di natura verbale (libri, lezioni) a beneficio di tutta la classe. Le potenzialità dei materiali educativi visuali sono, infatti, molteplici: rendono più semplice la comprensione dei concetti, la memorizzazione dei contenuti, la rappresentazione globale del problema o della questione affrontati e la pianificazione dei lavori da svolgere a casa o a scuola.

LA FASE 1 E I SUOI RISULTATI

La prima fase della ricerca è stata svolta in collaborazione con un gruppo di ragazzi inglesi. L'obiettivo dello studio è stato quello di comprendere le pratiche spontaneamente utilizzate da studenti con dislessia nei contesti multimodali dei social network. I risultati mostrano un intenso utilizzo di materiali visivi, sia durante le attività di comprensione sia in quelle di produzione di contenuti, che potrebbero essere la manifestazione di una preferenza verso un tipo di apprendimento visivo.

CONTATTACI! Per prendere parte al progetto o avere maggiori informazioni, scrivici all'indirizzo yvonne.vezzoli@unive.it

CONSENSO INFORMATO Modulo per gli studenti



Università
Ca' Foscari
Venezia



TITOLO DEL PROGETTO: LE VISUAL LITERACIES DIGITALI NELLE
SCUOLE SUPERIORI

RICERCATORI: YVONNE VEZZOLI, DR. MONICA BANZATO, DR. ASIMINA
VASALOU

1. CONFERMO CHE HO LETTO E COMPRESO IL FOGLIO INFORMATIVO.

2. SONO CONSAPEVOLE CHE LA PARTECIPAZIONE È VOLONTARIA E CHE
SONO LIBERO/A DI ABBANDONARE LO STUDIO IN QUALSIASI MOMENTO
E SENZA DOVER DARE ALCUNA SPIEGAZIONE, SENZA CONSEGUENZE.
IN QUESTO CASO, I DATI RACCOLTI SARANNO CANCELLATI.

3. SONO CONSAPEVOLE CHE EVENTUALI DATI PERSONALI RACCOLTI
(VOLTI, NOMI, E-MAIL) SARANNO OFFUSCATI E CHE L'ANONIMITÀ SARÀ
GARANTITA IN OGNI FASE DELLA RICERCA.

4. AUTORIZZO YVONNE VEZZOLI, LA DR. MONICA BANZATO E LA DR.
ASIMINA VASALOU AD AVERE ACCESSO AI DATI RACCOLTI DURANTE
QUESTA RICERCA.

5. ACCONSENTO A:
- PARTECIPARE AD UN MASSIMO 4 LABORATORI FRA APRILE E GIUGNO
2017;

- PARTECIPARE AD UN MASSIMO DI 4 INCONTRI IN CO-PRESENZA CON UN'INSEGNANTE DELLA SCUOLA FRA SETTEMBRE E DICEMBRE 2017;

- ESSERE AUDIO E VIDEO REGISTRATO DURANTE GLI INCONTRI;

- CONDIVIDERE CON I RICERCATORI LE MIE PRATICHE ONLINE, NEL PIENO RISPETTO DELLA PRIVACY.

NOME DATA FIRMA

E-MAIL: _____

NUMERO DI TELEFONO: _____

CONSENSO INFORMATO

Modulo per i genitori



Titolo del progetto: Le visual literacies digitali nelle scuole superiori

Ricercatori: Yvonne Vezzoli, Dr. Monica Banzato, Dr. Asimina Vasalou

1. Confermo che ho letto e compreso il foglio informativo allegato.

2. Sono consapevole che la partecipazione è volontaria e che io e mio figlio/a siamo liberi di abbandonare lo studio in qualsiasi momento e senza dover dare alcuna spiegazione, senza conseguenze. In questo caso, i dati raccolti saranno cancellati.

3. Sono consapevole che eventuali dati personali raccolti (volti, nomi, e-mail) saranno offuscati e che l'anonimità sarà garantita in ogni fase della ricerca.

4. Autorizzo Yvonne Vezzoli, la Dr. Monica Banzato e la Dr. Asimina Vasalou ad avere accesso ai dati raccolti durante questa ricerca.

4. Autorizzo mio figlio/a (nome del figlio/a: _____) a:

- partecipare ad un massimo di 4 incontri di natura laboratoriale fra aprile e giugno 2017;

- partecipare ad un massimo di 4 incontri in co-presenza con un'insegnante della scuola fra settembre e dicembre 2017;

- essere video e audio registrato a fini di ricerca durante gli incontri;

- condividere con i ricercatori le proprie pratiche online, nel pieno rispetto della privacy.

NOME

DATA

FIRMA

Indirizzo e-mail per eventuali comunicazioni: _____

Numero di telefono per eventuali comunicazioni: _____

Phase III: Authorisation for teachers' training; proposal of training course; attendance certificates; consent forms.



Università
Ca' Foscari
Venezia

Dipartimento di Filosofia e Beni Culturali
Università Ca' Foscari di Venezia

Venezia, 9 gennaio 2018

Il sottoscritto **Prof. Fiorino Tessaro**, coordinatore del Curriculum in Scienze della Formazione del dottorato di ricerca in Filosofia e Scienze della Formazione del Dipartimento di Filosofia e Beni Culturali dell'Università Ca' Foscari di Venezia,

constatato che la **Dott.ssa Yvonne Vezzoli**, dottoranda in Scienze della Formazione presso questa Università, sta svolgendo un percorso di Ricerca-Azione presso l'IIS "Pacinotti" di Venezia Mestre, finalizzato alla tesi di dottorato, con la partecipazione esperta dei docenti dell'Istituto, autorizza la dott.ssa Vezzoli a tenere un corso di formazione su "*Didattica multimodale: una prospettiva inclusiva*" riservato ai docenti partecipanti all'attività di ricerca. Il corso si svolgerà in 4 incontri pomeridiani, per una durata complessiva di 8 ore.

Il corso si terrà in forma gratuita.

Si rilascia la presente autorizzazione ai soli fini assicurativi.

Firma

CORSO DI FORMAZIONE DOCENTI

Didattica multimodale: Una prospettiva inclusiva

Yvonne Vezzoli

Università Ca' Foscari di Venezia
Dipartimento di Filosofia e Beni Culturali
CISRE – Centro Internazionale di Studi
per la Ricerca Educativa e la Formazione Avanzata

 Università
Ca' Foscari
Venezia **Dipartimento
di Filosofia
e Beni Culturali**



Sulla base dei lavori svolti con gli studenti con dislessia degli Istituti Scolastici Algarotti e Pacinotti di Venezia e il polo Da Vinci di Portogruaro, il centro di ricerca CISRE attiva il corso di formazione “Didattica multimodale: una prospettiva inclusiva” per i docenti della scuola secondaria di secondo grado. Il corso sarà svolto dalla Dott.ssa Vezzoli a titolo gratuito durante i mesi di gennaio-febbraio 2018.

Obbiettivi del corso

Il corso ha l'obiettivo di fornire strumenti didattici concreti utili per le discipline specifiche di insegnamento, sulla base delle strategie di apprendimento evidenziate dalle precedenti ricerche e delle potenzialità inclusive individuate negli ambienti multimodali. Gli strumenti didattici saranno progettati in modo partecipativo dagli insegnanti in collaborazione con il ricercatore durante il corso.

Chi può partecipare

Docenti di scuola secondaria del primo e secondo anno, dell'asse scientifico-tecnologico e storico-sociale. Il corso sarà attivato con l'adesione di un minimo di tre insegnanti per area per ogni scuola aderente al progetto.

Durata del corso e incontri

Il corso si svolgerà a gennaio-febbraio 2018 e avrà la durata di due mesi. I quattro incontri previsti avranno cadenza bi-settimanale e si svolgeranno nel primo pomeriggio nelle scuole aderenti al progetto, dalle ore 14.15 alle ore 16.00 circa. Le date indicate di seguito potranno subire piccole variazioni a causa della disponibilità di persone e luoghi e saranno confermate in modo definitivo durante il mese di dicembre 2017.

- **12 gennaio 2018 - Incontro 1**
Il ruolo chiave delle literacies visuali nelle strategie di apprendimento degli studenti con dislessia: una prospettiva inclusiva
Incontro seminariale con spazio di confronto e riflessione sul tema (1.45 ore)

- **26 gennaio 2018 - Incontro 2**
Progettazione per competenze: la personalizzazione dei percorsi
Laboratorio esperienziale di progettazione didattica partecipata (1.45 ore)

- **9 febbraio 2018 - Incontro 3**
Progettare una didattica inclusiva: alcuni strumenti operativi
Laboratorio esperienziale di progettazione didattica partecipata (1.45 ore)

- **23 febbraio 2018 - Incontro 4**
Le potenzialità degli ambienti digitali multimodali per una didattica inclusiva
Incontro seminariale con spazio di confronto e riflessione sul tema (1.45 ore)

Rimango a disposizione per qualsiasi approfondimento o chiarimento e vi ringrazio anticipatamente.

Cordiali saluti

Yvonne Vezzoli

Dottorato in Scienze della Formazione
Università Ca' Foscari di Venezia
E-mail: yvonne.vezzoli@unive.it
Telefono: 3406996137



Dipartimento di
Filosofia e Beni Culturali



Università
Ca'Foscari
Venezia

**Corso di Formazione
"DIDATTICA MULTIMODALE: UNA PROSPETTIVA INCLUSIVA"
CISRE – Centro Internazionale di Studi per la Ricerca Educativa e la
Formazione Avanzata**

ATTESTATO DI PARTECIPAZIONE

Si attesta che

il/la Dott./ssa _____

nato/a a _____ () il _____ nei giorni 22-29 gennaio

2018 e 5-19 febbraio 2018 ha frequentato presso l'istituto Da Vinci di

Portogruaro il corso di formazione "Didattica multimodale: una prospettiva

inclusiva". Si attesta inoltre che le attività si sono tenute in 4 incontri di 2

ore, dalle ore 14.15 alle 16.15 dei giorni sopraindicati, per un ammontare

totale di 8 ore di frequenza.

Venezia, 19 febbraio 2018

La Docente del corso

Dr. Yvonne Vezzoli



Dipartimento di
Filosofia e Beni Culturali



Università
Ca'Foscari
Venezia

**Corso di Formazione
"DIDATTICA MULTIMODALE: UNA PROSPETTIVA INCLUSIVA"
CISRE – Centro Internazionale di Studi per la Ricerca Educativa e la
Formazione Avanzata**

ATTESTATO DI PARTECIPAZIONE

Si attesta che

il/la Dott./ssa _____

nato/a a _____ () il _____ nei giorni 19-26 gennaio

2018 e 2-9 febbraio 2018 ha frequentato presso l'istituto Pacinotti di Venezia il corso di formazione "Didattica multimodale: una prospettiva inclusiva". Si attesta inoltre che le attività si sono tenute in 4 incontri di 2 ore, dalle ore 14.15 alle 16.15 dei giorni sopraindicati, per un ammontare totale di 8 ore di frequenza.

Venezia, 9 febbraio 2018

La Docente del corso

Dr. Yvonne Vezzoli

CISRE - Dipartimento di Filosofia e Beni culturali - P.zo Marcanton Marcorà
Dorsoduro 3484/D - 30123 (VE)

CONSENSO INFORMATO

Modulo per i partecipanti

Titolo del progetto: Co-progettazione di attività didattiche inclusive

Ricercatori: Yvonne Vezzoli, Dr. Monica Banzato, Dr. Asimina Vasalou



1. Confermo che ho letto e compreso il foglio informativo allegato.

2. Sono consapevole che la partecipazione è volontaria e che sono libero di abbandonare lo studio in qualsiasi momento e senza dover dare alcuna spiegazione, senza conseguenze.

In questo caso, i dati raccolti saranno cancellati.

3. Sono consapevole che eventuali dati personali raccolti (volti, nomi, e-mail) saranno offuscati e che l'anonimità sarà garantita in ogni fase della ricerca.

4. Autorizzo Yvonne Vezzoli, la Dr. Monica Banzato e la Dr. Asimina Vasalou ad avere accesso ai dati raccolti durante

questa ricerca.

4. Acconsento a:

- partecipare ad un massimo di 4 incontri di natura laboratoriale
fra gennaio e febbraio 2018;

- essere video registrato a fini di ricerca durante gli incontri;

- essere audio registrato a fini di ricerca durante gli incontri;

- condividere con i ricercatori le proprie pratiche online, nel
pieno rispetto della privacy.

NOME	DATA	FIRMA
------	------	-------

Indirizzo e-mail per eventuali comunicazioni: _____

Numero di telefono per eventuali comunicazioni: _____

Appendix 2.

Interviews

Phase I: Interviews.

INTERVIEWS

GENERAL QUESTIONS (STRUCTURED INTERVIEW)

“Now I am going to ask you some questions about your use of Facebook. Please try to answer to every question. If you don’t want to, just tell me “I don’t want to answer” and try to explain me why”.

- 1) How much time do you spend on Facebook every day? Try to make an estimate in hours or minutes.
- 2) Would you define yourself as an “active user” (someone who share many posts, comments, likes and reactions) or a “passive user” (someone who read Facebook Home and the profiles of Facebook friends most of the time)
- 3) Which device do you use most? (Phone, tablet, computer) Try to explain me why.
- 4) How often do you usually share posts on your profile? Try to tell me how many times a week or a day.
- 5) How often do you usually comment someone else posts? Try to tell me how many times a week or a day.
- 6) Do you use Facebook reactions more than comments? If yes, why?

QUESTIONS ABOUT POSTS (SEMI-STRUCTURED INTERVIEW)

“Now please show me your Facebook profile. I am going to ask you some questions about the types of contributes you shared, not about the contents.”

- 1) Try to explain me why you shared an image/a link/a text/a video (also combined)

Themes to touch during semi-structured interviews:

- fear of failure while writing/commenting
- embarrassment in sharing contents
- “barriers” in reading other Facebook friends
- opinion about using Facebook as an educative resource at school

Phase II: Interviews.

INTERVISTE

PRIMI 20 MINUTI:

Riguardo a tutte le attività svolte (mostra una sintesi visiva/tabella di quello che abbiamo fatto insieme):

INCONTRO 1: 1H	INCONTRO 2: 2H	INCONTRO 3: 2H
QUESTIONARIO	ATTIVITA' SULLE STORIE PREFERITE SUL CARTELLONE (VIDEO, FILM, LIBRI...) PRIMA PARTE DI COSTRUZIONE DELLA STORIA	SECONDA PARTE DI COSTRUZIONE DELLA STORIA ATTIVITA' SUI SOCIAL MEDIA CON IL CARTELLONE

- Cosa ne pensi delle attività che abbiamo fatto insieme?
- Ci sono delle somiglianze fra quello che abbiamo fatto e altre attività che fai di solito? (a scuola o fuori?)

Riguardo al workshop:

Learning

- Focalizziamoci sull'attività di costruzione della storia. Che parti ti sono piaciute di più e perché?
- Ci sono momenti durante e dopo l'attività in cui hai imparato qualcosa di nuovo? Perché?

Collaboration

- Questa era un'attività collaborativa. Hai lavorato con ragazzi che prima non conoscevi. Hai contribuito attivamente all'attività?
- Tu e il tuo gruppo eravate d'accordo in ogni fase del lavoro o ci sono stati dei momenti di discussione? Se sì, quali? Sono stati utili, significativi per il risultato finale dell'attività?
- Hai *imparato* qualcosa dagli altri membri del tuo gruppo?

SECONDI 40 MINUTI:

Domande personalizzate sulla base di 2/3 estratti di video e conversazioni successi durante il workshop.

Se parlano di momenti specifici durante la fase precedente mi focalizzo su quei momenti. Se non lo fanno, propongo 2/3 estratti del workshop. La mia idea è di presentare almeno 1 estratto uguale per tutti i membri di ogni gruppo. Gruppi diversi commenteranno estratti diversi.

Riguardo alla situazione:

- Cosa stavi cercando di fare in questo momento? C'era un problema che stavate cercando di risolvere? Quale?

Riguardo ai ruoli/collaborazione:

- Cosa stava facendo ogni membro del gruppo? Come stava contribuendo allo svolgimento del compito?
- Come avete risolto il problema? Tu avresti fatto in modo diverso?

Riguardo all'apprendimento e multimodalità/visual literacy

- Perché avete scelto [immagine, video, ...]? Tutto il team era d'accordo con questa scelta? Avresti fatto in modo diverso?
- Ciò come supporta la storia che vuoi raccontare?
- C'è un'altra risorsa che avresti potuto usare che sarebbe stata più efficace per comunicare la tua storia e perché non l'hai voluta usare?

Appendix 3.

Questionnaires

Phase I: Questionnaire for parents.

READING

1) Omits or adds extra words when reading

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

2) Is hesitant when reading aloud, and reread the same words more than once

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

3) Repeats the same line twice or misses the lines while reading

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

4) Don't recognise familiar words while reading

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

5) Confuses words that are visually similar while reading – e.g. years-yours, when-then, navy-very

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

6) Use the finger to keep the place while reading and, if don't, loses his place

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

7) Finds difficulties with dictionaires and encyclopaedias while locating words

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

8) Has difficulties in separate words into distinct syllables

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

9) Misreads mathematical questions that include words

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

WRITING

10) Inverts the order of the letter while writing

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

11) Produces messily written work, with spellings crossed out several times

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

12) Spells the same word differently in one piece of work

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

13) Has difficulties with punctuation

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

14) Has difficulties with grammar in English

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

15) Writes a great deal but “loses the thread”

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

16) Writes very little, but to the point

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

17) Has a poor standard of written work compared with oral ability

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

18) Has poor handwriting with badly formed letters

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

19) Mispells words while writing

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

20) Has neat handwriting but writes very slowly

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

COMPREHENSION

21) Reread several times the text to comprehend it

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

22) Read as a reasonable level, but has a lower level of comprehension

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

23) Has difficulties in identifying the main idea of a text

1	2	3	4	5	6	7
NEVER		OFTEN			ALWAYS	

Phase III: Questionnaires for teachers.

Questionario

Grazie per la tua partecipazione a questo corso di formazione. Prima di iniziare, per favore completa questo breve questionario. Il tempo richiesto è di non più di 10 minuti.

Dati anagrafici

Nome e Cognome _____

Età _____

Materia/e di insegnamento _____

Classi di insegnamento (biennio, triennio...) _____

Scuola _____

Privacy

Acconsento all'utilizzo di questi dati, considerati in forma anonima, a fini di ricerca.

Acconsento ad essere audio e video registrato, in forma anonima, a fini di ricerca.

Dislessia e Tecnologie

1. Cos'è la dislessia?

- Un disturbo di apprendimento che riguarda la lettura e la scrittura
- Una differenza di apprendimento
- Una disabilità grave
- Una caratteristica delle persone molto portate a lavorare con le immagini
- Altro: _____

2. Quanto ti ritieni capace con le tecnologie?

- Per niente
- Poco
- Abbastanza
- Molto
- Moltissimo

3. Quanto utilizzi Internet fuori dalla scuola?

- Mai
- Una volta a settimana

- Più volte a settimana
- Ogni giorno
- Più volte al giorno

4. Se lo utilizzi, principalmente per cosa lo utilizzi?

5. Quanto usi i social network fuori dalla scuola?

- Non sono iscritto o non li uso
- Una volta a settimana
- Più volte a settimana
- Tutti i giorni
- Più volte al giorno

6. Se li usi, quale/i social network utilizzi in particolare?

- Facebook
- Instagram
- YouTube
- LinkedIn

- Twitter
- Altro: _____

7. Quanto lavori con la tecnologia con le tue classi?

- Per niente
- Poco
- Abbastanza
- Molto
- Moltissimo

8. E con i ragazzi con dislessia in particolare?

- Per niente
- Poco
- Abbastanza
- Molto
- Moltissimo

9. Se lavori con la tecnologia in classe, quali programmi utilizzi in particolare?

10. In generale, come lavori con i ragazzi con dislessia? Come intervieni a livello didattico con loro?

11. Quanto lavori con le immagini durante le tue ore di lezione?

- Per niente
- Poco
- Abbastanza
- Molto
- Moltissimo

Grazie!

