

NOTHING IS LOST. THE TEACHERS' MULTIMODAL SKILL IN USING DIGITAL RESOURCES TOWARDS LEARNING DIFFICULTIES

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Abstract: *The effective teacher's mediation specifically take place in adapting learning content and learning environment, according to the students' learning needs. As the studies confirm, technologies do not directly effect on students' learnings if they are not used in multimodal way by the teacher. This leads to a rethinking of the teacher's technological and digital skills and to deepen the teacher's multimodal ability to integrate teaching resources. Starting from the researches on teaching differentiation, the proposal describes an in-depth study on the multimodal strategies of an history teacher in case of a student with Autism in a Primary School class. The triangulation analysis of data highlighted emerging aspects concerning three levels of differentiation strategies: content, process and product. These findings, confirming the meta-analyses already known, offer insights on the teachers' multimodal skill and lead to deepen the studies on the relationship between digital resources and school inclusion.*

Keywords: *digital resources; case-study; multimodal teaching;*

Introduction - 'knowledge' and 'competences' for empower all learners:

Start typing the body of your paper here. Papers will outline the issue addressed and research questions, the literature and background to the topic, the analytical frame, the methodology and the research results. Teachers are asked to meet the needs of different types of students and prepare them to live in increasingly complex contexts, also mediated by technology (OECD, 2015). In this perspective, a new teacher's mediation (Damiano, 2013; Kelly et al., 2012) should be expressed in adapting learning content, 'personalizing' learning strategies and settings up learning environments, also thanks to technological resources, based on students' learning needs (Wood, 1992; Walters, 2010). From the theoretical point of view, the teachers' integration aspects (Chocran-Smith, 2001, p. 13):

what they know about teaching ('pedagogical' knowledge - generally linked also to 'technological' knowledge - Shulman, 1986; Mishra & Kohler, 2007)

what they know about what they teach ('subject matter'/content knowledge)

could be integrated with 'what they know about the students they teach ('personalization' knowledge - Tomlinson, 2011).

Among the models in literature (Hoechsmann & Dewaard, 2015), the European Framework for Digital Competence of Educators (DigCompEdu, Redecker, 2017) seems to describe this teacher's integration work as a multilevel 'macro-competence'.

The DigCompEdu's fifth area of 'Empowering Learners' (Redecker, 2017, p. 22) refers to 5.2 Differentiation^[1] and personalization, 'to use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, and to follow individual learning pathways and objectives'.

Within the 'inclusive' paradigm (Booth & Ainscow, 2002; UNESCO, 2015) - that overcomes the distinction between *mainstream* and *specialized* intervention - the macro-

competences of ‘Empowering Learners’ of DigCompEdu (5.) - specifically ‘Differentiation and personalization’ (5.2) - are required to all teachers.

From this perspective, how teacher uses digital resources to encourage the inclusion of students with learning difficulties? Or, from the perspective of ‘teacher knowledge’ (Shulman, 1986; Chocran-Smith, 2001; Damiano, 2013), how ‘subject matter/content’, ‘technological’ (Mishra & Khoeler, 2007) and ‘personalization’ knowledge of the teacher influence each other?

1. Differentiation, technology and multimodality

The relationship between learning difficulties and technologies is well researched (Kennedy & Deschler, 2010; Maccini et al., 2002; Smith & Okolo, 2010). The most recent studies confirm (Hattie, 2009, 2012; Pitler et al., 2013) that technology does not raise students' learning *per se* but, in cases of learning difficulties, if they are used within a ‘differentiated’ strategies (Mitchell et al., 2010; Giangreco, Cloninger, Iverson, 2011) that changes school programs, not just the teaching supports.

The teaching *differentiation* (Tomlinson & Murphy, 2015) is a methodological perspective that aims promoting learning processes for all the students by proposing the same activities carried out in different ways (Heacox, 2001; Grant & Basye, 2015). As stated by Tomlinson (2017), it is mainly based on ‘taking multiple approaches to three curricular elements’: *content* (input, what students learn), *process* (how students learn it), *product* (output, how students demonstrate what they have learned).

Over time, specific differential intervention guidelines have been developed. The author also recently (2017) outlined the *rhythmic phases* of preparation, revision and sharing of a differentiated class (Fig. 1).

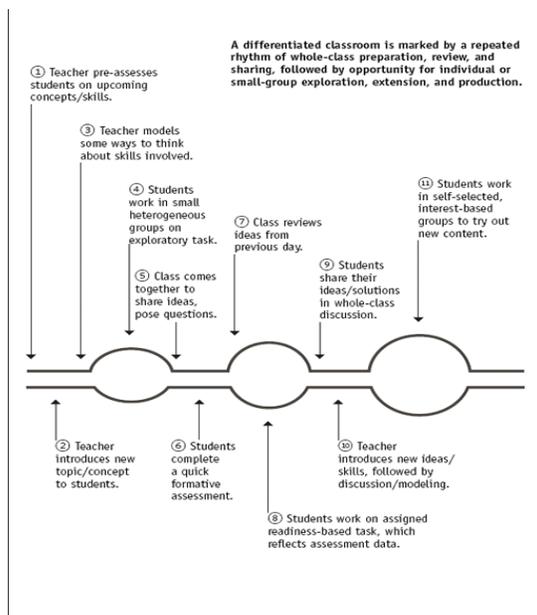


Fig. 1 - Tomlinson, 2017, p. 13

Over time, specific differential intervention guidelines have been developed. The author also recently (2017) outlined the *rhythmic phases* of preparation, revision and sharing of a differentiated class (Fig. 1). From the perspective of the teacher's knowledge (Shulman, 1986; Chocran-Smith, 2001; Damiano, 2013; Perla, 2010), some elements of previous phases are to be highlighted:

before introducing new concepts/skills the teacher must know the students' previous knowledge;

then, teacher modifies both the content to be taught (*content*) and the idea of how students learn the concept/skill (*process*) - ('some way to think about skills involved')

after that, teacher chooses to have students carry out activities that highlight above all the learning processes ('explanatory tasks' – as *product*) and the knowledge they possess

The teaching differentiation allows to further deepen the relationship between learning difficulties and technologies (Pitler, Hubbell, Kuhn, & Malenoski, 2007; Kendal & Stacey, 2001) thanks to three directions:

content - a series of integrative contents to those traditionally are used by teachers (i.e., teaching cards, textbooks) – i.e., online databases;

processes - specific tools that favor the explication - for students and teachers - of learning processes (i.e., graphics, charts, tables, graphs, photos, sound clips);

product - supplementary tools for the realization of the final products by the students and the formative evaluation by the teacher (i.e., research, storytelling, etc.)

The link between *processes* and 'multimodal strategies' is explained by Kress & Van Leeuwen (2001; Walters, 2010; Kress, 2014). About school learnings (Marchetti & Cullen, 2016, p. 42), in case of learnings difficulties in school contexts (Efthymiou & Kington, 2017), the multimodal strategies offer a 'springboard' (Marchetti & Cullen, 2016) to meet all learning styles and cognitive differences in different areas (visual, motor, kinesthetic, etc.)².

The teaching strategies of differentiation starts with in-depth knowledge of students' learning needs (Tomlinson, 1999), goes on with the content *re-shaping* - thanks to the multimodal use of multiple communication levels (written, iconic, oral, non-verbal, computer mediation – v. Mayer's 'multimedia effect', 2005) – and get to the choice of processes and products adapted to the characteristics of the students (Tomlinson, 2001; 2017) and the reshaped content. This is the same path already described in the previous paragraph but strengthened.

2. In-depth study on history teacher's multimodal strategies

The in-depth study (Larsson, 2009; Mortensen, 2013; Coe et al., 2016; Cohen, Manion & Morrison, 2018) focalized on the multimodal strategies (Walters, 2010; Kress, 2010) of an history teacher with an Autism Spectrum Disorder (ASD) student in a Primary School class and aimed at describing the multimodal ability to integrate graphic and digital teaching resources. The multimodal strategies have been distinguished according to the three dimensions of didactic differentiation – *content*, *product*, *processes* (Tomlinson, 2017).

Object - The interaction 'ASD student' – 'history teacher' (Leaf et al., 2009; Leaf, 2012), mediated by graphic and digital resources (time-line, posters, videos - Jungwirth, 1993; Sorzio, 2014).

Context - The study has been conducted on pre-existing material, collected during a participant observation (Spradley, 1980) carried out during 2014-15 years in the training internship of a Master Degree at the University of Bari. The internship was conducted in a medium-size primary school near Bari (3 sections and 15 classes) which has already carried out in the past procedures for the inclusion of students with Autistic Spectrum Disorder (ASD); in a class of 18 students (10 females and 8 males) - one student with Autism Spectrum Diagnosis, supported by a specialized teacher.

²The close relationship between processes-differentiation and multimodality has been well highlighted by Watts-Taffe et al., 2012; Parris & Headley, 2015.

The student was included in an educational-rehabilitative program co-designed by the school and the rehabilitation center. The activities and graphic/technological supports were shared by teachers and expert educators of the center.

Data collection - The moderate-participant observation (Spradley, 1980) in the field (DeWalt & DeWalt, 1998) during two activities: *a.* a group lesson on the Sumerian civilization (*content*), held in the classroom by the history teacher; *b.* an individual activity on the time line (a graphic organizer explaining the same content), held out the classroom.

Data analysis - As suggested by Tomlinson, ‘a differentiated classroom is marked by a repeated rhythm of whole-class preparation, review, and sharing, followed by opportunity for individual or small-group, extension, and production’ (2017, p. 42). Recalling the Tomlinson’s *rhythmic phases* (Fig. 1), the teaching strategies of differentiation during the activities are described in Tab. 3:

Tab. 3 – Phases of activities’ differentiation – adapt: Tomlinson, 2017

Tomlinson’s <i>rhythmic phases</i> (Fig. 1)	Observed phases	Description
1. Teacher pre-assesses students on upcoming concepts/skills	1. History teacher pre-assesses ASD student on upcoming concept of Sumerian civilization Warm-up individual activity	Before the group lesson the teacher carries out a warm-up individual activity with the ASD student, using the mind map (fig. 1) as ‘advance organizer’
2. Teacher introduce new topic/concept to students	2. History teacher introduce every student the new topic of Sumerian civilization Group lesson	History teacher carries out a group lesson using two graphic supports: mind-map already used in the first individual activity (fig. 1) and the interactive timeline on the white board (fig. 3)
9. Students work on assigned readiness-based task, which reflects assessment data	3. ASD student works on the construction of the handmade time-line Assessing individual activity	In a peer-to-peer activity the ASD student build an handmade timeline (fig. 3) as a <i>product</i> of the content and the learning process.

The documentation procedures analyzed the mind-map (fig. 2), the interactive and handmade time-lines (fig. 3 - 4) on Sumerian culture, used in the warm-up individual and assessing individual activities.

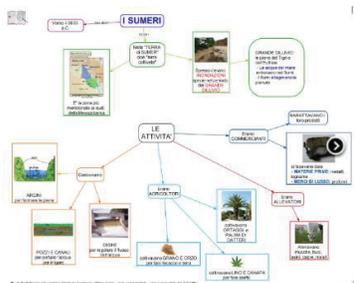


Fig. 2. Mind-map used in the warm-up activity



Fig. 3. Interactive timeline in the group lesson



Fig. 4. Handmade timeline in assessing individual activity



Fig. 5. Interactive video in the group lesson

3. Results

The results of the analysis are articulated based on the levels of differentiation: *content*, *process*, *product* (Tomlinson, 2017; see par. 1). The deepening will be elsewhere.

Content - The history teacher chose to warm-up the ASD student through an activity in which he provided the essential information on the Sumerian civilization synthesized in a mind-map (fig. 2), used as 'advance organizer' (Neisser, 1967; Zakas et al., 2013).

Before carrying out the group lesson, history teacher verified the student's knowledge on which, only later, he would be advised by setting the time line. The warm-up activity involved only the ASD student, not the whole class, able to capture/grasp the essential information and elaborate the structure of the time-line in the same activity - the group lesson.

Process - The history teacher, then, carried out the group lesson diversifying strategies and supports:

the interactive video (fig. 4), explaining civilization (*content*), had double function: recalling the knowledge already possessed by the ASD student and introducing new knowledge for the class;

the interactive timeline (fig. 3) has been used for everyone but as 'advancer organizer' for the ASD student, an exemplary model of the *product* that he would soon realize in the assessing activity.

Product - The history teacher then chose to diversify the assessing activities and final products: an online research in small group to the class; a handmade timeline (fig. 4) to the ASD student, in peer-to-peer.

This final product has been further analyzed, through the criteria of analysis of multimodal documents, identified by Bateman (2008). It is possible to note that in the handmade time-lines (fig. 4) the images (i.e., Ziqqurat, cuneiform writing, etc.) recall the same learnings of the warm-up activity and strengthen the basic learning *contents* and the graphic indicators referring exclusively to the Sumerian civilization, not to other contemporary fluvial civilization (i.e., Assyrians, Babylonians).

This graphic support - used both as a *product* and as a *tool* for assessing knowledge - has been designed in a simplified form, in order to facilitate the recall of information and the ordering along the time line.

Further aspects emerging from the analysis of multimodal documents (Bateman, 2008) will be integrated elsewhere. Here only the emerging aspects of three different aspects of *content*, *process* and *product* are highlighted (Tomlinson, 2017), regarding the differentiation strategies used by history teacher.

4. Implications

Researches on multimodal strategies have already offered evidence-based outcomes, concerning learnings in general (Bruce et al. 2013), and useful tips for intervention

(Tomlinson, 2017), regarding learning difficulties. The present in-depth study on multimodal strategies (Walters, 2010; Kress, 2010) of a history teacher with a ASD student has mainly highlighted:

reduction of the *rhythmic phases* indicated by Tomlinson (2017, fig. 1) - unlike the nine phases of Tomlinson (2017 – fig. 1), the observed activities (tab. 3) are three, focused on the dynamic teacher-student and not on the whole class, since the interactive work-groups are missing. The history teacher chose to diversify the numbers of activities - three for the ASD student (warm-up, instruction, assessing), two for the class (instruction, assessing) and, above all, their function – a peer-to-peer assessing activity and a small group research;

double function of the same resources used - the interactive video (fig. 4) has been used as *reminder* for the ASD student' knowledge and *presenter* of new knowledge, for the rest of the class, at the same time;

simplification of the graphic resources - the interactive time-line of the group lesson has been simplified - in elements and structure - in the assessing activity in order to favor the ASD student's strengthening of the knowledge and avoid distractors.

5. Conclusions

Regarding the already known meta-analyzes (Hattie, 2009; Pitler et al., 2013), these findings confirm that digital resources for learning difficulties should be used within didactic differentiation strategies (Tomlinson, 2017), appropriately adapted by the teacher.

Also regarding digital resources, the teacher's multimodal skill (Eilam, 2015) allows to grasp the implicit aspects of didactic differentiation – i.e., the content's adaptation, the diversification of processes and learning products. This leads us to extend investigations on the close relationship between digital resources and teacher's multimodal skill in order to better understand the effects of the differentiation and personalization (5.2 – Tab. 1, Redecker, 2017) strategies in the inclusion of all students.

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