

Digital Technologies and Digital Strategies to Enhance Musical Knowledge: A Qualitative Case Study

Michele Della Ventura
Music Academy “Studio Musica” – Department of Music Technology
Via Andrea Gritti, 25 – 31100 Treviso Italy
dellaventura.michele@tin.it

ABSTRACT

This article provides an overview of the role that the on-line platform OPEN SoundS can play in promoting musical education in a classroom with dyslexic students. The platform is a musical environment designed and developed as a virtual studio where students and teachers can create collaborative musical projects. In this on-line environments, the users deal with technologies for music processing, research, and communication that can help to develop personal skills and to enhance learning and teaching. The purpose of this study is to identify implications for future studies in the use of digital technology for learning. Results showed that students with dyslexia compensated for their processing deficits by relying on learning strategies.

KEYWORDS

Dyslexia, learning motivation, music education, student performance, technology enhanced learning

1 INTRODUCTION

Pondering on the current state of the relationship between the internet and the educational disciplines calls for a statement of fact: the diffusion of internet usage is an already acknowledged fact which can no longer be understood as a marginal phenomenon and which appears to be susceptible of important growth and developments [1][2]. We may, in other words, interpret it as a relevant aspect of a new “normality” [1] which is progressively

establishing itself and tends to position those who think it possible to stay offline in a marginal area [3], imposing on them serious penalties at the level of information, communication and updating [4].

Internet represents an important tool for the didactic, enhancing the learning process: with Internet it is possible to speak of e-learning.

E-learning is a platform with flexible learning using Information and Communication Technology (ICT) resources, tools and applications, and focusing on interactions among teachers, learners and online environment [5]. The learning environment must be a “*smart learning environment*”: “*technology-supported learning environment that can make adaptations and provide appropriate support in the right places and at the right time based on individual learners’ needs, which might be determined via analyzing their learning behaviours, performance and the online and real-world contexts in which they are situated*” [6][7].

Digital technology can improve the learning process but if used appropriately, it also represents a dynamic, forceful and useful tool for teachers because it can enhance their teaching process. If teachers use digital technology to enhance learning and teaching, they can also help students to improve their educational outcomes.

Nowadays, there are a lot of learning platform for different subjects, but there is little attention for the musical field.

This paper presents a case study conducted in a Music High School using the learning-environment *OPEN Sounds* (OS) in order to improve the performance of students in the area of theory, analysis and composition. The

main aim of this project was to analyze the impact of the use of OS in the students' learning process: increase the student's motivation in order to see if it corresponds to an improvement of his/her academic results. Moreover, this project took the students' learning styles into consideration, in order to meet the needs of all students: non-dyslexic and dyslexic students.

This paper is organized as follows. Section 2 describes the learning style and teaching style. Section 3 describes the motivation to learning. Section 4 describes the computer environment OPEN SoundS. Section 5 shows an experimental test that illustrates the effectiveness of the proposed method and finally, conclusions are drawn in Section 6.

2 LEARNING STYLE AND TEACHING STYLE

Learning style means "one person's preferred approach to learning, his/her typical and stable way of perceiving, processing, storing and recovering information" [8].

Knowledge of the students' main learning and cognitive styles and the reflection on their own personal characteristics, of their own teaching method, constitute an important element among the assets of a good teacher. Only by taking into account the individual differences could the teaching method be sensitive to the ways in which the student learns, take advantage of his/her inclinations and adapt them to contexts and situations where such inclinations might cause difficulties [9] [10].

Students learn in different manners in accordance with the modalities and strategies that every one of them uses to process information, starting from the sensory channels that allow us to perceive the stimuli coming from the external environment: verbal, iconographic, auditory and kinesthetic channel [8]. Thus, only if the teacher takes into consideration the students' learning style - by favoring the use of strategies that are more suitable for them - does he facilitate the

achievement of the educational and didactic goals.

While the construction of the teaching activity, based on a certain learning style, actually favors all the students, instead, in case of a dyslexic student, referring to the learning styles and the various strategies that characterize him/her, during the educational procedure, becomes vital for achieving success at school.

The teacher must, therefore, deal with the problem related to the "class" concept seen as a set of students having heterogeneous learning styles. The presence of dyslexic students imposes on the teacher certain didactic choices that help such students and that also turn out to be useful for **all** the other students (the non-dyslexic ones) [11] as well in order to make didactic practice more efficient, the study method more conscious and the learning more long-lasting and more profound.

The teaching strategies used by the teacher may be different, but at the same time useful for all the students in general [12]. A thorough planning of the learning process may use strategies that are useful, at the same time, for all the students (dyslexic or not):

- the use of simple and clear language during the explanations, with terms that are repeated and refer to the written text (adopted handbook);
- the use of images, diagrams and conceptual maps that refer to the iconic aspects of the written text;
- the definition of the lesson on the macro-structure level, on which to build afterwards the explanation of every single concept and the relationships with other concepts.

The strategies must, however, be accompanied by a series of indicators (see Table 1) that the teacher has to take into account so as to do an ongoing evaluation of the learning process.

The choice of such indicators is determined by certain criteria:

- the importance and significance assigned to the indicators (i.e. to the aspects

described by them) by the parties involved in the project/intervention;

- the facility and reliability of survey of the indicators in the evaluation to be carried out;
- the power of synthesis by means of which they express complex phenomena and summarize their evolution in time;
- the causal relationship between the indicator and the set of predefined objectives.

Indicators referred to the internal process
<ul style="list-style-type: none"> ▪ The students needs clear and complete instructions and indications ▪ The student asks for information and clarifications during the explanation ▪ The student asks for a summary of the explained concepts ▪ The student associates images to the concepts
Indicators referred to the learning and growth process
<ul style="list-style-type: none"> ▪ The student associates different concepts ▪ The student easily expresses his/her own ideas ▪ The student takes notes and highlights the most difficult concepts ▪ The student intervenes during the explanation ▪ The student explains in his/her own words the concept so as to achieve certainty with respect to his/her learning ▪ The student makes connections to concepts that have been already explained ▪ The student applies already-used strategies in similar contexts ▪ The student autonomously extrapolates solutions adaptable to other contexts ▪ The student looks for alternative paths to the solution of a problem

Table 1. Indicators for the evaluation of the teaching strategies.

The development of strategies precedes the motivational development, in that the capacity to strategically deal with the learning situations leads to positive results, which lie

at the heart of motivation.

3 MOTIVATION TO LEARN

Motivation is defined by psychologists as an internal process that activates, guides, and maintains behavior over time [12]. In other words motivation gets you going, keeps you going, and determines where you're trying to go [13]. Motivation influences learners to choose a task, get energized about it, and persist until they accomplish it successfully, regardless of whether it brings an immediate reward. Motivation is present when learners actively seek out and participate in activities without having to be rewarded by materials or activities outside the learning task.

Emotions have an effect on learning and achievement, mediated by attention, self-regulation and motivation [14]. Therefore, emotion represents an *indicator* of the motivation: emotion is related to motivation in such a way that human beings tend to execute things that we hope would lead to happiness, satisfaction and any other positive emotion at some degree [15].

Motivation represents an important factor when the teacher has to deal with the concept of "classroom" intended as a group of students having heterogeneous learning styles.

The presence of dyslexic students imposes on the teacher certain didactic choices that help such students and that also turn out to be useful for **all** the other students (the non-dyslexic ones) in order to make didactic practice more efficient, the study method more conscious and the learning more long lasting and more profound [16].

Dyslexia is defined as a **Specific Learning Disorder (SLD)**: it is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities [17][18]. Dyslexic students can write and read, but they manage to do so using their capacities and energies at the maximum, given that they cannot do it automatically. They grow tired quickly, they make errors, fall behind, do not learn [19].

One of the major issues of the individuals affected by SLD is the lack of **autonomy** in the learning process, which leads the individuals to **disesteem** (emotion) and educational failure [17] (weaknesses), therefore to a lack of motivation.

To ensure that all students have the possibility to develop a wide range of musical skills, teacher must take into consideration the different learning styles of the students and leads them during the learning process.

Based on what has been said above, it becomes obvious that teaching and learning go beyond the content: students learn because someone teaches and helps to learn.

4 OPEN SOUNDS

OPEN SoundS is an on-line platform that offers a new dimension in training on the Net: the possibility to produce and share music remotely within communities.

OPEN SoundS's working dimension and project are a virtual environment designed for creative expression mediated by the use of dedicated technology and by the peer communities set up to develop more proficient learning processes through music production teamwork.

In other words: a virtual environment and strategic model to teach how to approach and access the digital world, its tools, practices, codes, alongside a conscious use of them when learning.

With OS students can collaborate in groups, talking freely to one another. Discussion helps with the understanding of what they are doing and why [20] (i.e. the use of a stylistic feature instead of one another, the use of a cadence). More able learners develop their communication skills by clarifying their ideas as they explain them to others. Less able students are usually supported by other group members, and feel more confident (**emotion**) to contribute ideas [21].

OS is a learning environment where students and teachers can create collaborative musical projects (in a formal and informal way). They can create a project, describing it in every

aspect, uploading music files, reading the contribution of each student and writing/reading comments about the creative productions.

The creation of a music project through a teamwork permits the acquisition and development of musical skills and a progressive awareness of the musical grammar rules.

In this new learning context an important role is played by the operations of **monitoring and analysis** essential for the development of a quality learning process. In this context emerge the necessity to ponder on the relationship that the technologies have with didactics so as to monitor and analyse both the changes in the learning habits and styles of the students [22].

Therefore, it is necessary to define some learning indicators (table 2) that can help the teacher to assess the process especially when the are dyslexic students in the group class.

Indicators referred to the internal process

- Use of informal language to seek dialogue
- Comforts self by seeking out special object or person (emotion)
- Seek a preferred friend
- Acceptance of redirection/advices from other users (emotion)
- Indication of needs and wants
- Recognition that others' thinking in a different way
- Ability to cooperate with the group members
- Ability to encourage the group members to participate in the dialogue
- Use acceptable language and musical grammar rule rules during communication with others
- Use successful strategies to solve a problem
- Sustain interest in working on a task, especially when people offer suggestions, questions, and comments
- Cooperate and shares ideas and materials
- Seek help to resolve problems
- Suggest solutions to a problem
- Show interest in the speech of others
- Respond appropriately to specific

statements or question <ul style="list-style-type: none"> ▪ Make simple statements about an idea ▪ Intensity of the cooperation among the members ▪ Ability to use resources optimally ▪ Increase of the empathy among the group members ▪ Capacity to retain the group members
Indicators referred to the learning and growth process
<ul style="list-style-type: none"> ▪ Number of messages ▪ React to a problem: seeks to achieve a specific goal (emotion) ▪ Cooperate and shares ideas and materials ▪ Reply appropriately to others' needs ▪ Imitate others in using stylistic feature ▪ Observe and imitate how other people solve problems; ask for a solution and uses it ▪ Suggest solutions to a problem ▪ Resolve problems through negotiation and compromise ▪ Follow detailed, instructional, multistep directions ▪ Describe the use of many musical grammar rule ▪ Incorporate new, less familiar stylistic feature in everyday conversations ▪ Application of musical grammar rules in new but similar situations ▪ Engage in simple back-and-forth exchanges with others ▪ Ask questions based on the problem ▪ Quality of the formulated hypotheses (to solve the problem) ▪ Increase of the capacity to use again resources and knowledge ▪ Flexibility to accept others advices
Indicators referred to the user's perspective
<ul style="list-style-type: none"> ▪ User satisfaction degree ▪ Increase of the awareness of the group work ▪ Increase of the awareness of the own skills ▪ Activity sharing approach ▪ Increase of the amount of activity ▪ Increase of the self-worth

Table 2. Indicators to evaluate the (in-itinere) learning process.

5 APPLICATION AND ANALYSIS

The method proposed in this article consists in the use of the computer environment *OPEN SoundS* in order to improve the performance of students in the area of theory, analysis and composition.

In this regard, the main aims of the project were:

- to promote the development of key competences;
- to encourage the ability to share the common construction of knowledge and project-making processes;
- to use a new method to teach and learn through the formal and informal system of knowledge access and construction;
- to foster the meaning fullness and value of the emotional aspects that are the key to active participation in virtual workgroup;
- to encourage student engagement in study, enhancing self-awareness and motivation.

The research was conducted for a time period of eight months (from October 2016 to May 2017) and it involved the fourth grade of the Music High School, with a total of 18 students: 14 girls and 4 boys of which 2 affected by dyslexia.

In the first three months of work the students participated in the lessons in the classroom listening to the explanations of the teacher, taking notes and studying on the book adopted by the teacher. At the end of every month, an examination was passed in the classroom (identical for non-dyslexic and dyslexic students) taking note of the students' mistakes.

Table 3 shows the list of the recurring mistakes and the number of students who made them in the first period (from October to December 2016).

Mistake	Number of students
Fifth relation	8
Eighth relation	7
Progression of fifths	8
Progression of eighths	6

Augmented interval	9
Incorrect use of stylistic features	11
Incorrect realization of a cadence	7
Incorrect realization of a progression of chords	10
Incorrect realization of a Musical Pedal	11

Table 3. List of the students' mistakes (1st period).

In the following months, students were allowed to use OS to study all together, making different exercises proposed by the teacher where it was possible to apply the musical grammar rules related to mistakes of table 2.

At the end of the project (on May 2017) another examination was passed in the classroom and the result were very satisfactory (see table 4 and figure 1).

Mistake	Number of students
Fifth relation	3
Eighth relation	3
Progression of fifths	4
Progression of eighths	2
Augmented interval	3
Incorrect use of stylistic features	2
Incorrect realization of a cadence	1
Incorrect realization of a progression of chords	1
Incorrect realization of a Musical Pedal	4

Table 4. List of the students' mistakes (2nd period).

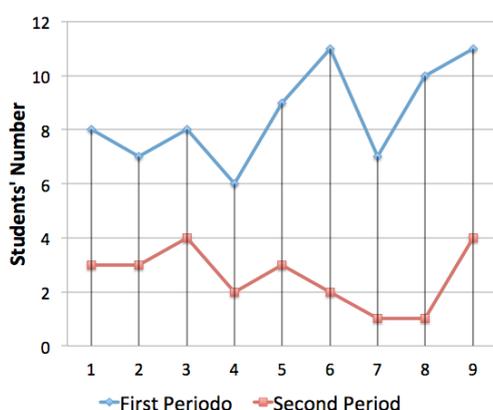


Figure 1. Results of the examinations.

There was a substantial improvement, as far as the two dyslexic students are concerned, to the point of managing to pass the final examination with a mark higher than 60%, considering that it was not (as already mentioned) different from the test of the other colleagues. The learning improvement also appeared for students who already drew a high profit: the process was positive for them as well, inasmuch as they learned to select the information they found based on the group members (particularly with reference to the dyslexic students).

The method has shown that: firstly, the situational interest which was encouraged in students by mere novelties; secondly, individual interest (selecting ideas, composing music) as well as self-regulation and independent learning were well expressed throughout the entire period of research: students also liked the fact that learning was simple and that they were successful in learning.

From the notes of teachers' reflections we found out that there was a positive productive students' motivation which was expressed in their selection of more demanding tasks and in their perseverance in improving achievements and their desire to put in place new musical ideas.

6 DISCUSSION AND CONCLUSIONS

With the increased availability of on-line technologies and computers software, teachers and students may be able to change the manner to teach and to learn. Emotions play a critical role in the teaching and learning process because learners' feelings affect motivation, self-regulation and academic achievement.

Didactics is mainly concerned with proposing, setting up, managing "learning environments", in other words particular contexts that are furnished with specific devices deemed capable of favoring knowledge acquisition processes.

The introduction of OPEN SoundS was truly satisfying: there was a positive and significant impact both on the learning and on the teaching which was subsequently mirrored by the results reached at a didactic level. The participants were very highly motivated to learn using OPEN SoundS. Therefore, the principle affordance of OPEN SoundS was that it provided an arena for active, critical learning about non dyslexic and dyslexic students. The students' approach to learning was profoundly social and collaborative.

These perspectives may be drivers for developing didactics responsive to complex and technology-rich learning environments, and where the learning object is not just given but jointly constructed.

Teachers can make the best use of technology in the classroom by developing their awareness of a range of digital technologies and considering carefully both how and why they can be used to support students' learning.

REFERENCES

- [1] L. Atzori, A. Iera, G. Morabito, The Internet of Things: A survey, *Computer Networks*, Vol. 54, Issue 15, 2010.
- [2] M. Della Ventura, *The Social Network as a Filter for Internet Research*, In the Proceeding of the 3rd International Conference on Educational and Information Technology, Toronto, Canada, 2014.
- [3] N. Winters, K. Walker, D. Rousos, *Facilitating learning in an intelligent environment*, in: The IEEE International Workshop on Intelligent Environments, Institute of Electrical Engineers, London, 2005.
- [4] S.J.H. Yang, T. Okamoto, S.S. Tseng, *Context-aware and ubiquitous learning*, *Educ. Technol. Soc.* **11**(2), 1–2, 2008.
- [5] S. Codone, *An E-learning Primer*, Pensacola, Florida, 2001.
- [6] G.J. Hwang, *Definition, framework and research issues of smart learning environments – a context-aware ubiquitous learning perspective*, *Smart Learn. Environ.* **1**(4), 1–14, 2014.
- [7] B. Klimova, *Assessment in smart learning environment—A case study approach*, In: Uskov, V., Howlett, R.J., Jai, L.C. (eds.) *Smart Innovation, Systems and Technologies*, vol. 41, pp. 15–24, 2015.
- [8] A. Echazarra et al., *“How teachers teach and students learn: Successful strategies for school”*, OECD Education Working Papers, No. 130, OECD Publishing, Paris, 2016.
- [9] B. Le Donne, P. Fraser and G. Bousquet, *“Teaching strategies for instructional quality: insights from the TALIS-PISA Link data”*, OECD Education Working Papers, No. 148, OECD Publishing, Paris, 2016.
- [10] M. Silberman, *“Active Learning: 101 Strategies to Teach any Subject”*, Needham Heights, MA: Allyn & Bacon, 1996.
- [11] Loftin et al., *Learning behaviors via human-delivered discrete feedback: modeling implicit feedback strategies to speed up learning*, *Autonomous Agents and Multi-Agent Systems*, pages 1–30, 2015.
- [12] R. E. Slavin, *Educational Psychology: Theory and practice*, Needham Heights, MA: Allyn and Bacon, 2000.
- [13] M. Glynn Shawn, Lori Price Aultman, Ashley M. Owens, *Motivation to learn in general education programs*, *The Journal of General Education*, Vol. 54, N. 2, (pp. 150-70), 2005.
- [14] R. Pekrun, T. Götz, W. Titz, R.P. Perry, *Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research*, *Educational Psychologist*, **37** (2), 91–105, 2002.
- [15] R.E Thayer, J.R. Newman, T. McClain, *Self-regulation of mood: Strategies for changing a bad mood, raising energy, and reducing tension*, *Journal of Personality and Social Psychology*, **67**, 910–925, 1994.
- [16] J. Hatcher, M.J. Snowling, Y.M. Griffiths, *Cognitive assessment of dyslexic students in higher education. British Journal of Educational Psychology*, *British Journal of Educational Psychology*, Vol. 72, 2002.
- [17] L. Saccomanni, *Disturbi di apprendimento e Disturbo da deficit di attenzione/iperattività*, In *Giornale Neuropsichiatria dell'Età Evolutiva*, n. 19. Pacini Editore, Pisa 1999, pp. 93-104
- [18] G.R. Lyon, S.E. Shaywitz, B.A. Shaywitz, *A definition of dyslexia*. Springer 2003, Vol. 53, pp 1-14
- [19] A. De Filippis, *Dislessia e disturbi dell'apprendimento*, Edizioni Omega, Caserta 1998, pp. 5-13, pp. 28-34
- [20] D. Hayward, *Teaching and Assessing Practical Skills in Science*, Cambridge: Cambridge University Press, 2003.

- [21] T. Barbero, *Innovative Assessment for an innovative Approach*. PERSPECTIVES A Journal of TESOL Italy, Special Issue on CLIL, Vol. XXXVII, n. 2, 2012.
- [22] M. Della Ventura, *E-Learning Indicators to Improve the Effectiveness of the Learning Process*, In Proceedings of the International Conference on E-Learning in The Workplace (ICELW 2015), New York, USA, 2015.