

## NURTURING SINGING AND MUSIC LITERACY IN SCHOOLS WITH THE ARTIFICIAL INTELLIGENCE-BASED SOFTWARE, "SOLFY"

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### ABSTRACT

The importance of Solfege training in public schools music education - which opens the way to music literacy for all - was emphasized by almost all great educators during the modern history of music education. The present article will describe - in a dialog form - a new didactic, interactive & integrative, artificial intelligence-based solution for teaching and self-practicing Solfege in public schools: "Solfy." The article is also a warm invitation for music educators to test and implement it in their schools.

**Keywords:** Solfege, music education, music literacy, solmization, Solfy

### INTRODUCTION

*"Singing, independent of an instrument, is the real and profound schooling of musical abilities. Before rearing instrumentalists, we must first rear musicians."*

Zoltán Kodály (in Kremer 2018, p. 9)

Singing and vocal activities could be found among the basic music education activities at primary schools in Slovakia – as in other countries. They are part of education, not only in artistic education, but also in general education. In primary schools, attention is paid to solmization during both, primary and lower secondary education.

In primary education, the content standards in the 1st, 2nd and 3rd grades include solmization. The content standards for voice activities contain *"gestures showing pitch and length of tones, relative solmization, phonogestics"* (Educational standards for primary education, 2014, p. 12).

In secondary education, within the subject Music Education in the educational field of Art and Culture, solmization is mentioned in the 5th, 6th and 7th grade. The content standard describes the *"arbitrary gestures showing pitch and length of tones, solmization, phonogestics, hand signs to express rhythm, graphic notation, classical notation ..."* (Educational standards for lower secondary education, 2014, p. 4)

The aims of vocal-intonation activities expressed in the form of critical competencies require that students learn to *"intonate within the major tonal series (c<sup>1</sup> - c<sup>2</sup>) on solmization syllables using other auxiliary means of vocal intonation... since the 6th grade, (they learn) to intonate on solmization syllables in diatonic melodic major and minor keys units"* (Innovated Music education curriculum – 7<sup>th</sup> grade, 2016, p. 4)

Specific methods should be used to teach music, such as *"intonation method using relative solmization, imitation and combined methods of song acquisition, guided music*

*discovery, information-receptive method, improvisation*" (Innovated Music education curriculum – 7<sup>th</sup> grade, 2016, p. 7)

In the appendix to the supplement to the State Educational Program from 2015, it is stated that the auxiliary intonation means to represent "*solmization syllables so-mi, so-la-so-mi, do-mi-so, do-re-mi-fa-so-la*" (Appendix to the supplement to the State Educational Program, 2015, p. 5).

The Innovated State Educational Program also underlines the importance of solmization for Primary Art Schools (ZUŠ). As stated in the educational standards, one solmization exercise is a part of the final exam within the 1. part of the I. stage of the basic study in ZUŠ. (Educational Standards for artistic departments in ZUŠ, 2015, p. 509)

In the 3rd and 4th grade of the 2. part of the I. stage of the basic studies in ZUŠ, the musical-theoretical knowledge of the performance standard also includes "*the use of the method of relative solmization and singing of supporting songs, thus strengthening the student's sight-singing*" (Educational Standards for artistic departments in ZUŠ, 2015, p. 558, 560). Similarly, the solmization and singing of supporting songs are also required from the student after the end of the 2nd year of II stage of essential study at ZUŠ (Educational Standards for particular artistic departments in ZUŠ, 2015, p. 583).

*"Tonal intonation method of relative solmization ... enables the correct reading of the music and proper vocal reproduction. With it, it is possible to ensure individual's progressive music development, complex personality development. It is an effective way of teaching music... The dominant component of this method is singing which requires effective music education methods."* (Strmeňová, 2019, p. 340)

The need to develop intonation activities through solmization is emphasized in the national curriculum for general education primary schools and primary art schools. However, despite its undeniable importance in Slovak schools, modern methods for teaching solmization are not available. The new technologies can help build the right digital tools for supporting teachers and students to make real signs of progress in solmizations. One of the options to update learning solmization in schools is implementing the *A.I.*<sup>1</sup>-based program Solfy, which was co-founded by dr. Morel Koren from the Bar Ilan University, Israel. In the following text, we bring a short interview with him.

## MAIN PART

M.S., Q1: How did you start the micro company that creates the program, and who are the partners?

Solfy A: The Solfy Initiative - which includes Tzipi Koren (music teacher, music pedagogy, co-founder), Dr. Adoram Erell (expert in digital voice identification, analysis, and processing, technical director, co-founder), Dr. Morel Koren (music teacher, music pedagogy, co-founder), and other collaborators - started operating in 2017. The research and development begin to run in 2018 and 2019, thanks to the

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<sup>1</sup> Artificial intelligence (*AI*) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence.

financial support received from The Israel Innovation Authority<sup>2</sup> and the National Project *Digital Israel*<sup>3</sup>.

M.S., Q2: How did the implementation of the program start?

**Solfy A:** Preparing to present the first working version of the program at the Colloquium of Musicology and Music Education, *George Enescu* University of Arts Iasi, February 2020<sup>4</sup>, we initiated its implementation in two classes in collaboration with prof. Ciprian Juncă from *Ion Simionescu* school<sup>5</sup>. The results were satisfactory and presented at the Colloquium. The second verification occurred between March and July 2020, collaborating with Dr. Loredana Muntean from the *Department of Educational Sciences, University of Oradea*, within her students (PIPP). The almost immediate reaction to switching to online learning and practice was motivated by her statement: *"All digital resources can be used as long as they respect the specific features of the students' age and the teachers' aesthetic and didactic criteria. [...] we can assert that digital resources constitute a must-have of a school anchored in the contemporary world, not only because they are part of everyday life but also because they are beneficial for the education of primary school children."* (Muntean, 2017, Vol. 1). *"Therefore, the ones teaching musical education must have a close perception of the assets and ways through which the new technology can facilitate the access to knowledge [...]"* (Pop-Sârb, 2017, Vol. 3). More details about Solfy's implementation in Romania are in the joint article [Perspectives for music education in schools after the pandemic](#) written by Music Teachers Associations Network (p. 53-59).

M.S., Q3: Who is Solfy addressing?

**Solfy A:** Solfy addresses the formal & vocational, primary & secondary school students and music lovers that want to self-evaluate, study, practice, and progress in solmization and music literacy. For the students enrolled in the music pedagogy path, the future music teachers, it is recommended to study and test Solfy, know this option, being ready to implement it in their classes.

M.S., Q4: How would you describe Solfy's functionalities?

**Solfy A:** At Solfy address <https://www.4solfy.com/>, under the Help menu are video tutorials with translations that describe all the functionalities. One of the tutorials includes Slovak subtitles.

In the classroom, only the teacher will use the program with a laptop and projector for 10-15 minutes teaching and singing Solfege in conjunction with the traditional materials and assigning homework. Students will practice at home, several times a week, each time 10-15 minutes, preparing homework with the help of Solfy's artificial intelligence. They would benefit from Solfy guided practice, self-practice, self-assessment, self-navigation, and the opportunity to review previous topics registered in Solfy. They will become aware of their success or failure - which can be remedied by perseverance.

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<sup>2</sup> <https://innovationisrael.org.il/en/>

<sup>3</sup> [https://www.gov.il/en/departments/digital\\_israel/govil-landing-page](https://www.gov.il/en/departments/digital_israel/govil-landing-page)

<sup>4</sup> [https://www.arteiasi.ro/?page\\_id=1144&lang=eng](https://www.arteiasi.ro/?page_id=1144&lang=eng)

<sup>5</sup> <https://youtu.be/PAY0nLNMWJI>

Solfy's content is ordered progressively on Levels, Lessons, and Solfeges. Each Level contains 26-28 Lessons, each consisting of two exercises and two songs. The contents can be approached modularly, according to the teacher's decision. Each new Lesson adds a new notion (or two), with concrete examples, the student having to complete the Solfeges chronologically to move on to the next task.

The first Level allows teaching and practicing auditory, vocal, and cognitive skills, learning the sounds and notes *sol, fa, mi, re, do*, measure 2/4, *halves, quarters, eighths* with the respective *rests*, notions of *dynamics* (e.g., *forte, piano*), *arpeggio, legato, musical form, syncope*, and *counter-time*. The second Level will assimilate new subjects: *measure 3/4, la, si, do* (on score), *si, la* (under the score), *canon, alteration signs, etc.* The third Level adds *4/4 measure, new signs of alteration*, the concepts of *modulation* and *transposition* (offering the same Solfege in different tonalities), and others. To move on to the *next Lesson*, students must complete and record all four Solfeges from the *current Lesson*, succeeding in at least one of them. Students who need more practice to pass on can repeat the weekly homework to achieve satisfactory results.

Solfy's advantages:

- Solfy "sounds" the scores as solfeges sung by a human (synthesized) voice, with the traditional syllables: *do, re, mi, fa, sol, la, si*. Thus, singing Solfege, the user consciously expresses the sonic meaning of the written musical language, proving knowledge acquisition.
- The analysis system provides *feedback* on the interpretation's quality, mentioning mistakes, allowing the user to record again and correct them.
- The user can compare the *feedback* window with the *reference* window to be aware of the differences and insist on correcting them.
- Solfy rewards successful performances with a pleasant accompaniment, creating a feeling similar to the one created by a *public appearance on stage*.
- The teacher decides the frequency of weekly progress, giving only one Lesson (or more) as homework.
- Teachers can prompt pupils to *Practice* solfeges at home in different modes: *Tempo = 100, or 120, Record with MIDI+beats* (MIDI synthesized melodic guide and metronome), *Record with Beats* (only with the metronome), *Record with Orchestra* (that is possible only after winning this option), and *Record with Mute* (without any auditory support).
- Students can advance independently - accordingly with the time that they will invest in practice.
- Solfy is a *Self Singing and Practicing Solfege* solution for stimulating music literacy in formal education, and it invites teachers to test it by themselves and implement it in their classes.

Currently, Solfy works on Windows™, Android™, MacOS™, with Chrome™, Edge™ and, Opera™, but not on iOS™ (iPhone and iPad).

M.S., Q5: What advantages does Solfy offer compared to other digital programs for music education?

**Solfy A:** Comparing with other digital music education programs that give feedback only on pitch and (eventual) duration, Solfy provides feedback on the correctness of the sung syllables and dynamics – in addition to pitch and duration.

M.S., Q6. Why is it necessary to run a significant pilot?

**Solfy A:** Solfy can be adapted to different systems/levels of music education as primary, vocational, pedagogical high schools, and university's path for music pedagogy - depending on the goals of the teachers who implement them. As the program is still in development, a significant pilot is needed to check the program's technology and pedagogy, in class, online, and during the individual study, at home, to learn from practice, whether and what needs to be improved or changed - and make, the necessary adjustments. In addition, the Pilot will offer opportunities for teachers to check themselves facing the digital technology and the new didactic method of teaching and evaluating. A significant pilot means implementing the program for one academic year and evaluating it by analyzing pupil's results.

We propose to the community of music educators participant at the Horizons of Art 8 / Horizonty umenia 8 to support and encourage such a pilot with a significant number of schools from Slovakia and other counties, following the example of the 2007 pilot researched and evaluated by Prof. Graham Welch (Welch, 2011). A detailed description of the Pilot's impact appears in several articles, starting with "*Researching the First Year of the National Sing Up Singing Program in England: An Initial Impact Assessment.*" Eighty-one schools with 3,762 students have participated in this Pilot in the first stage. In the following years, 2008-2011, the participation expanded, comprising approximately 90% of the almost 17,500 primary schools in England at that time (Welch, 2012).

M.S., Q7: In which countries is Solfy already applied to teach Solfege?

**Solfy A:** Solfy is in use in educational pilots in Israel, Romania, Moldova, Greece, Canada, the U.S., Mexico, and in preparation to be introduced soon in other countries. As I have mentioned already in the previous questions, we expect that the music educators participant at the Horizons of Art 8 / Horizonty umenia 8 and their colleagues will support, encourage and participate in Solfy's Pilot in Slovakia, and will accept to research, evaluate and publish the results of the project in relevant academic articles.

At the same time, the developers address passionate and ambitious music teachers from all the countries that want to collaborate in organizing Local Collections of Children Music to help prepare original musical material to be uploaded in Solfy's site, together with the subsequent updates.

M.S., Q8: What main advantages do you see in applying Solfy in school education?

**Solfy A:** Using Solfy in their lessons for only 10-15 minutes - along with traditional teaching methods - general teachers and music teachers in formal and vocational systems can benefit from staggered and diverse content, online materials ready to be presented visually and auditive at any time, and the opportunity to assign homework. They will also have the chance to monitor and coordinate their students' activities asynchronously remotely. In addition, pupils and students will practice Solfege being guided by Solfy's artificial intelligence. As a result, they will benefit from self-practice, self-evaluate, and self-control of their activities. At the same time, the education system

can benefit from additional countless hours of Solfege guidance by Solfy's artificial intelligence - in practice at home, outside the school (as a flipped<sup>6</sup> classroom).

M.S., Q9: From your experience, what possible barriers can teachers and pupils encounter in implementing Solfy in classes?

**Solfy A:** First of all, teachers (also supervisors and senior officials in the ministry administration) may face self-mental barriers (which are - so to speak, somewhat *normal* on the meeting with the new and the unknown). However, accepting to try, test, and check the software, implementing it first in a few classes for only 10-12 minutes in each Lesson in combination with the traditional methods of training, in other words, enrolling first in a Pilot with Solfy, will help up come all the barriers and prepare the way for significant changes in formal music education. The pioneers teachers in the Pilot will become ambassadors of Solfy, nurturing singing and music literacy in the school's meaningful music education, opening the doors to music literacy in the standard system - beginning with the elementary level. The ultimate challenge of music education is achieving *music literacy*. "An essential element of the changes is the teacher. Independent, capable of tackling the curriculum with flexibility and liberty, the teacher has the power of continuously shaping the musical teaching process, adapting it to the reality of the children they work with" (Muntean, 2017, Vol. 2).

M.S., Q10: What main reason inspires you to promote Solfy and helps you overcome various obstacles?

**Solfy A:** The main reason is the prestige, celebrity, and money earned from Solfy's sales. Are you surprised? Sure, you should be, and you can laugh deep because it is only a joke. We invest our time, energy, knowledge, and ambition because we are convinced that Solfy represents one of the future steps in music education. Developing it will benefit teachers, students (also parents), the educational system, and sure will bring tremendous satisfaction to the Team.

## CONCLUSION

Solfy is one of the few software – actually until now, the only one - that facilitates and promotes vocal singing and self-practicing Solfege interactively, integratively, and enjoyably in public schools and at home.

The authors intend to continue developing the program and expanding the possibilities of exploration, study, practice, and fun. They hope that Solfy will be received with sympathy by those interested - teachers, children, parents, and ministry representatives who will appreciate and positively recommend implementing Solfy in the educational system.

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<sup>6</sup> <https://lesley.edu/article/an-introduction-to-flipped-learning>

The authors are open to receive suggestions and constructive criticism from teachers who want to collaborate, implementing Solfy in their classes in the frame of this Pilot. Such action and the immediate benefits offered to the enrolled teachers and students will be a unique research and evaluation opportunity, the fruits of which will be presented at the next Horizons of Art 9 / Horizonty umenia 9 in 2022!

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