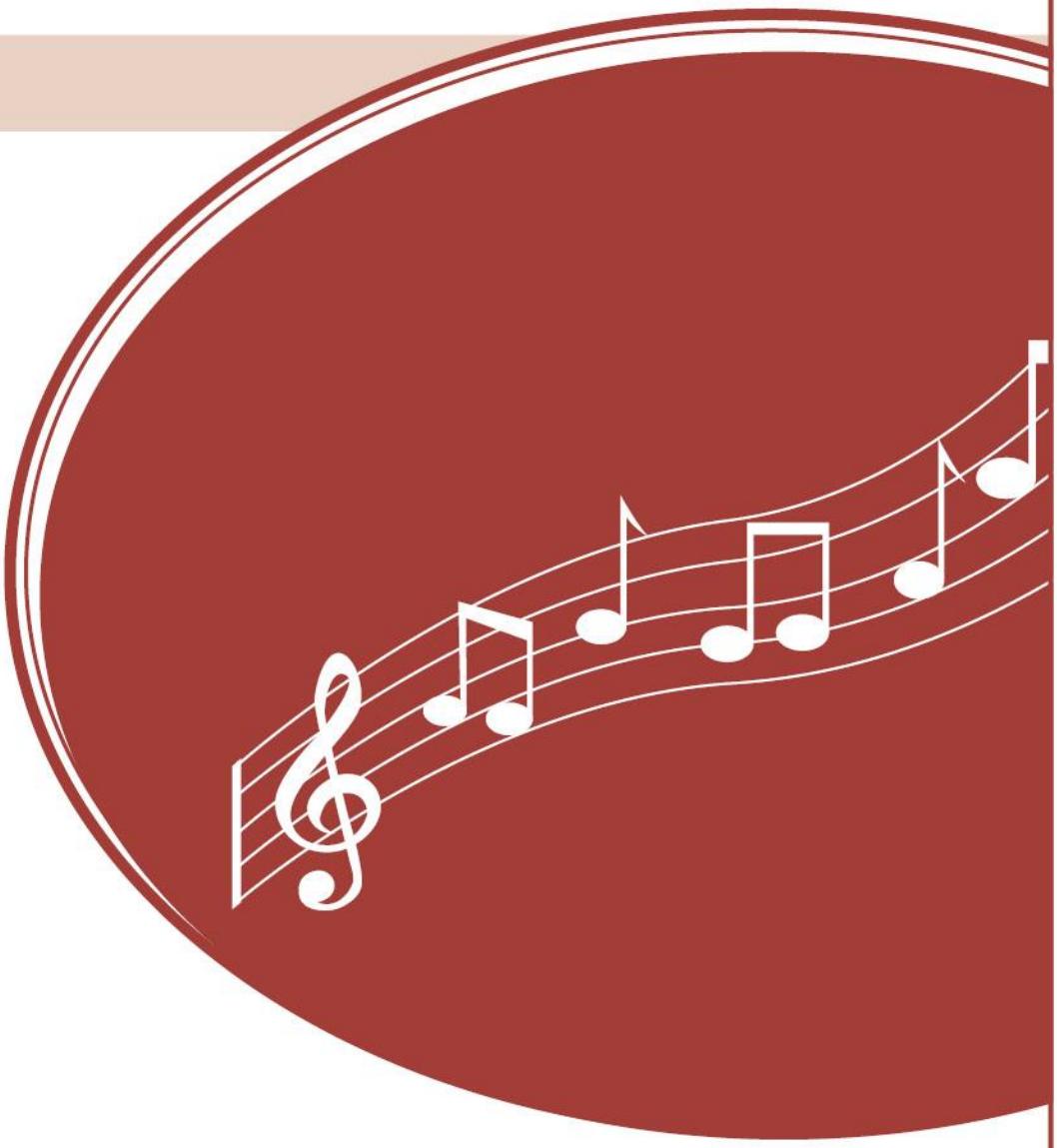
Teaching Learners with Dyslexia

Music



Dyslexia

With the support of
Erasmus+ Programme
of the European Union

A series of special education teaching guides

Inclusion in Europe through Knowledge and Technology

Project no: KA201-2015-012

Teaching Music to Students

who have Dyslexia

Content

Inclusion in Europe through knowledge and technology

Information on the fundamental principles, practices, educational material and teaching aids used to teach various subjects to students with special needs are few and far between. In some cases, material has been prepared for internal use at specialised schools or in other closed environments. In other cases, knowledge has been passed from teacher to teacher as part of workplace training.

No systematic material on pedagogical principles, practices, educational material and teaching aids exist for areas such as teaching first language teaching, foreign language teaching, mathematics and music for the blind, partially sighted and dyslexic.

With this in mind, the goal of this European project is to further develop, implement and disseminate good practices in the area of inclusive education and learning technologies by delivering three primary components: *Teaching Guides*, Guide on g*ood practices Inclusive learning and Teaching* and *SMART E-learning objects*.

Teaching guides

In completing the project, RoboBraille partners have created a series of twelve educational guides covering fundamental principles, practices, educational material and teaching aids covering first language teaching, foreign language teaching, mathematics and music for the blind, partially sighted and dyslexic.

Inclusion guide on good practices for inclusive learning and teaching

In support of this, the project has collected and collated information on good inclusion practices in five select areas (teacher skills, alternate media, support structures, preparation for inclusion and teaching environments) which are published in a catalogue of good practices.

SMART e-learning

Finally, the project will adapt a comprehensive set of educational material on the RoboBraille service prepared in the LLL Ld. RoboBraille SMART project into a set of learning objects for popular e-learning platforms for web and tablet deployment.

For all materials produced by this project

Because the material covers teaching of students of various age, they are named students, learners, pupils and children. The material also reflects the different culture and level of inclusion practices of the project partners. The guide is not a substitute for formal training of teachers.

Introduction to this teaching guide

Dyslexia is by now a widely known but poorly understood specific learning disability. It can be difficult to define because the causes underlying its measurable manifestations can be very variable. However, dyslexia is a real problem, which affects the learning of reading and writing of many individuals and whose effects may be exacerbated by an inadequate education. The complexity of the problem is increased by the fact that dyslexia and reading and writing difficulties may vary according to the cultural and linguistic background.

There are several definitions of dyslexia but probably the most frequently used on is the definition introduced by the International Dyslexia Association (IDA) in 2002: “Dyslexia is a specific learning disability (SpLD) that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.”

Dyslexia is a hidden disability thought to affect around 10% of the population, 4% severely. It is the most common of the SpLDs.

It is essential to keep in mind if we want to understand the problem of learners with dyslexia, that the most frequent type of dyslexia is caused not only by phonological difficulties. The difference of these learners’ way of learning is an overall speciality in the information processing. Problems may also arise in non-literal areas such as music.

The best music teaching practices can help to avoid difficulties with music not only in case of dyslexic learners, but of all learners. This guide provides insight into how dyslexia can influence music learning and what the best teaching methods are, as well as what the common abilities and effects are that makes music a special area of interest concerning dyslexia. The clarification of the concepts and connections can lead to a more directed intervention both in the field of dyslexia and in teaching music.

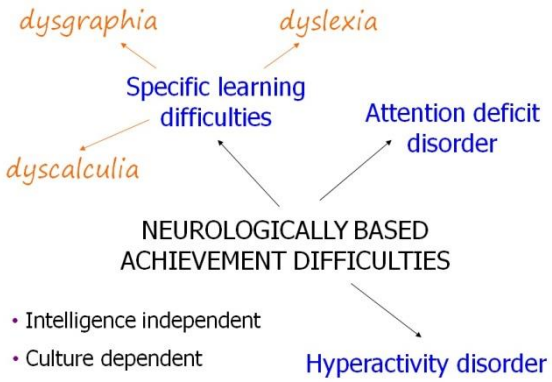
Learners with dyslexia are challenged, because they are more sensitive to the learning environment. Problems found in the learning environment are therefore often reinforced by this sensitivity. Teaching and learning methods suggested in this guide can be used as a foundation for creating an inclusive teaching environment.

Specialized pedagogies for teaching music to students with dyslexia

The dyslexic brain is not better or worse than other brains, but it works effectively in a different way. To get the most out of these "special brains" we need to try to understand them.

Dyslexia and other difficulties

Dyslexia is a type of neurologically-based achievement difficulty and in many cases, it goes together with other similar specialties.



All these neurologically-based difficulties have congenital and acquired forms. Although they are independent of intelligence, the environment influences their emergence and the severity of the achievement difficulties. Instruction can prevent or amplify the difficulties.

There are certain characteristics that learners with dyslexia possess:

- Holistic information processing.
- Poor sense towards details.
- Rich imagination.
- Difficulty with automation of motion, actions and knowledge.
- Short term memory.
- Short term attention span.
- Diverted attention.
- Impulsivity.
- Restlessness.
- Preference of the fast solutions.
- Inflexibility.
- Autonomy.
- Sensibility.

Depending on the area of difficulties, the characteristics listed above can appear in different areas and severity levels. We can consider this list a basic package that often characterizes learners with dyslexia.

Dyslexia is not merely the difficulty in reading as the word 'dyslexia' suggests. Dyslexia can appear as part of neurologically-based achievement difficulties beyond dyslexia itself. However, even if difficulties are limited to dyslexia, the background causes may be very different, and mostly multiple. The difficulty can be any of these below:

- Phonological awareness.
- Auditory processing.
- Visual processing.
- Spatial orientation.
- Motor abilities.
- Sequential processing.

As such, persons with dyslexia are more predisposed to work holistically and with less focus. This can cause both difficulties and advantages in any cognitive area and affect abilities beyond reading.

Dyslexia and music

Research has shown that **music and language skills are related in both normal-readers and dyslexic learners**.[1] Studies proved a strong relationship between musical discrimination abilities and language-related skills.[2] Musical notes discrimination predicted phonological skills, which in turn predicted reading abilities in both dyslexic and non-dyslexic learners. Dyslexic music learners are less proficient at melodic discrimination.

These findings suggest a direction where dyslexia is disadvantageous for music learning. On the other hand, music intervention that strengthens the basic auditory music perception skills of children with dyslexia may also remediate some of their language deficits.

As learning **music** is a multi-sensorial process, it **can have positive influence on the reading abilities.** The sound discrimination and phonological awareness are the most obvious areas, and thus there are already a huge amount of scientific results to prove it. However other overlapping areas between reading and music abilities can be identified, and that way point

[1] Anvari, et al. (2002) Relations among musical skills, phonological processing, and early reading ability in preschool children. Journal of Experimental Child Psychology, 83, pp. 111–130.

[2] Zatorre R. J, Baum S. R (2012) Musical Melody and Speech Intonation: Singing a Different Tune. PLoS Biol 10(7): e1001372.

to the areas of interest considering the connection between music learning and dyslexia. Research has shown that learning music **can have developmental effect on a wide range of areas** related to the school achievements:

- Sound discrimination.
- Phonological awareness.
- Geometric representation.
- Short term memory.
- Attention.
- Executive functions.
- Sequential processing.
- Motor coordination.

Comparing this list with the dyslexic learners' characteristics suggests many mutual areas. It means that music learning can be a challenge for the dyslexic brain, but it also means that learning music is more important for the learners with dyslexia compared to others.

Musicians with dyslexia

Dyslexic musicians are rare. Considering the many areas that are common in music and reading abilities, it seems to be understandable. Just as there are dyslexic writers and poets and mathematicians with dyscalculia, there are dyslexic musicians and dyslexia should not be a reason for not becoming a musician.

Difficulties are not the same as disabilities. Learners with dyslexia need more individualized instructions and special ways to excel.

Some well-known dyslexic musicians include:

- Celine Byrne, soprano.
- Cher, singer and actress.
- Noel Gallagher, musician from the Oasis.
- Mireille Mathieu, singer.
- Ozzy Osbourne, musician and singer from the Black Sabbath.

Obviously, there are dyslexic musicians but compared to the other areas of excellence relatively, few famous musicians can be found. It seems as if dyslexia is a hardly compensable disadvantage for becoming excellent in the area of music. However, the case can be consid-

ered differently. **Learning music has proved to have therapeutic effects on the dyslexia insofar as early music learning may prevent the manifest reading difficulties**.[3] On the other hand, early difficulties may hinder the child in becoming enthusiastic about music. In addition, the environment may not be confirmatory when exposed to the child's difficulties. Likely, only children with really strong inner drive to learn music can break through the barriers.

It is important to differentiate music learning from performance. **Many excellent musicians are able to function at a professional level purely learning and performing music by ear.** For example, Paul McCartney is unable to read notes. There is no evidence he has dyslexia, but he is a gifted musician without the ability to read music.

To read and perform music, many different areas of the brain have to work together. Research shows that the brain processes pitch (spatial information) and rhythm (symbol recognition) differently and at different areas of the brain.[4]

The pattern of activation for reading letters, numbers or musical symbols is different across the brain. While reading letter, numbers and music notes share some networks, they are partly independent, and totally independent from music abilities. Consequently, there are many combinations of difficulties when it comes to the connection between dyslexia and music abilities. Neither of them rules out someone from becoming a musician.

Musical dyslexia – does it exists or not?

Research lead to the conclusion, that specific musical dyslexia could occur. According to the researchers, this deficit may be related to pitch or musical symbols or both. However, no conclusive case of musical dyslexia has yet been made.[5]

Information processing and the background abilities that form the skills are overlapping and any disturbances in one area can cause difficulties in other areas. However, through adaptive compensation methods most of the problems can be addressed. That may explain why it is difficult to find clear cases.

---

[3] B. S. Jaarsma A. J. J. M. Ruijssenaars W. Van den Broeck Dyslexia and Learning Musical Notation (1998) A Pilot Study Annals of Dyslexia 48 137-154

[4] Omar, Rohani, Hailstone, Julia C. Warren, Jane E., Crutch, Sebastian J., Warren, Jason D. (2010) The cognitive organization of music knowledge: a clinical analysis. Brain. Apr; 133(4): 1200–1213.

[5] Hébert, Sylvie; Cuddy, Lola L. (2006) Music-reading deficiencies and the brain. Advances in Cognitive Psychology. Vol 2. No 2-3, pp 199-206.

Whether the so called ‘musical dyslexia’ is an independent syndrome or it is just another artificial category, the main task is to find the strong and weak points of a learner and find the matching instruction to learn music as well as learning to acquire any other skills properly.

Challenges relating to the specific learning difficulty

Problem areas

Dyslexic learners may encounter problems in one or more of the following areas:

- Auditory skills.
- Motor skills.
- Spatial skills.
- Visual perception.
- Timing skills.
- Short-term memory.
- Phonological processing.
- Co-ordination.
- Concentration.
- Organisation.
- Sequencing.

Considering the abilities that music learning requires, it is obvious that dyslexic learners face significant barriers in this respect. The commonly identified problems for those with dyslexia when studying music include:

- Learning notation.
- Eye-ear-hand co-ordination.
- Melodic and rhythmic repetition.
- Maintaining a steady beat.

In more details:

- Reading music accurately, without leaving out or adding tones. Not always in the same place in the score.
- Accurate recognition of rhythmic figures that look alike.
- Accurate notation of music, especially in examinations, where the extra tension brings more errors.
- Writing music dictations (pitches, rhythm and/ or chords) as the pupil writes something else down than what he meant to do and he cannot see his mistake.
- Learning and remembering the concrete order of scales and arpeggios (triads, sevenths, inversions, etc.).

- Remembering a melodic (rhythmic) phrase and being able to sing or clap it back. Possibly his fantasy makes something else out of the original phrase, or he can only remember part of what he heard.
- Sight-reading either playing or singing.
- Translating written or illustrated instructions about technique (for example, fingering charts) from the book or the board to the instrument.
- Counting rests or measures of rests in an ensemble.
- Playing the accompaniment or counterpoint part.
- Reading words and music simultaneously.
- Transposing music.
- Reading from two or more clefs (as in trombone, viola, violin, cello.)

Usually the problems form enough reason to give up music learning.

The dyslexic brain has a vast capacity to learn, just not the usual way. The difficulties arise because the dyslexic learner's brain needs more stimuli to develop a skill. However, after the 'picture' is complete, it would work on a very high level. The 'all or none' way of learning means a long time without detectable development.

The lack of the usual step-by-step approach is characteristic to the dyslexic learners' every manifestation. The learner and also the environment perceive no or very little progress for a significant period of time.

Self-confidence and motivation

The root of the problem may be the interpretation of the slow progress. The general approach is that able learners learn fast and poor learners learn slow. It seems to be a logical approach, but it is wrong.

Effective learning leads to high abilities, but effective learning is not one type of learning. Rather, effective learning is personalized learning involving many different methods which may or may not be effective.

There are many dyslexic learners with excellent literal, mathematical and musical abilities, yet there few with outstanding abilities in these areas. Those who excel probably had sufficient time and received proper instruction in a supporting environment to develop their abilities.

Due to the incorrect judgement of the slow progress of dyslexia learners, many **secondary problems and disturbances** may arise and harden the life of dyslexic learners and their teachers. The mostly identified are:

- Low self-esteem.

- Frustration.
- Exhaustion.
- Anxiety.
- Fear of failure.

A description of suitable teaching methodologies and practices

The main feature of inclusive instruction is that it offers different ways for the learners to learn, including the methods that fit learners with special needs such as those with dyslexia.

A teacher needs to know a variety of methods and let the learner show which one suits the best. The most important task is to ensure that students are successful in order to preserve their interest and motivation to learn.

The best way to teach is to know the individual's structure of abilities as well as individual compensation technologies and adapt learning methodology accordingly. There are personal patterns of the strengths and weaknesses of a dyslexic learner beyond the characteristics caused by dyslexia. Some methods can be useful for everybody, whereas others are advantageous only for selected learners.

Considering that dyslexic learners frequently mix up stimuli, **teaching has to be structured, cumulative, and thorough**. A learner should never become uncertain, because after anything has been mixed up, it will be unstable knowledge forever. In that respect, less is more. New material should not be introduced before the previous knowledge has been safely acquired. Repetition is the mother of learning, and even more so for dyslexic learners.

Effective methods can be grouped as follows:

- **Multi-sensory approach** – it uses different modalities and cross-modalities to deepen the effect of the stimuli.
- **Associations** – information can be stabilized if it is connected to another, already stable knowledge or anything that can be a connection to the new information.
- **'First holistic then sequential' approach** – rather than starting with step-by-step methods, it gives the large picture and builds the details to it methodically.

Multi-sensory teaching

Multi-sensory learning is the normal way of human learning, yet this approach is often not used. Using more modalities means that poorer senses get support from better senses, and that senses support each other. The more supporting points we have, the more stable the learning will become.

As an example, here is what Sheila Oglethorpe[6] suggested as multi-sensory methods to teach the scale of C major on a piano: She combines the auditory and kinaesthetic senses. It helps a lot if pupils hear themselves say aloud what they need to learn, reinforcing this by feeling their fingers where possible.

[6] Author of the book 'Instrumental Music for Dyslexics'

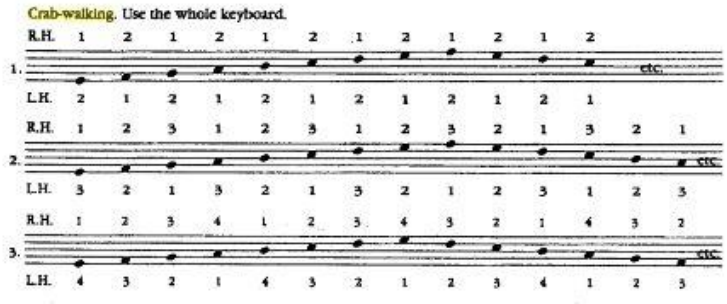


Figure 1: Crab walking

A practice of the fingers and the notes is the crab walk. The learner can practice finger movements while learning the names of the keys.

These exercises can be adapted for instruments other than the piano. If you are teaching the flute, the learner can see, hear and feel the fingering on the pads. On the trumpet, the position on the valves and on the violin, the fingering on the strings.

A picture of the keyboard with the finger numbers of the scale on it can also be helpful. However, some learners do not think in terms of finger numbers, so other ways have to be invented. The scale can be written out as notes on the piano above the keys.

Building associations

When teaching a learner with dyslexia, one needs to build new information on existing knowledge. The stable points can tie the new points.

Associations connect separate items. They can berth the most important elements, and other details can be attached to these stable points.

Example: When learning scales, the students can come up with any picture that helps them remember that a scale. Students may, for example, remember the D major scale as the one with Fish and Chips in – the Fish representing F sharp and Chips reminding them of the C sharp.

Dyslexic learners may confuse left and right. Avoid using these terms by replacing them with others. You can connect to any objects or equipment in the room.

Example: Left to the window, right to the door. The student can learn to find the anchors in any room. This works well in case of the piano but may be more difficult with instruments in the hand as the student can move and turn to other directions. When playing the violin or another string instrument, it is easy to differentiate because of the asymmetric posture: To the violin, to the stick. In the lack of such obvious differences, the teacher has to encourage the student to find something that could help to differentiate the directions. Ribbons on a hand, etc., could constitute association points.

There are ways of perceiving and learning that are not common; such ways are often not used but may show very precisely the special routes of the special learners. Case studies may reveal such specialties.

Example: A dyslexic music learner reported that because she could not learn fluent note reading, she had to learn the music by heart if she wanted to play. As her music sense was not good enough to be able to play the music after hearing, first she had to memorize the piano pieces. She could play many pieces by heart because she memorized the movements by associating the sequences to spontaneously arising imaginary stories of the piano keys (anecdotal reference from guide contributor).

First holistic approach; then sequential

The key is that it is easier to lay out a puzzle if you can see the picture that should be the result, than to try with the small pieces without any hint of the big picture. To see the connections, the big picture is an advantage.

Patterns belong to the strength of the dyslexic brain. It is easier to remember a whole picture than a sequence. For example, to remember a PIN code, a dyslexic brain rather remembers the pattern of the keypad than the sequence of the numbers. Also, a phone number is easier to remember using a picture of the keypad and the movements on it. Similarly, mind maps can be of great help to the dyslexic brain because they are holistic and at the same time show detail.

When learning music, dyslexic learners may not read individual notes easily, but rather the shapes as they appear. **Pointing out patterns** – both melodic and rhythmic – can help to decipher the music; it simplifies things.

Sometimes in a piece of music there are only a few bars to learn as many bars are repeated. It is not certain that the learner notices it, but the teacher can point them out.

Keeping similar fingerings in similar passages is a type of a movement pattern. Silently choreograph the notes on the keys, feeling the pattern under the fingers can help to work out a pattern.

A special case: A professional pianist with dyslexia saw patterns and shapes in music, of which – to her surprise – other musicians seemed largely unaware. She talks in highly graphic terms about having a clear picture of each composition – perceived as a journey through a three-dimensional landscape of structures, milestones, landmarks and colours. She finds working on right and left hands separately and slowly is fatal – the picture is fragmented.[7]

[7] Macmillan, Jenny (2005) Music and dyslexia - and how Suzuki helps, European Suzuki Association Web-Journal, Spring. www.europeansuzuki.org

Complex methods

There are well-developed programs to teach music, and the approach and the elements these programs use are very close to the needs of the dyslexic learner.

Suzuki method

Shinichi Suzuki's music instruction method mimics the learning of the mother tongue. This approach to teach children music is effective also for dyslexic learners. It is similar to second-language learning, which is no problem for a dyslexic learner among native speakers, following the learning of the mother tongue.

The Suzuki approach seems to address many of the problems identified in the research literature for young musicians with dyslexia.

The Suzuki method is helpful for the dyslexic learners, summarised by the following:

- Structured and systematic learning.
- Cumulative, there are enough repetitions and learners maintain their past repertoire.
- Initially playing by ear although learning notation from the earliest stage;
- Musical and technical point in one piece before progressing;
- Uses aural, visual and kinaesthetic senses;
- Lots of feedback and demonstrations by recordings of their pieces, observation of other learners' lessons, and watching their teacher' demonstration;
- Safe learning by playing rhythm games and singing activity games with other children in unison, duets, or other ensembles at group lessons;
- Emphasis on technique from the very first lesson, they learn to be aware of every movement;
- Emphasis on musicianship, they learn to listen carefully to the sounds they are making
- Natural, any child who can speak his/her native language has the potential to learn to play music

Kodaly method

Zoltan Kodaly was a Hungarian composer, author, educator and expert on Hungarian folk songs. The method was developed by his colleagues and students based on his teachings. The approach and the practice of the method are very close to the ways dyslexic learners need.

Here are some important notes:

- Everyone is capable and has the right to musical literacy.

- Singing is the foundation of musical learning.
- Music education must begin with the very young.
- Games, movements, instruments, reading and writing music with singing are incorporated.

The process follows a child's natural learning development:

- Aural - Oral – Kinaesthetic
- Written - Visual – Abstract

A modified version of the Curwen's[8] hand signs is used in the Kodaly Method to teach students how to sing in pitch. The multi-sensory method is one of the most effective parts of this music learning approach.

Orff Method

This approach is a way of introducing and teaching children music on a level that they can easily comprehend. Musical concepts are learned through singing, chanting, dance, movement, drama and the playing of percussion instruments. Improvisation, composition and a child's natural sense of play are encouraged.

Lots of music devices are used during the Orff lessons: xylophones, castanets, bells, triangles, cymbals tambourines, timpani, gongs, steel drums and conga drums and many other percussion instruments are part of the teaching.

Reading quotes by Carl Orff explains why his method is especially useful for dyslexic learners:

"*Experience first, then intellectualize.*"

"*Since the beginning of time, children have not liked to study. They would much rather play, and if you have their interests at heart, you will let them learn while they play...”*

"*Elemental music is never just music. It's bound up with movement, dance and speech, and so it is a form of music in which one must participate, in which one is involved not as a listener but as a co-performer.*"[9]

[8] John Curwen was a congregational minister and British educator. He popularised a system of musical notation known as the tonic sol-fa originally developed by Sarah Ann Clover. In conjunction with the sol-fa syllables, he developed hand signs.

[9] http://musiced.about.com/od/lessonplans/tp/orffmethod.htm

Learning technologies for inclusive teaching of music to students with dyslexia

Working with dyslexic students is a good opportunity to develop creativity in teaching while also gaining a better understanding of how students learn in general. Many technologies can be helpful in this process. Ancient and modern tools help realize the special methods.

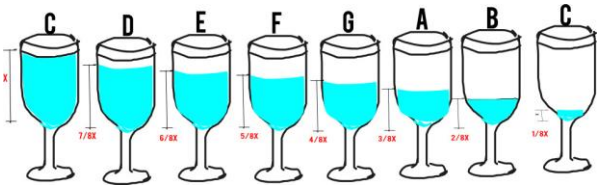
Technology of the 21st century can gain ideas from the usage of the body and tools in music. Digital assistive and study technologies can be used to provide an effective learning environment for everybody.

Using the body and the everyday tools – sensory-motor technologies

Many everyday tools can be used as musical instruments.

Musical glasses in the music classes

Singing glasses are not only an entertainment at the dinner table, but also a music tool that can be used in music classes. A wet finger moving along the rim of the glass, and within a few seconds a special sound can be produced. The glasses can be tuned by drinking or adding some drops of water, until the glasses sing together in a simple chord, or a whole scale. The proper notes can be produced by comparing the sound of the glass to another instrument or using an electronic tuner, tuning app, tuning fork or telephone. A good tuner app is Piano Tuner.



This simple tool can help to understand a lot from the physics of music, while creating wonderful sounds. Even those with dyspraxia, difficulty in activities requiring coordination and movement, has a chance to use it.

Keeping the rhythm

Many tools are available for rhythm practice. Starting with own body parts which are always at hand, or using any household objects, like Stomp.

See Stomp in the kitchen: https://www.youtube.com/watch?v=XXD76CSpfc0

Practicing can be fun with strange object giving out different sounds.

Percussion in pairs or in groups help the less able members to be successful. The group percussion enchants everybody.

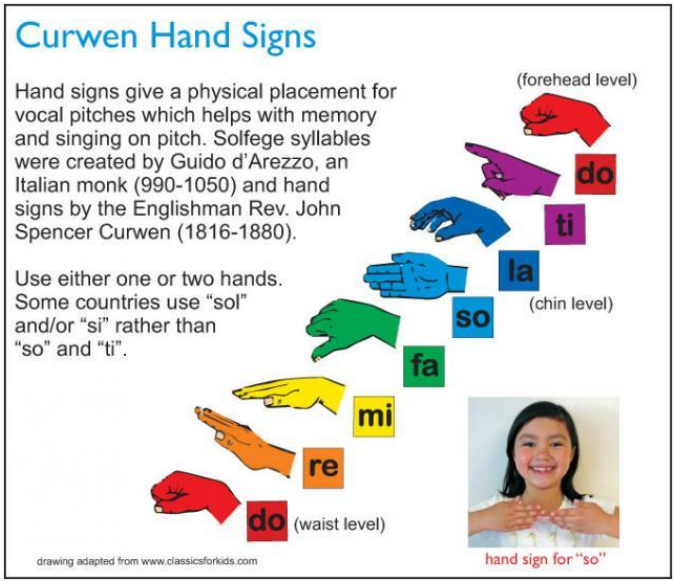
Cups are one of the most popular tools for rhythm games nowadays. More and more difficult choreographies can be developed. Not only keeping the beat, but also memorizing sequences can be trained by this game.

Kinaesthetic methods

The human body, the sensory and motor organs are part of the music. The more they are used in learning, the easier and more stable result can be achieved.

Hand signs

There's a long history of relating the notes of the scale to the body - going back more than a thousand years to Guido of Arezzo and the "Guidonian hand" image that presents the musical scale at various joints of each finger.



Today, the signs devised by John Curwen in the 18th century are associated with the Kodály method of teaching.

The hand signs cover an octave of a major scale, and each is performed in a different vertical position. If colours are added, the method also has multi-sensory support.

Dalcroze Eurhythmics

Students can learn rhythm and structure by listening to music and expressing what they hear **through spontaneous bodily movement**. For example, note values and rhythms are represented by stepping and clapping.

Also, sol-fa is part of the Dalcroze lessons to make learning a total sensory-motor process. When syllables are assigned to the notes of the scale, they enable the musician to hear the pitches mentally which can be seen as a note, and also can be vocalized.

Activity and free exploration are great to support learning. Improvisation using instruments and the body encourages improvement of the imagination, creative expression, inner hearing, music appreciation and understanding of musical concepts.

Boom whackers or bells

Boom whackers create distinct tones when whacked against a surface. The tone is determined by the length of the tube. The tubes are cut to the correct lengths to form the eight notes in a C major diatonic scale. The tubes create tones in much the same way as other tube-shaped instruments.

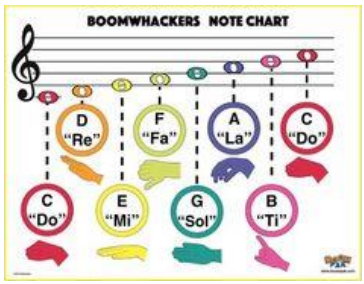
Not the colour only, but in the first place the size of the tubes are of a great help to navigate among the notes.

Colour

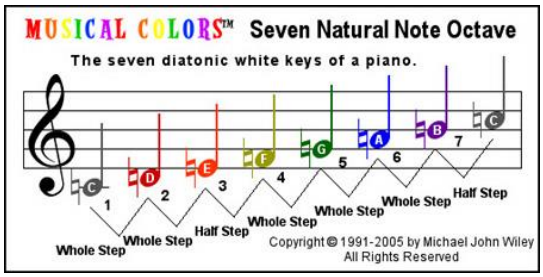
Colours are often used when teaching music to dyslexic students.

A set of bells in another coloured instrument set. Here, the colour codes are different. Yet, any code is helpful for a music learner, especially one with poor analytic information processing.

The music sheets created for these instruments can be used for dyslexic learners to start to learn notes. After substantial practice, the colours can be left out and even a dyslexic musician will be able to read the sheet. Hand signs and the coloured notes can be combined to support a multi-sensory approach.



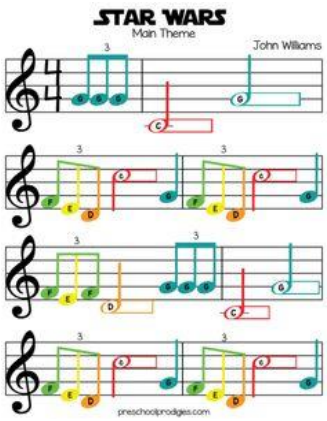
Another example: High-lighter pens in three different colours – one colour to highlight sharps, another for flats and finally one for naturals. Also, repeated bars in music can be colour-coded for easer recognition. Likewise, colours may be used to identify dynamics.



Note reading can also be taught using colour. The colour staff system of notation devised by Margaret Hubicki relates each note to the colour of the rainbow in a cyclical way.

Other systems follow the rainbow colours, but start differently like the boom whackers, bells or xylophones.

A book titled 'A Rosetta Stone' covers the connection between sound and music. The following links relay this information: http://www.virtuosoism.com



There is a YouTube link to the introduction of the concept: http://youtu.be/Viue81moXis, and a YouTube link to Debussy's Arabesque in full colour using the concept: http://youtu.be/PqItTVJSHnU

Colour codes is not standardised and different colouring schemes are being used. Many musical people state that F is red, but there are some who says it is green, etc. There is a debate whether physics can give the right answer using frequencies. Others argues that feeling of the people is the more relevant when it comes to the colours of the notes.

It is difficult to decide which colour code should be used, but it is advisable to choose and use a colour code consistently. The colours will be helpful for a while, and then even the dyslexic learner will be able to leave the colours and read the notes.

Technological tools

Technology can support learning in many ways. Individualized music sheets can be created. Likewise, recordings and practice programs make the music learning more effective.

Text and image editor programs, tuners and the training programs are the most obvious technological tools for the music learners. Especially dyslexic learners need technological aids to create individual learning tools and environments.

Creation of individual sheet music

Sheet music may be modified and optimised to the individual dyslexic learner much in the same way as font faces, sizes and colours can be used to ease reading.

Suggestions to learn music as a dyslexic learner from a dyslexic musician:

1. Enlarge the music sheets.
2. Put corresponding colours at beginning and end of lines (green at end of one line and beginning of next line, then blue, then green, etc.) to facilitate the eye finding the next line.
3. Darken the middle line of the stave and the first ledger lines above and below.
4. Rewrite the music so that all the stems have the same direction.
5. Make sure that the music is written in proportional notation (that half notes occupy twice as much space as quarter notes) to facilitate rhythm reading.

There are several mainstream programs available to modify sheet music. As such, there is no need to use special applications, though they are also available.

Sheet music editor programs

Using a music sheet editor not only supports creation of individualized music sheets; while working on the sheet, the learner can develop a deeper understanding of the notation.

There are many free music sheet editor programs. Some examples:

- **Musescore** free sheet music editor: https://musescore.org

- **Finale** creates orchestrations of up to 8 staves and enters notes by clicking them into the staff or importing MIDI or MusicXML files. https://www.finalemusic.com/products/finale-notepad
- **Flat** is a collaborative music notation software, web-based music score editor to collaborate and compose: https://flat.io

Recorded music and demonstration

Recordings help to remember the music by listening to it many times. However, it has another important advantage. Whilst listening to the music, a finger can follow the line of the music on the page similarly as following the text with the finger while reading.

One of the main focuses of the Suzuki method is to learn to play a piece of music by listening to it as babies learn to speak by hearing their mother speak. Providing recordings of the music to be played, and regularly demonstrating phrases and passages in the lesson, is essential for dyslexic learners.

Several recording applications are available:

- Audacity is a free, open source, cross-platform audio software for multi-track recording and editing: http://www.audacityteam.org
- LMMS is an audio workstation for creating digital music: https://lmms.io
- Spek is free software available for Unix, Windows and Mac OS X. It helps to analyse audio files by showing their spectrogram: http://spek.cc
- Mixxx is an open source computer program for DJ music, natively supports most common music file formats, and can be controlled with MIDI and HID controllers: http://www.mixxx.org

Programs and applications for practice

Technical solutions can also help learning and practicing. There are free online programs and applications for computer and mobile devices to learn music, develop and practice music abilities.

The best place to start**:** http://www.miles.be

Alain Benbassat's method can be useful for some dyslexic learners. He uses connections of sounds to train the ear. His training 'Functional Ear Trainer' is available online and for mobile devices for free.

Some other examples:

- **Note Trainer:** http://android-apk.org/apk/com.bigboxlabs.notetrainer/1.06/irishandroid/note+trainer+(sight+reading)/

- **Piano Companion** – chords, scales, progressions: https://play.google.com/store/apps/details?id=com.binitex.pianochords&hl=en
- There is a page for music teachers with a selection of the best apps for music learning: http://www.educatorstechnology.com/2015/07/some-of-best-android-apps-for-music-teachers.html

Summary of advices for teachers

Methods

- Find out which method is most helpful to the student.
- A multi-sensory approach including colours, patterns and music recordings aids learning.
- Produce well-structured lessons; it helps to use a uniform format so that the student knows in what order you do things.

Solutions to the problem areas

- If the dyslexic student complains about the notes dancing, produce enlarged or simplified copies of the music, try covering the music with coloured acetate sheets or copy the music onto coloured paper.
- Poor short-term memory is a particular weakness for dyslexic students, use mnemonics.
- Dyslexic learners may confuse left and right, avoid using these terms: find other ways.
- Beware of sequencing problems: many dyslexic students can find it difficult to sequence note names backwards.

Tricks

- Encourage students to say things out loud what they need to learn.
- Teach the concept in another way if the child seems to be unsure or confused.
- Always over-teach information to avoid confusion.
- Do not speak too much or too fast, and try to use short sentences.
- Use pictures instead of sentences for short instructions.
- Help with personal organisation, highlighting things to be practised by putting a small bookmark in the music, with no more than three things to practise listed on it.

Strengthening

- Test the understanding by watching the body language without challenging the student.
- Build the student's self-esteem: focus on strengths, set realistic goals and ensure all results are rewarded.
- Be flexible and persistent.

Videos

- Boom whackers Arrangements: https://www.youtube.com/watch?v=Vz_P6qQF-Yg
- Boom whackers in the music lesson: https://www.youtube.com/watch?v=zCyr12ZpFaA
- Body percussion workshop: http://www.youtube.com/watch?v=6NUqFvIcvTY&feature=related
- Kids doing Slap Happy body percussion: http://www.youtube.com/watch?v=QHqxFoZRZZc&feature=related
- Body music, body percussion: http://www.youtube.com/watch?v=8cCj3xeiv7M&feature=related
- Stomp: https://www.youtube.com/watch?v=US7c9ASVfNc
- Cup song: https://www.youtube.com/watch?v=SZUluEavfeI
- A video on the sound editor programs: https://www.youtube.com/watch?v=SbFYuKNL8vE

Sources for this guide

- Anvari, S.H. Trainor, L.G. Woodside, J. Levy, B.A. (2002) Relations among musical skills, phonological processing, and early reading ability in preschool children. Journal of Experimental Child Psychology, 83 (2002), pp. 111–130. http://dx.doi.org/10.1016/S0022-0965(02)00124-8
- Ars-Nova Software, http://www.ars-nova.com/Theory%20Q&A/Q22.html
- Forgeard, M., Schlaug, G., Norton, A., Rosam, C., & Udita I. (2008). The relation between music and phonological processing in normal-reading children and children with dyslexia. Music Perception, 25 (4), 383-390.
- Jaarsma B. S., Ruijssenaars A. J. J. M, Van den Broeck W. (1998) Dyslexia and Learning Musical Notation A Pilot Study Annals of Dyslexia 48 137-154.
- Hébert, Sylvie; Cuddy, Lola L. (2006)Music-reading deficiencies and the brain. Advances in Cognitive Psychology. Volume 2. No 2-3, pp 199-206
- Macmillan, Jenny (2005) Music and dyslexia - and how Suzuki helps, European Suzuki Association Web-Journal, Spring. www.europeansuzuki.org
- Mishra, Jennifer (2015) http://theconversation.com/how-the-brainreads-music-the-evidence-for-musical-dyslexia-39550
- Pertz, Judith: Music and Dyslexia: A Guide for Instrumental Music Teachers. https://jlpertz.home.xs4all.nl/dys/muz_dys1-EN.htm
- Omar, Rohani, Hailstone, Julia C. Warren, Jane E., Crutch, Sebastian J., Warren, Jason D. (2010) The cognitive organization of music knowledge: a clinical analysis. Brain. Apr; 133(4): 1200–1213. Published online 2010 Feb 8. doi: 10.1093/brain/awp345
- Zatorre R. J, Baum S. R (2012) Musical Melody and Speech Intonation: Singing a Different Tune. PLoS Biol 10(7): e1001372. https://doi.org/10.1371/journal.pbio.1001372
- http://www.juilliard.edu/journal/1502/voicebox
- http://dyslexiahelp.umich.edu/latest/research-examines-professional-musicians-and-dyslexia
- https://www.patoss-dyslexia.org/SupportAdvice/InformationSheets/2012-02-05/MusicDyslexiaSpLD/
- http://www.violinist.com/discussion/response.cfm?ID=9023
- http://www.musicalcolors.com/what.html
- https://www.brainscape.com/blog/2014/11/can-music-help-you-learn/?utm_source=trans_email&utm_medium=email&utm_campaign=LearnHacks1

- http://musiced.about.com/od/lessonplans/tp/orffmethod.htm
- http://musiced.about.com/od/lessonplans/p/dalcroze.htm

With the support of
Erasmus+ Programme
of the European Union