DOI: 10.61905/wwr/208911

"Family Upbringing" vol. XXXII (2/2025)
„Wychowanie w Rodzinie" t. XXXII (2/2025)

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Musical Abilities of Future Teachers of Children Aged 3 to 10 – a Pilot Study

Zdolności muzyczne przyszłych nauczycieli dzieci w wieku od 3 do 10 lat – badania pilotażowe

Submitted: December 17, 2024 – Accepted: August 2, 2025

Abstract

Aim. The aim of this article was to examine the level of musical abilities of future preschool and early school education teachers and to relate it to the requirements outlined in the core curricula (2014, 2016, 2017) and teacher education standards (2012, 2019, 2024).

Methods and materials. The selection of the group was purposeful. The study was conducted on a group of 91 female students of preschool and early school education at a Polish university. The research employed the diagnostic survey method, within which the *Short Test of Musical Aptitude* was used. The collected research material was subjected to quantitative and statistical analysis.

Results and conclusion. The research results indicate an average level of musical abilities among the participants, including: a good level of musical aptitude in perceiving

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changes in repeated melodic examples, reproducing tempo changes through movement, and individually performing rhythms; and an average level of ability in vocally repeating melodic examples. The identified abilities may be useful in organising various forms of musical activities. Vocal deficits suggest the need to introduce high standards in the field of music education in teacher training programs. The article also highlights the need for further research, including longitudinal studies, on the relationship between teachers' musical preparation and the effectiveness of broadly understood music education.

***Keywords*:** teachers, preschool education, early school education, education students, musical abilities

Abstrakt

Cel. Celem niniejszego artykułu było zbadanie poziomu zdolności muzycznych przyszłych nauczycieli edukacji przedszkolnej i wczesnoszkolnej oraz odniesienie go do wymagań postulowanych w podstawach programowych (2014, 2016, 2017) i standardach kształcenia nauczycieli (2012, 2019, 2024).

Metody i materiały. Dobór grupy był celowy. Badania przeprowadzono na grupie 91 studentek pedagogiki przedszkolnej i wczesnoszkolnej w jednej z polskich uczelni wyższych. W badaniach zastosowano metodę sondażu diagnostycznego, w ramach której wykorzystano *Test krótkich prób zdolności muzycznych*. Zgromadzony materiał badawczy poddano analizie ilościowej oraz statystycznej.

Wyniki i wnioski. Wyniki badań wskazują na przeciętny poziom zdolności muzycznych wśród badanych, w tym: dobry poziom zdolności muzycznych w zakresie percepcji zmian w powtórzonych przykładach melodycznych, odtwarzania ruchem zmian tempa, indywidualnego wykonywania rytmu; przeciętny poziom zdolności w zakresie powtarzania głosem przykładów melodycznych. Zidentyfikowane zdolności mogą być przydatne w zakresie organizowania różnych form aktywności muzycznej. Deficyty w zakresie wokalnym sugerują konieczność wprowadzenia wysokich standardów w obszarze edukacji muzycznej na studiach nauczycielskich. Badania realizowano w wąskim gronie, więc mają one charakter pilotażowy. Warto podjąć ogólnopolskie, a także międzynarodowe badania porównawcze bazujące na ujednoliconej metodologii i trwające w dłuższym czasie. Warto podjąć badania podłużne na drodze eksperymentu pedagogicznego w celu zbadania związku między zdolnościami, kompetencjami muzycznymi przyszłych nauczycieli a efektywnością szeroko rozumianego procesu edukacyjnego na różnych poziomach kształcenia.

***Słowa kluczowe*:** nauczyciele, edukacja wczesnoszkolna, edukacja przedszkolna, studenci pedagogiki, zdolności muzyczne

Introduction

The implementation of the educational process in kindergartens and grades I–III that is consistent with the child's needs and numerous educational requirements (including normative, psychological and pedagogical ones), requires the teacher to have appropriate predispositions and also preparation in the field of music education. For this reason, the level of musical talent (*e.g.*, Kołodziejski, 2018, 2019) and musical intelligence (*e.g.*, Majzner, 2019) is verified. Musical abilities are often diagnosed during broader pedeutological studies concerning musical competence (*e.g.*, Swaminathan & Schellenberg, 2018; Szczyrba-Poroszewska, 2020; A. Wilk, 2004; K. Wilk, 2018) or musical skills (*e.g.*, Dyląg, 1992, 1994).

Analysing numerous Polish definitions and classifications of musical competencies important for teachers of kindergartens and grades I–III (*e.g.*, Dyląg, 1994; Kataryńczuk-Mania, 2010; Kisiel, 2000; Ławrowska, 1999; Sacher, 2012; Szczyrba-Poroszewska & Lasota, 2023; Weiner, 2010; A. Wilk, 2004; K. Wilk, 2018; Wojciechowska, 2009; Zwolińska, 2007), it is noteworthy that they most often come down to three basic components: knowledge, skills and attitudes (*cf.* Szczyrba-Poroszewska & Lasota, 2023; A. Wilk, 2004; K. Wilk, 2018; Wojciechowska, 2009). In terms of the analysis of the classification of competencies, we can distinguish substantive, methodical and educational competence (*cf.* Strykowski *et al.*, 2003; Szczyrba-Poroszewska & Lasota, 2023; Taraszkiewicz, 2001). In the formulated definitions of musical competencies, the role of musical abilities is often indicated, an example of which is the perception by A. Wilk (2004) of musical competencies of children and youth in an integrated, complementary way – in addition to knowledge about music, as well as imitative, creative and perceptive skills, the appropriate level of special abilities is also important. K. Wilk also takes into account similar components:

> [...] a teacher [...] who is often the only music educator for the youngest children – should have: basic musical abilities (pitch and analytical hearing, musical memory and sense of rhythm as well as the ability to hear harmony, dynamics and articulation [...], vocal skills enabling clear singing in-key; the ability to play melodic and available non-melodic instruments; the ability to move aesthetically, which determines basic dancing possibilities. (2018, p. 464)

In foreign literature, musical abilities are often defined as musical competence. According to Swaminathan and Schellenberg, "[…] individuals differ in musical competence, which we defined as the ability to perceive, remember, and discriminate sequences of tones or beats" (2018, p. 1). According to research, „[…] musical competence had positive partial associations with music training, general cognitive ability, and openness" (2018, p. 1), which is why musical competence was ultimately considered to be the result of many factors, including musical education (Swaminathan & Schellenberg, 2018).

In contemporary literature, there is an ongoing discussion on the new understanding of the foundations of musical abilities in the context of the importance of genetic and environmental factors. For example, research is currently being conducted on the genetic mechanisms that underlie musical abilities. Genes are being discovered that are related to singing, music perception, absolute pitch and music perception; music perception, and musical memory and music listening (Tan *et al.*, 2014). Researchers emphasise that the level of musical abilities differs not only between individuals, but also in the share of different components of musical abilities in the same person (Tan *et al.*, 2014). Of particular interest are studies conducted among adult twins, the aim of which is to determine whether musical abilities and skills are influenced more by genes or the environment (Seesjärvi *et al.*, 2016).

In the context of the above reports, the definition of musical abilities formulated in Polish literature by Burowska and Głowacka (2006) is still relevant, stating that musical abilities are "[…] genetically determined, relatively stable individual features that enable efficient learning and acquisition of musical skills in the field of perception, reproduction or creation of music"[1] (Burowska & Głowacka, 2006, p. 11). In the common understanding, according to the Dictionary of the Polish Language, a *gifted person* is perceived as having a "predisposition to easily master certain skills" (Zdolności, n. d.),[2] which corresponds with the scientific view. According to researchers, above-average musical abilities combined with appropriate training and experience result in faster progress and higher results in formal music education with less work than in the case of students with lower abilities (Sloboda, 2002, p. 285):

> A child whose ability exceeds that of their peers will probably make faster progress in formal education and achieve better results. A child who does not have these abilities, on the other hand, will learn more slowly, will have to put in much more effort to achieve mastery, and will probably exceed the critical period of development, after which it is unlikely to achieve mastery.[3]

They are also of significant importance for the organisation of the music education process. A teacher with higher musical abilities will organise the process of music education with greater ease and greater benefit for the children (Sacher, 2012).

In light of the common beliefs, the studies that question the unequivocal cause-and-effect relationship between musical practice and musical abilities are surprising (Schellenberg & Lima, 2024). The researchers Mosing, Madison, Pedersen, Kuja-

[1] Authors' own translation.

[2] Authors' own translation.

[3] Authors' own translation.

Halkola, and Ullén explain that "[…] music practice may not causally influence music ability and that genetic variation among individuals affects both ability and inclination to practice" (2014, p. 1795).

They further state that the musical abilities measured in their study are more general and consider primarily sensory abilities used to process musically relevant auditory information. They explain that when playing an instrument, it is possible to acquire and develop

> […] instrument-specific sequential motor skills, score reading, and memorization. It is likely that the observed effects of music practice on the brain predominantly reflect the development of such specific skills, rather than the improvement of a general ear for music. Another explanation for the observed associations, in line with the finding of an underlying genetic factor, is that individuals seek out leisure activities they are good at. (Mosing, Madison *et al*., 2014, p. 1801)

According to Schellenberg (2020, p. 416), "[…] musicians are as much born as they are made" and "[…] as we get older, genes increasingly determine the environments we are in, which in turn magnify our genetic predispositions."

> Music training is likely to work similarly, with predispositions (re: general cognitive ability, personality, and music aptitude) influencing who takes music lessons, which then, potentially, magnify these predispositions. Socioeconomic status (SES) also plays a role, because music lessons cost money, and parents need to be supportive and cooperative. (Schellenberg, 2020, p. 417)

It is worth noting that musical abilities are a concept with a rather narrow semantic scope. Broader concepts that include musical abilities are talents and musicality (*cf.* Burowska & Głowacka, 2006; Januszewska-Warych, 2006; Suświłło, 2018; Weiner, 2010). Musical abilities constitute a structure created from many (variously defined) musical abilities (*e.g.,* musical ear, musical memory, sense of rhythm) combined with musical taste (Januszewska-Warych, 2006; Lewandowska, 1978), general features (Wierszyłowski, 1979), and general abilities (Tiepłow, 1952), with intellectual and emotional-motivational dispositions that determine the effectiveness of musical activities (Manturzewska, 1990). According to the latest "reports musical aptitude is a marker of general intelligence (Swaminathan & Schellenberg, 2018; Swaminathan *et al.*, 2017; Swaminathan *et al.*, 2018). This correlation appears to be explained by genetics but not by shared or nonshared environment (Mosing, Pedersen *et al.*, 2014)" (Schellenberg, 2020, p. 417).

Musicality is commonly associated with the emotional reception of music (Przychodzińska, 1979). In musicality, classical researchers distinguish two sides: emotional (experiencing music) and auditory (perception of musical structures; Tiepłow, 1952) or

two levels of musicality: basic (musical abilities, *i.e.,* hearing musicality, sense of rhythm and the ability for auditory imagery that allow us to reproduce simple musical structures) and higher order (created by the complex interaction of basic musicality, extra-musical features, personality and experiences of the individual) (Szuman, 1956). Leading contemporary scientists indicate that "[…] we are musical by design" (Welch, 2022, p. 100) or "[…] we all have the potential for musicianship" (Hargreaves & Lamont, 2017, p. XVII). The main challenge for educators and educational institutions is to "[…] understand the complexities of musical behaviour and what counts as development, as well as how this might be nurtured most effectively for all children and not just some" (Welch, 2022, p. 100).

Nowadays, in addition to musical abilities, the concept of musical intelligence has gained popularity, which

> […] enables people to create, communicate, and understand the meaning carried by sounds. Unlike linguistic intelligence, which develops in all cultures without any formal guidance, a high level of musical intelligence requires intensive training. In the West, few people can become proficient in this area without many years of practice [...]. The main elements of information processing here refer to pitch, rhythm, and timbre (tone). Composers, conductors, and instrumentalists, as well as acousticians and sound engineers, can boast of musical intelligence. (Gardner *et al.*, 2001, p. 158)[4]

The literature emphasises the importance of preschool and the early school period in acquiring musical knowledge, skills, motivation, developing abilities and talents (*e.g.*, Bautista *et al.*, 2024; Sacher, 2012; Sloboda, 2002). As Sacher emphasises: "The process of musical education is determined, on the one hand, by the natural growth of a person and their genetic endowment, and on the other hand, by the assimilation of educational and acculturation influences" (Sacher, 2012, p. 91)[5]. In pedagogy, there is a belief that over time, the environmental influence on the development of musical abilities and talents decreases (Bonna, 2016; Burowska & Głowacka, 2006; Gordon, 1997; Kołodziejski, 2018, 2019). An important contribution to such thinking is made by Gordon's theory, for whom the age of nine is the limit for both developing and stabilised abilities. Other researchers also assume that the period between the ages of nine and thirteen is the time of stabilisation of musical abilities and interests. This is a diagnostic period for continuing further musical education or resigning from it (Burowska & Głowacka, 2006).

In musical development, researchers distinguish many important moments in which a child is particularly sensitive. In the context of contemporary achievements in the field of neuroplasticity, the term *sensitive phase* is used more often than *critical phase*, because

[4] Authors' own translation.

[5] Authors' own translation.

the brain can change throughout life, but children learn faster than adults (*cf.* Artıktay, 2024; Suświłło, 2018; Żylińska, 2013). Understanding those phases is important for organising the process of universal music education, but also for raising awareness of the stages that a future teacher should go through before starting his or her studies.

According to Sloboda, children up to the age of five can correctly reproduce songs and chants that function in their culture. With age, the ability to imitate increases, which is exemplified by, for example, increasingly longer songs that can be performed spontaneously (Sloboda, 2002). For example, in five-year-olds "[…] the concept begins to form that the carrier of melodic identity is the pattern of pitch and rhythm, regardless of the timbre and words" (Sloboda, 2002, p. 253), "[…] between the ages of five and ten, reflective awareness of structures and patterns increases [...]" (2002, p. 256) and "[…] between the age of five and adulthood (...) the listener becomes capable of reflective judgment on musical quality [...]" (2002, p. 260)[6].

According to Burowska and Głowacka, the most important changes in children's development occur between the first and thirteenth years of life – the auditory analyser matures, psychomotor skills improve, which is associated with increasingly precise auditory reception of various musical parameters, their reproduction with voice, movement or playing an instrument. An important condition for musical development is acquiring the ability to imagine sounds, which affects the correct performance of mental operations based on musical material. For example, between the ages of 6–9 years is the optimal period for starting to play an instrument (piano, violin); between 7 and 10 years of age — usually after two years of school and appropriate activities of the teacher — correct intonation can develop. During adolescence, *i.e.*, from the age of 13 to 19, openness to emotional experience of music increases — music unites individuals of a specific generation. For young people who have not received musical education, simple, repeated, syncopated dance rhythms are particularly attractive. Their interest is most often attracted by timbre, tempo and pulsation. In the period from 16 to 18 years of age, interest in the expressive side of music, interpretation problems, and objective-aesthetic attitude are shaped, while the expressive-sound layer of musical pieces becomes important, and participation in groups (choral, instrumental, dance, *etc*.) becomes possible. Due to intellectual development, it is possible to use musical knowledge (understanding, perception of music; Burowska & Głowacka, 2006).

University education of future teachers of children aged 3 to 10 in Poland is usually organised in accordance with the Teacher Education Standards. For example, the 2012 Standard (Rozporządzenie [Regulation], 2012) covered the areas of substantive preparation for teaching the subject, as well as didactic preparation: "Methods of music education. Reception and creation of music by a child. Children's songs, singing and dance." Preparation for the implementation of the content included in the current core curriculum of pre-

[6] Authors' own translations.

school education and general education was signalled. The number of hours was established generally and depended largely on the capabilities of the teaching unit. The latest standard from 2024 (which duplicates the content regarding music education in preschool and grades I–III from the 2019 standard) specified the minimum number of hours. As part of substantive preparation, music should be implemented for at least 30 hours. On the other hand, "Methods of music education" was included in the amount of 45 hours. The learning outcomes after the above-mentioned courses refer to the area of knowledge, skills and social competencies.

Table 1

Learning outcomes in the field of music and music education methods in accordance with the Teacher Education Standard

Music	**Methods of music education**
In terms of knowledge, the graduate knows and understands: B.7.W1. music terminology and its application in music education; B.7.W2. sources of musical culture, their cultural and social conditioning and importance for the development of a child or student; B.7.W3. characteristic features of children's creativity, its personal and environmental conditions; varieties, textures of musical pieces depending on the way of performing the music (solo, chamber music, symphonic, choral, vocal-instrumental), basic issues in the field of musical forms, basic terms of musical notation; B.7.W4. basic musical repertoire in preschool and early school education; B.7.W5. selected contemporary concepts and models of music education in Poland and in the world. In terms of skills, the graduate can: B.7.U1. design a musical message adapted to the circumstances; B.7.U2. perform simple melodies on a selected instrument or with voice. In terms of social competencies, the graduate is ready to: B.7.K1. take convincing action to promote fine arts; B.7.K2. inspire children or students to independent or joint musical activity; B.7.K3. promote the idea of joint musical performance as a culture-forming activity and protect national heritage.	In terms of knowledge, the graduate knows and understands: E.7.W1. principles of designing rhythmic and musical games for children in kindergarten and grades I–III of primary school; E.7.W2. the importance of performing musical pieces by children in kindergarten and grades I–III of primary school; E.7.W3. principles of designing music classes oriented towards deriving pleasure from the activities undertaken by children or students, rather than the end result; E.7.W4. ways of developing the creative activity of a child or student; E.7.W5. methods and techniques of diagnosing a child or student in terms of their musical abilities and monitoring their musical development. In terms of skills, the graduate is able to: E.7.U1. encourage a child or student to participate in rhythmic and musical games; E.7.U2. lead a child or student to perform a musical piece; E.7.U3. encourage a child or student to take an interest in a musical piece; E.7.U4. diagnose the level of musical abilities of a child or student. In terms of social competencies, the graduate is ready to: E.7.K1. act for the promotion of fine arts; E.7.K2. activate children or students to practice music together.

Source: based on Obwieszczenie [Announcement], 2024; Rozporządzenie, 2019.

University education should prepare future teachers to implement the provisions of the core curriculum, which, although often modified (*e.g.*, 2014, 2016, and 2017), have for many years oscillated around forms of musical activity and elements of musical notation. Teaching centres have relatively large autonomy in the implementation of the standards. Since documents regulating the education process are often modified, the musical abilities of the teachers can improve their adaptation to new normative requirements, especially when combined with self-education throughout their entire professional career.

The musical abilities of the teacher, in addition to musical competence, constitute the basis for organising various forms of musical activity, which is also significant from the point of view of neurodidactics. In her considerations on neurodidactics, Żylińska encourages searching for an educational system that makes better use of the brain's strengths (2013). She emphasises the importance of activities that "sculpt the brain" (*i.e.*, specific brain structures change under the influence of activity) (2013, p. 18). According to the researcher, "[…] nothing stimulates the brain as strongly as creative engagement in all types of art. Toddlers should sing a lot, dance, sculpt, draw, paint and, above all, play with other children [...]" (Żylińska, 2013, p. 23)7. A properly organized process of music education in kindergarten and grades I–III can develop children's competencies through various forms of musical activity, but it is important to be aware of external conditions (values, interests, education, financial status of the family and quality of music education) and internal conditions (intellect, physical fitness, level of musical talent, child's motivation; Sacher, 1997), as well as appropriate teacher predispositions and competencies in organizing various forms of musical activity, around which legal acts oscillate, *i.e.*, the core curriculum and Teacher Standards.

Many educators emphasise the importance of the teacher's role in the child's development, as exemplified by Kisiel's statement:

> […] in primary education, where it is significant to develop the child's activity and motivation to engage in music and to strengthen their awareness of basic musical concepts, the teacher should be characterised by high pedagogical skills, including motivational abilities, musical culture, and consequently, familiarity and freedom in using various forms of musical activity. (Kisiel, 2000, p. 31)[8]

Learning through observation and imitation has been recognised in neurodidactics. "Mirror neurons develop intensively in [...] preschool age and in the first years of school" (Żylińska, 2013, p. 123), and require the creation of an appropriate environment. "In order to activate the mirror neuron networks, children should be provided with as many

[7] Authors' own translation.

[8] Authors' own translation.

diverse patterns of action as possible and allowed to assume different roles" (Żylińska, 2013, p. 124)9. Such postulates also find their way into music education, "[...] the first path through which children learn is by imitation. Good modelling of vocal sound, healthy habits while singing, playing instruments, and listening are essential during music classes" (Suświłło, 2018, p. 60)10. For this reason, "[…] in the case of educating young children, the most important thing is to provide them with appropriate models and correct intonation in the teacher's singing" (Suświłło, 2018, p. 53)11.

In the above context, it can be concluded that the teachers should present the highest possible level of musical abilities, because children observe them closely. Music educators emphasise that: "At the end of the preschool age and at primary school, the child tries to imitate the patterns he or she sees, which is of great importance in the development of their abilities and future interests […]" (Suświłło, 2018, p. 19)12. A teacher who is a role model and an inspiration becomes an authority for them (Olbrycht, 2007) and a source of delight, which is very important from the point of view of organising the teaching process in accordance with the rules of the mind (Żylińska, 2013).

Problem and Aim of the Research

Main research objectives: 1) Diagnose the level of musical ability of future teachers in general and specific aspects, 2) Relate the level of musical abilities of future teachers to the requirements stipulated in the core curricula (2014, 2016, and 2017) and teacher education standards (2012, 2019, and 2024).

The following research problems were identified and formulated as questions: 1) What level of musical ability do future teachers demonstrate in general and specific aspects? 2)To what extent do the musical abilities of future teachers allow them to organise activities within the scope of forms of musical activity outlined in the core curriculum and teacher education standards?

Research Method and Sample Characteristics

The diagnostic survey used a psychometric technique: the *Short Musical Ability Test* by Horbulewicz and Janczewski, called the *HJ Test for short*. Initially, the test was dedi-

[9] Authors' own translation.

[10] Authors' own translation.

[11] Authors' own translation.

[12] Authors' own translation.

cated to children aged 7–11 who applied for admission to a primary music school. It also proved useful in the selection of candidates for studies in preschool and early school education at the university in Krakow. The relatively high degree of accessibility of this tool is owed to the fact that the measurement of musical abilities is carried out through activities such as clapping the rhythm to check the sense of rhythm, playing changes of tempo with movement to check the sense of tempo, and singing melodies to verify pitch hearing. Therefore, the measurements provide information not only about musical abilities but also about motor and vocal skills, which are extremely important for children and teachers of preschool and early school education (Dyląg, 1992). The structure of this text assumes conducting six trials: 1.a. individual performance of rhythm (5 tasks), 1.b. individual performance of changes of tempo (5 tasks), 2.a. individual intonation of the melody (10 tasks), 2.b. individual recognition of melodic changes (12 tasks), 3. individual completion of the melody (4 tasks), 4. individual analysis of polyphony (4 tasks). It should be noted that the research in the Krakow centre most often used the first four trials, which are considered by the authors as the most important. Each task is assessed on a 2-point scale, where 0 means an incorrect answer, 1 point – an answer containing incomplete information, and 2 points – a correct answer. The sum obtained from the individual tasks is the basis for the overall assessment of the musical abilities of the examined person. Individual tasks can be used to diagnose specific musical abilities. A five-point scale and scoring thresholds proposed by A. Wilk (2004) were adopted to examine the general level of musical abilities of children and future teachers. They also constituted a reference for proposing scores for individual tasks, on the basis of which the levels of specific musical abilities were determined (Table 2).

Table 2

Accepted score thresholds for musical ability levels

Level of musical ability	Accepted point thresholds			
	Overall result	Sense of rhythm, sense of pace	Chanting the melody	Recognizing melodic changes
high level	58–64	10	18–20	22–24
Good	48–57	8–9	16–17	18–21
Average	32–47	6–7	10–14	12–17
Low	16–31	3–5	6–9	6–11
very low	0–15	0–2	0–4	0–5
Total points:	64	10	20	24

Source: A. Wilk, 2004 (own research).

The selection of groups was based on the expediency and availability of the subjects. The main group of subjects consisted of 91 students of preschool and early school education, who were completing their full-time bachelor's degree course of studies in the academic year 2015/2016. During their university education, music classes

included three music subjects: Music for children, Stimulating the musical activity of children, and Playing musical instruments. The subject of Voice production and hygiene also offers the possibility of raising and implementing some important musical issues. The analysis of the study plan shows that music classes were mainly carried out during the second year of studies (semesters III and IV). During this time, the following classes were held: Music for children – 40 hours (including 10 hours of lectures and 30 hours of exercises) and Stimulating the musical activity of children – 40 hours of exercises. Additionally, music classes were also present in the first and last semester of education: Voice production – 15 hours and Playing musical instruments — 30 hours. As the analysis shows, music classes (including Voice production) comprise 5.5% of all classes conducted during the 3-year education cycle. This research is a fragment of a broader study (Szczyrba-Poroszewska, 2020).

Data Analysis Procedure

The results obtained from the HJ Test were analysed. Calculations were performed in Excel. The entire research material was subjected to statistical analysis, quantitative and qualitative interpretation. The results obtained for the entire test and individual tasks were related to the ability levels and point thresholds presented in Table 3. They were also related to significant descriptive statistics for both the overall result and detailed musical abilities. For comparison purposes, the obtained data were presented in a tabulation.

Table 3

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very low	0–15	0–2	0–4	0–5
Total points:	64	10	20	24

Source: A. Wilk, 2004 (own research).

Research Results

The ability levels achieved by future teachers are presented in both general and specific aspects in the table below (Table 4).

Table 4

Test results regarding levels of musical ability are presented in numbers and percentages, mean and deviation

Tasks:	Level of musical ability					
	very low	low	average	good	very good	Average with de-viation
Individual performance of the rhythm	1 (1%)	13 (14%)	28 (31%)	39 (43%)	10 (11%)	8 ± 1.7
Individual execution of tempo changes	3 (3%)	13 (14%)	11 (12%)	27 (30%)	37 (41%)	8 ±2.2
Individual melody intonation	15 (16%)	28 (31%)	21 (23%)	20 (22%)	7 (8%)	10 ±5.3
Individual recognition of melodic changes	0 (0%)	1(1%)	24 (26%)	40 (44%)	26 (29%)	19.0±2.9
Overall musical abilities	0 (0%)	7%	53%	31%	9%	45, 0±9.0

The obtained average results included in Table 4 suggest that the general level of musical abilities of future teachers is average, which also corresponds to the results of other researchers (Kołodziejski, 2018, 2019; Majzner, 2019), among others, the following tests were used: *Advanced Measures of Music Audiation* and Wing's *Musical Intelligence*, and raises justified questions as to whether it is sufficient to create optimal conditions for the musical development of a child (Majzner, 2019). It is worth noting that Preschool and Early School Pedagogy (PESP) students, who completed 3-year studies in 2016, had a lower average level of musical abilities (by 5 points) than those admitted to the first year in the 1990s (*cf.* A. Wilk, 2004). The results of the PESP students included in this study were similar to the recruitment results from the 1980s (ranging from 44 to 50 points – *cf.* Dyląg, 1994). The better results were probably influenced by the modifications introduced in the 1990s, which included selection criteria (musical predisposition tests), a relatively large share of music subjects in the study plans, a multitude of music and methodical subjects, exams at the end of music and methodical education, creating own concepts of music and methodical education based on the then current psychological and pedagogical literature, as well as practices in the field of music education. Music education in the education plans amounted to 14% (A. Wilk, 1999), while for the studied group (finishing education in 2016) it amounted to 5.5% of all classes carried out during the 3-year cycle of education (*cf.* Rozporządzenie, 2012).

In total, the students participated in 125 hours of music classes (including voice classes), which significantly exceeds the minimum number of 75 hours stipulated in the current Education Standards from 2019 and 2024.

The levels of musical ability achieved by future teachers can be linked to the requirements formulated in the core curricula. The female students demonstrate a good level of musical ability in the perception of changes in repeated melodic examples. This ability is largely dependent on innate musical abilities (Seesjärvi *et al.*, 2016). Respondents have predispositions to conduct games, in which children will recognise differences in the repeated melody. They coped best with tasks requiring memorisation and identification of changes in a repeated melody. The easiest tasks were those in which the melody was repeated in the same way or was repeated much higher. The tasks in which the change concerned one melodic or rhythmic detail were more difficult. Other researchers have proven that people who have formal musical education have a better ability to perceive rhythm in music (Spiech *et al.*, 2023). In the context of preschool education, it can be expected that the presented abilities will enable effective directing of children's attention to changes in music, especially in the range of pitch (Rozporządzenie, 2014; Rozporządzenie, 2016; Rozporządzenie, 2017) as well as to the recognition of melodies, songs and chants (Rozporządzenie, 2017). In grades I–III, the teacher will have an easy time directing children's attention to the changing elements of music, *i.e.*, melody and pitch (2014, 2016, and 2017).

The students achieved a good level of musical skills in the area of reproducing tempo changes with movement. They have a predisposition to lead musical and movement games that include tempo changes. In the context of preschool education, the presented skills will enable more effective directing of children's attention to tempo changes in music and their expression with movement. They will also be useful during dancing, making music and playing percussion instruments (Rozporządzenie, 2014; Rozporządzenie, 2016; Rozporządzenie, 2017). In grades I–III, the teacher will be able to easily show children how to react to tempo changes (2014, 2016), also in the pieces they listen to (2017). They will also probably be a model in the area of movement interpretation of musical content and performing dances and dances (2017).

The students achieved a good level of musical ability in the area of individual rhythm performance. They have a predisposition to conduct rhythmic games, such as implementing rhythmic patterns. Analysing their ability to perform rhythm, it was observed that the easiest to repeat were short fragments (from two to four bars) in 2/4 and ¾ meter. Difficulties appeared in the implementation of slightly longer musical examples characterised by a more complex meter. In the area of preschool education, the presented abilities will facilitate directing children's attention to noticing changes like music in terms of rhythm and expressing them with movement. They will be helpful during dances, music-making and playing percussion instruments (Rozporządzenie,

2014; Rozporządzenie, 2016; Rozporządzenie, 2017), as well as in playing music by a child and creating experiments for children in the area of rhythm and movement (Rozporządzenie, 2017). In grades I–III, the teacher's skills will be beneficial when presenting children with simple rhythms and rhythmic patterns using their voice, reproducing them while playing percussion instruments, implementing rhythms and rhythmic patterns with rhythmic syllables, gestures and movement, and also in directing children's attention to changing rhythms. They will be invaluable when expressing the duration of rhythmic values, notes and rests with movement (2014, 2016), combining listening to music with movement activity, sound-creating gestures, *e.g.*, clapping, clicking, stomping, hitting the thighs, *etc.,* and with the accompaniment of simple instrumental arrangements (Rozporządzenie, 2017). Thanks to the presented skills, the future teacher can become a role model in the following areas: presenting musical content with movement, interpreting rhythmic patterns with movement (2017), performing dances and claps, performing rhythmic themes (one's own or from well-known pieces of music), rhythmic playing on percussion instruments and everyday objects (2017). According to researchers, metro rhythmic abilities can be stimulated by environmental factors (Seesjärvi *et al.*, 2016).

The students demonstrate an average level of ability in the area of repeating melodic examples with their voice. However, they demonstrate sufficient predispositions to introduce and perform simple chants and songs. In tasks requiring the repetition of unknown melodies, short sequences (three, four sounds) proved to be the easiest for almost half of the respondents. Longer melodic examples were more difficult. The abilities demonstrated will be helpful in teaching simple children's and folk songs, as well as in vocal expression of emotions and extra-musical concepts (Rozporządzenie, 2014; Rozporządzenie, 2016). They will probably also support experimenting with the voice, performing melodies, songs and chants (Rozporządzenie, 2017). In grades I–III, the teacher should be a role model in the area of singing simple melodies, children's repertoire and nursery rhymes. They should also perform songs by ear (at least 10 songs per year) and know the national anthem (Rozporządzenie, 2014; Rozporządzenie, 2016). In addition, their role includes teaching songs and chants related to Polish tradition, customs and history, including patriotic pieces (Rozporządzenie, 2017). The teacher should present songs in an exemplary manner, because children learn to a large extent through imitation (*cf.* Żylińska, 2013; Suświłło, 2018). According to researchers, correct intonation should develop between seven and ten years of age (Burowska & Głowacka, 2006), and with age the ability to perform more and more complex melodic examples increases (Sloboda, 2002). The average level of vocal abilities achieved by the respondents may turn out to be insufficient when performing more complex and intricate songs.

The musical abilities of future teachers can be related to the Teacher Education Standards. The Standard (Obwieszczenie, 2024; Rozporządzenie, 2019) does not specify

what musical abilities candidates should have. Researchers point to low expectations regarding musical experience that existed before starting pedagogical studies, as one of the reasons for the poor preparation of preschool teachers for conducting music classes around the world (*e.g.*, Bautista *et al.*, 2024). The learning outcomes refer to the area of knowledge, skills and social competence. From the context, it can be concluded that they are largely based on elementary musical abilities in the sense of rhythm, sense of tempo, producing a melody with voice and hearing the pitch, and perceptual sensitivity of melodic structures. It is worth noting that as part of the methods of music education, the graduate should also have the ability to diagnose the musical abilities of students (Obwieszczenie, 2024; Rozporządzenie, 2019).

Conclusion

As a group, the assessed students have an average level of musical ability. It is worth noting that the detailed results of the study reveal greater diversity. The latest reports from the field of music psychology regarding musical ability emphasise the importance of not only the environmental factors but also the genetic factors. For this reason, in cases of low initial musical abilities demonstrated by candidates for the teaching profession, even intensive training undertaken during university music education may not bring desired results. Considering the high value of music in the process of child education, the need for higher standards in music teacher training should be emphasised. For example, teacher education standards should: 1) determine the level of musical ability expected from candidates and graduates, as contemporary research emphasizes their relative stability, which seems to be independent of training (Kragness *et al.*, 2021; Schellenberg & Lima, 2024), an example of which is, among others, the ability to distinguish pitch (Seesjärvi *et al.*, 2016). Genetic factors also influence the degree of engagement in music (Gustavson *et al.*, 2023), 2) emphasize the importance of informal engagement in music, which is essential in developing good musical abilities (Correia *et al*., 2023), 3) consider candidates with formal musical education, who, according to researchers, achieve better results, among others, in the ability to perceive rhythmic structures in music (Spiech *et al.*, 2023), and are usually characterized by a high level of innate musical abilities (Mosing, Madison *et al.*, 2014; Schellenberg, 2020).

The effectiveness of the teaching process for preschool and school-age children, as well as the quality of the implementation of the content included in the core curriculum, may depend largely on the level of musical ability of teachers. Also, during recruitment for the position of teacher, directors of educational institutions should pay attention to the high level of musical ability presented by candidates for the teaching profession.

Research Limitations

The research was carried out in a small group, so it is of a pilot nature. It is worth undertaking nationwide and international comparative research based on a unified methodology and taking place over a longer period of time. Additionally, longitudinal research through a pedagogical experiment could examine the relationship between the abilities, musical competencies of future teachers and the effectiveness of the broadly understood educational process at various levels of education.

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