

**Music and Language in Education:
Musical Experience as an indicator
of L2 Morphosyntactic Proficiency
and an Evaluation of Dutch Music
Education**

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Music and Language in Education: Musical Experience as an Indicator of L2 Morphosyntactic Proficiency and an Evaluation of Dutch Music Education

Abstract

This study investigated the interactions between musical experience and performance in a morphosyntactic test in the participants' L2 English. Participants were 37 students from Dutch secondary schools of HAVO and VWO levels. They were asked to complete a short morphosyntax exercise and a questionnaire. Based on the literature I hypothesised that I would find correlations between factors of musical experience and all categories of morphosyntactic exercises. Findings indicated no difference in mean score between participants who did and did not play an instrument. For participants who did play an instrument there was a correlation between years played and accuracy in morphosyntax exercises. This study also investigated the quality of one of the most reliable sources of musical experience for students of L2 English, music lessons in secondary education. There is a great deal of ambiguity regarding the quality of music education in the literature. Participants were 41 Dutch people of ages 15 to 78 who attended Dutch secondary schools. Participants were asked to complete a questionnaire inquiring about their experience in music education, and the competence of their music teacher during their time in secondary school. Findings are that the students do not feel that they achieve the official goals set by the government for music education (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5). Teacher competence was rated slightly more positively. There was no sign of an ongoing decrease in quality. There was a weak correlation between teacher competence and goal achievement. The overall conclusion is that, assuming that the connection between musical experience and morphosyntax exercise performance is causative, the potential bolstering of L2 acquisition adds to the reasons to strive to improve music education in secondary schools.

1. Theoretical Background

Prior research has indicated a significant connection between language and music, and presented evidence of positive transfer (Ilie & Thompson, 2006; Moreno, 2009; Livingstone & Thompson, 2009; McMullen & Saffran, 2004; Steinbeis & Koelsch, 2008; Gilleece, 2006; Brandt et al., 2012; Coutinho & Dikken, 2013). While most of the current evidence is correlational, there exists the idea that positive effects of training either language or music are bi-directional and that music training positively influences L2 acquisition. This is supported by the findings that music and language share cognitive processes (Koelsch, 2005; Moreno, 2009; and Steinbeis & Koelsch, 2008). While there is neurophysiological evidence which suggests that musical and linguistic syntax are processed in a similar fashion, correlation between performance on syntax tests and musical experience has not been described.

All Dutch students are exposed to music lessons during their secondary education. These music lessons would present an excellent opportunity to bolster the L2 acquisition of students. The quality of music education in Dutch secondary schools, however, does seem to be lacklustre. Hartkamp (2005) has described a general decline in quality over the course of the twentieth century, and research by Bremmer et al. (2011) illustrates a plethora of shortcomings in music education in secondary schools. These observations contrast with remarks made by Slob (2019), the Dutch minister of primary and secondary education, who is generally quite positive about secondary education as a whole, but does not go into detail on the subject of music education. This paper has two goals: 1. To test examine the potential correlation between musical experience and testable L2 English syntax-skills. 2. To assess the current state of Dutch music education by means of a survey and, based on this, suggest a course of action. The upcoming sections will explore the literature on the subject of the quality of music education in Dutch secondary schools and the interaction between music and cognition in more detail.

1.1 The Interaction Between Music and Cognition

Music has been shown to influence and interact with cognition and brain physiology (Brandt et al., 2012; Coutinho & Dibben, 2013; Ilie and Thompson, 2006; Livingstone & Thompson, 2009; McMullen & Saffran, 2004; Moreno, 2009; and Steinbeis & Koelsch, 2008). This interaction starts during infancy, where children rely on the musical aspects of language for early acquisition, or as Brandt et al. write:

Infants use the musical aspects of language (rhythm, timbral contrast, melodic contour) as a scaffolding for the later development of semantic and syntactic aspects of language. Infants are not just listening for affective cues nor are they focused exclusively on meaning: they are listening for how their language is composed (p. 6).

Brandt et al. argue that during the early stages of acquisition language is perceived by the infant as a specialised type of music.

This notion that language is perceived almost as if it were music, is also prevalent in the work of other researchers, as cited in McMullen and Saffran (2004); research by Trainor et al. (2002) found that six-month-old infants are capable of remembering specific superficial elements of a musical performance such as tempo and timbre. When tempo or timbre is changed they no longer recognise the musical performance. A similar phenomenon, described by Houston and Jusczyk (2000) occurs when 7.5-month-old infants are exposed to linguistic material, as they rely on superficial characteristics of the spoken words; they struggle to recognise the words when they are spoken in a different voice (McMullen & Saffran, 2004, p. 301). This similarity in encoding lends credence to the notion that music and language share cognitive processes.

This connection between music and language does not end in early childhood, but rather continues to play a role in the acquisition of new languages. Moreno (2009) writes “several studies have now reported evidence indicating a positive transfer (e.g., improvements in performance) from musical experience to other cognitive domains such

as language” (p. 330). Some of the most well-documented interactions are between music and elements of language in the auditory domain. One of the interactions in this domain is the following: musically proficient individuals are more proficient at producing and discriminating phonemes in a second language (Milovanov, Tervaniemi & Gustafsson, 2004). In Milovanov, Tervaniemi and Gustafsson’s experiment the participants were Finnish children of ages 13-15 with at least five to seven years of experience with the English language. Participants were divided into two groups, musical and non-musical. In order to be considered musical, participants had to pass two standardised musical aptitude tests. After being split into categories participants were asked to complete two tests, a production test where they had to read out a dialogue, and a listening discrimination test where they had to distinguish between sounds based on minimal contrast pairs (p. 717). The two standardised music tests were the Seashore music test and Karma’s musicality test. The seashore test consists of rhythm, pitch, loudness, and timbre differentiation exercises (Oxford University Press, n.d.). I was unable to find a description of the contents of Karma’s musicality test (as cited by Milovanov, Tervaniemi & Gustafsson, p. 717), since literature describing its contents is in Finnish and the test was published as an audiobook which does not appear to be available online. Participants in the musical category saw a 50% reduction in phoneme production and discrimination errors compared to the non-musical participants (Milovanov, Tervaniemi & Gustafsson, p. 718). An explanation for this phenomenon is provided in White et al. (2013). Musical training alters brain physiology in sections of the brain that are used for the processing of language as well as music. This then facilitates transfer since “the basic encoding of acoustic features in speech and music rely [*sic*] on largely overlapping subcortical and cortical networks” (p. 10). This results in music-to-language transfer because the processing of music “requires acoustic features to be encoded with a higher degree of precision than is typically required when processing speech” (p. 10). This leads to improved performance in both domains. They also write that this phenomenon is potentially bi-directional since non-musically-

educated speakers of languages which employ lexical tone, and therefore require more precision in pitch production, such as Cantonese, a tonal language, perform better on musical tasks compared to non-musically educated-speakers of English.

These findings indicate that, other than effects on the ability to discern between phonemes, there is an interaction between elements of tonal languages and music as well. This reported interaction ties in with the idea that speech prosody and music are connected, as described by Ilie and Thompson (2006), and Coutinho and Dikken (2013). The motivation for Ilie and Thompson's research was the result of prior research which indicated that "music and speech convey emotions in similar ways, suggesting the existence of a domain-general mechanism for decoding emotional meaning from acoustic information" (as cited in Ilie & Thompson, p. 320). Ilie and Thompson investigated the impact of audio stimuli on emotion along three dimensions of affect: valence, which describes whether the stimulus was judged as pleasant or unpleasant, energy arousal, which describes whether the stimulus was judged as awake or tired, and tension arousal, which describes whether the stimulus was judged as tense or relaxed (p. 320). The judgements on affect were provided by participants in their experiment, 27 American undergraduate university students ages 18-27. The stimuli that the participants had to judge consisted of musical phrases and excerpts of speech which were edited to change intensity, pitch and rate (p. 321). Their results showed that changes to intensity of speech and music had identical effects for all three dimensions of affect, whereas other changes to pitch or rate showed similarities but were not identical (p. 324-325). Coutinho & Dikken's research expanded on these findings by identifying a set of psychoacoustic cues corresponding to judgements of arousal and valence in the acoustic domain. They report strong similarities between both mediums in terms of the emotional response that is triggered by the psychoacoustic features. They write that their study "provides supporting evidence for the idea that emotional content of music and speech is decoded, at least partially, by a shared processor that responds to psychoacoustic features regardless of the

type of sound source” (p. 35). This shows that there potentially are some shared cognitive processes between the processing of music prosody and language prosody.

More evidence suggesting shared cognitive processes between music and language in relation to syntax has been found by measuring event-related potentials (ERP) in the brain, as summarised by Steinbeis and Koelsch (2008), Koelsch (2005) and Moreno (2009). In Steinbeis and Koelsch and in Koelsch the ERP associated with difficulties relating to syntactic integration, the P600, was found to be nearly identical for both structural violations of language and music in previous studies. Steinbeis and Koelsch describe another important ERP, the Early Right Anterior Negative (ERAN), which originates in the homotope of the area of the brain used in the processing of language (p. 3). This homotope is the right hemisphere mirror component of the left hemisphere’s Broca’s area. To further confirm the suspicion that there are shared cognitive processes between music and language Steinbeis and Koelsch investigated whether the ERAN and an ERP known as the N500 are influenced by linguistic stimuli. Both of these signals are “usually observed in response to final chords in a harmonic sequence failing to fulfil harmonic expectations by not returning to the tonic” (Steinbeis & Koelsch, p. 117). If the amplitude of the ERAN is reduced when an ELAN (Early Left Anterior Negative), the impulse that occurs for syntactic violations, occurs, that would suggest that there is a shared underlying process.

In their experiment Steinbeis and Koelsch (2008) exposed participants to a written sentence, presented word by word, in combination with either a musical structural violation, or its non-violated counterpart. The sentence that the participants were exposed to would either be syntactically correct and semantically expected, syntactically incorrect and semantically expected, or syntactically correct and semantically unexpected (Steinbeis & Koelsch, pp. 1170-1171). A structural violation for music consisted of an unexpected chord in a five-chord sequence. Steinbeis and Koelsch created expectations by playing four chords and then subverted those expectations by playing a Neapolitan chord instead

of a tonic chord in the place of the final chord. The penultimate chord in this sequence is always a dominant seventh chord; this sets a very strong expectation for western listeners that the next chord in the sequence will be a tonic chord, which sounds stable. By playing a Neapolitan chord, a chord whose function usually is to allow for the song to modulate to a different key, instead of the expected stability of the tonic, the listener is presented with a chord which sets expectations for tonal movement as a final chord. Music-syntactically this is highly unexpected, and thus generates a P600 ERP and an ERAN. Steinbeis and Koelsch hypothesised that if the same cognitive resources are responsible for the identification of both structural violations (syntactic and music-syntactic), the amplitude of the signal should be reduced when a syntactic violation occurs in both the music and the sentence. This is exactly what they found; for instances where a syntactic violation in a sentence co-occurred with a Neapolitan chord in the music the ERAN amplitude was reduced compared to when Neapolitan chords occurred simultaneously with semantic violations. If the ERAN amplitude is reduced in both contexts that would indicate that it is influenced by general working memory demands and not specifically modulated by the recruitment of syntactic processing resources required by the language system (p. 1177). Since the ERAN amplitude did not decrease when the structural violation occurred in the music simultaneous with a semantic violation in the sentence, this indicates that the ERAN is modulated by structural violations and not unexpected input in general.

While this shows that it is likely that there is a shared cognitive process between the processing of music and syntax, it has yet to be examined whether more familiarity with music correlates with a better performance in syntax exercises, which would indicate that music lessons enhance acquisition of L2 linguistic syntax.

Two additional factors, which are known to influence L2 performance, need to be controlled for in this study; namely L2 exposure (Dahl & Vulchanova, 2014) and Socioeconomic status (Duncan, Kalil & Ziol-Guest, 2013; Hackman, Farah & Meaney, 2010). It would ascribe additional value to the quality of music education from the

perspective of L2 acquisition if the correlations between musical experience and L2 performance are different from the correlations between exposure to an L2 and L2 performance. L2 exposure has been shown to positively influence L2 vocabulary acquisition and its effect is cumulative with formal L2 education (Dahl & Vulchanova). Hackman, Farah and Meaney write: “Childhood SES [socioeconomic status] affects some neurocognitive systems more than others. Studies that assessed multiple neurocognitive systems found that the largest effects of SES are on language processing” (p. 652), which indicates that the current study needs to rule out the influence of socioeconomic status (abbreviated to SES) on the results of the experiment. Through careful examination of the effects of L2 exposure we can derive whether the observed correlations are due to exposure to music or exposure to the L2.

This paper will attempt to add to the existing body of evidence indicating a connection between music and language outside of the acoustic domain. Are higher self-reported musical proficiency levels indicative of a better performance in L2 morphosyntax exercises and a more positive self-assessment of L2 skills? Is there a significant difference between participants who both listen to, and play an instrument or sing and participants who listen to music, but do not sing or play an instrument? This part of the present study will hereafter be referred to as study one (1).

1.2 The Supposed Decrease in the Quality of Dutch Music Education

Given the body of evidence detailing the positive interaction between music and language reviewed here, increasing the engagement of language learners with music might prove beneficial for the acquisition of new languages. A reliable way to engage language learners with music could be through the Dutch educational system. However, the SLO, *nationaal expertisecentrum leerplanontwikkeling*, (national centre for learning plan development) writes that in 2015 only 77% of schools offered any kind of music education in the first year of secondary education (SLO nationaal expertisecentrum leerplanontwikkeling, 2020). Furthermore, according to Hartkamp (2005), this does not seem to be a new

development, as Hartkamp describes a gradual decline in the prevalence and quality of music education over the course of the 20th century. This decline in quality is the result of a comparatively slow introduction of improvements when compared to other subjects (Hartkamp, p. 38), and is visible in the steady reduction of the amount of hours allotted to music education and a relative lack of innovation in teaching methods.

Hartkamp (2005) also describes a poor quality of music education in Dutch primary schools. More than half of all Dutch primary schools do not use a method for their music lessons. The lack of a method does not mean, however, that pupils do not receive any music education (p. 38). Additional anecdotal evidence indicates that since the 1960s and 1970s the quality of music education has left something to be desired.

This poor quality of music education might in part be due to the goals set for Dutch music education. The three goals for primary music education seem to be very advanced. They are phrased as follows (my translation): (1.) Students learn to use music to communicate feelings and experiences. (2.) Students learn to reflect on their own work and that of others. (3.) Students obtain knowledge and appreciation of aspects of cultural heritage (Besluit vernieuwde kerndoelen WPO, 2012). Keeping in mind that at least up to 2005 less than half of all primary schools used a method for music education and that in 1992 only 18% of students of 57 schools scored a passing mark for their singing (Hartkamp, p. 35) it seems unlikely that students are able to fulfil the first goal. The fulfilment of the second and third goals seems unlikely for the same reasons.

When it comes to secondary education, the goals are different. All the arts, including music, are combined into one set of goals. The five goals for the first two years of secondary education are as follows (my translation) : (1.) The student learns, by use of elementary skills, to investigate, apply, express themselves, and communicate by means of the eloquence of the arts. (2.) The student learns to present their own art to others, either alone or in a group. (3.) The student learns to observe and evaluate art based on their knowledge of the subject. (4.) The student learns to report on artistic activities, either as an

observer or a participant with the help of audio or visual materials. (5.) The student learns to reflect on their own work and that of others, including that of artists. (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5). These are the goals set for all students, not just those with art classes as electives since the Dutch school system does not introduce electives until the third year. These goals do not seem to align with the actual quality of music education, as these goals seem to indicate at least some degree of mastery of the arts, while only approximately 67% of schools in Amsterdam provide more than a single hour of music education in the first year (Bremmer et al., 2011, p.19). Combined with the fact that 45.9% of these schools do not have a single certified music teacher, and that starting in the second year of secondary education, a portion of schools already stops offering music education (Bremmer et al., pp. 3-19) it seems unlikely that these goals are actually attained by all pupils. The broad nature of the goals set for the arts in secondary education results in the omission of improvisation, something to which Bremmer et. al. ascribe a great deal of importance. They cite that improvisation is a great vehicle for gaining awareness of certain structural elements of musical performance which are not immediately apparent to students when they are asked to reproduce music instead of improvise (pp. 101-104).

In a recent letter from the ministry of education, culture and science, minister of primary and secondary education and media, Slob (2019) evaluates the current state of primary and secondary education. He reports positive change in the quality of education, but also raises a number of concerns (p. 5). One of the concerns is about the absence of an intermediate step between the goals set by the government and the realisation of those goals by the schools. The abstractness of the goals as seen in the previous paragraph makes objective assessment a nebulous affair. Minister Slob mentions that the lack of a clear shared definition of quality has further made accurate assessment of performance in relation to the goals difficult for both schools and the government (p. 6). These concerns in part stem from the fact that the current curriculum is, at the time of writing of this paper,

fifteen years old aside from two minor changes introduced in 2010 which are irrelevant for the current research (p. 2). Aside from these concerns, however, Slob was quite content with the quality of education.

The remarks in minister Slob's (2019) letter about the overall state of education contrast with older findings by Hartkamp (2005) and Bremmer et al. (2011) on the subject of the state of music education in particular. This is unexpected since there have been no large changes to music education since the publication of the *Kerndoelen onderbouw voortgezet onderwijs 2010* (Ocw), which, excluding two small more recent changes, has remained largely the same as the version published in 2006 (Rijksoverheid, n.d.a). Either the quality of music education has improved since Bremmer et al.'s research, or the government does not have a clear understanding of the quality of music education compared to the quality of education in other subjects. The latter seems likely since music is not part of the state exam, and is quite rare as an elective since it is not mandatory for schools to offer it as such.

This researcher has been unable to find an evaluation of the attainment of the goals, but it is something that can be incorporated into a self-assessment questionnaire. It would be useful to investigate the trend of perceived quality of music education across generations of students to see whether there are signs of improvement after the introduction of the current goals, or if the quality of music education will continue its gradual decline. How is music education perceived by students, and how do evaluations of experience with music education compare across generations? Since Bremmer et al. (2011) and Hartkamp (2005) illustrate a decrease in quality for both music education and music teachers, it is important to understand the relation between these two factors. Based on these observations we can suggest improvements to music education.

Teacher competence, according to Minister Slob (2019) is an essential factor in the quality of education. This is supported by Myrberg and Rosén, who cite:

having five years of good teaching can overcome the average achievement difference between low-income students and students from higher income families. Good teachers can thus make up for the typical deficits in preparation of students from low-income backgrounds (2004, p. 2)

Their findings reflect that more competent teachers had students who performed better than their counterparts with less proficient teachers (pp. 14-16). In their research competent teachers were defined as certified teachers since they found no influence of age and experience of the teacher on student results. If teacher competence has such significant impact on the performance of students, it should also influence the attainment of the goals in the *Kerndoelen onderbouw voortgezet onderwijs 2010* (Ocw). In the current study teacher competence cannot be measured the same way as in Myrberg and Rosén's research due to the wide age range of participants and the fact that it is unlikely that students know whether or not their music teacher is a certified music teacher.

Instead of defining teacher competence as being certified, the current study will measure teacher competence using the Tripods 7Cs system (Tripod Education Partners, 2017), a framework intended to measure teacher competence from student assessment. The framework divides teacher competence into seven distinct attributes; Care, Confer, Captivate, Clarify, Consolidate, Challenge and Classroom Management. These seven attributes will be explained in more detail in the method section. Philips, Ferguson and Rowley (2021) write "some educators may not believe 7Cs scores capture meaningful variation in teaching effectiveness because they do not believe there is sufficient evidence justifying the use of . . . classroom observation scores as criteria" (p. 3), which indicates that there are some doubts concerning the validity of the Tripods 7Cs system. This ties in with Myrberg and Rosén (2004) who also report that there exists a degree of scepticism towards attempts to quantify teacher competence. Philips et al. report some ambiguity in their results on whether the seven competences in the model represent seven teacher competence factors, or seven highly correlating factors belonging to the same construct (p.

15). Since this study aims to create a better understanding of the quality of Dutch music education in secondary schools, it is important that the validity of the system used to measure teacher competence is examined. If Minister Slob (2019) and Myrberg and Rosén's observations are accurate, and assuming that the 7Cs system are a valid method with which to assess teacher competence (Phillips, Ferguson, & Rowley, 2021), one would expect to see a positive correlation between the teacher competence ratings and goal attainment ratings in the current study. This section of the paper, which aims to investigate the quality of Dutch music education, will hereafter be referred to as study two (2).

2. Research questions

The overarching research question of this paper is as follows: What could music education in Dutch secondary schools contribute to L2 acquisition based on the correlation between musical experience and L2 morphosyntactic proficiency, and based on the current quality of music education. This question was divided into two separate studies to allow for an in-depth examination of both the interaction between musical experience and L2 morphosyntactic proficiency, and the evaluation of the quality of music education in Dutch secondary schools.

2.1 Study 1

The two main questions that the first section of this paper will attempt to answer are as follows: 1. Is there a difference between participants who do play an instrument or sing, and those who do not, when it comes to their performance in a L2 English morphosyntactic exercise, and what does this difference look like? 2. Are there correlations between performance in morphosyntactic exercises and factors relating to musical experience, and how do these correlations differ from correlations between exposure to English and performance in morphosyntactic exercises?

2.2 Study 2

The main goal of this section of the study is to evaluate the quality of music education in general, to assess this, the following questions need to be answered; 1. To what extent do

students feel that they attain the five skills (1.) eloquent self-expression, (2) competent presentation of art, (3.) the ability to make knowledgeable observations and evaluations of art, (4.) the ability to create audio-visual reports, (5.) the ability to reflect on oneself and on others (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5)? 2. What is the interaction between teacher competence and the attainment of these five goals? 3. How is the quality of music education rated and are there any diachronic trends?

There are two secondary questions which this paper will attempt to answer: Is the quality of music education in the first two years different for schools where music is available as an elective with a state exam and what does this difference look like? To what extent do the Tripods 7Cs system's (Tripod Education Partners, 2017) elements of teacher competence correspond to the factor teacher quality as mentioned by minister Slob (2019). The first of the two is relevant because higher quality of music educations in schools where it is available as an elective would point to a simple solution for the perceived low quality, namely more schools should strive to introduce music as an elective as this will bring about the changes necessary to increase quality. The second question is relevant because it is important that teacher competence corresponds to the same construct in this study as in the literature.

3.1 Method for Study 1

3.1.1 Participants

Participants were students in their second and third year of Dutch secondary education of HAVO and VWO levels, two levels of Dutch secondary education. HAVO stands for *hogere algemeen voortgezet onderwijs*, 'higher general continued education'. VWO stands for *voorbereidend wetenschappelijk onderwijs*, 'preparatory scientific education'. These are the upper two levels of Dutch secondary education. VWO prepares students for enrolment in universities while HAVO prepares students for enrolment in higher vocational education. Students in the second and third years of these levels, hereafter referred to as abbreviation + year e.g. HAVO 3, will likely possess elementary to intermediate

knowledge of the English language. Participants were sourced from these upper two levels of Dutch secondary education because the test material I used was used with a group of a similar age range in prior research by Piggott (2019).

There were a total of 40 responses. Two participants were excluded because they indicated that they did not want to be a part of the research. A further one participant was excluded since English was one of their native languages and this section of the only examines second language acquisition. The remaining 37 participants ranged in age from 13.41 to 15.85 ($M = 14.60$, $SD = .70$). Of these participants 80.6% came from VWO classes and 19.4% came from HAVO classes.

3.1.2 Materials and Procedure

All participants completed a short syntax and morphology test consisting of common types of questions with which the participants would probably have some degree of familiarity; conjugation exercises, superlative exercises, countability exercises, and word-order exercises. The test was the adapted version of the test developed by Schoonen et al. (2011), as modified by Piggott (2019) (Appendix A). The participants also filled in a form which is included as appendix B.

Due to the current lockdown the test was turned into an online variant using Google Forms. Participants were asked to complete the test within the time limit of 30 minutes. Participant feedback indicated that the entirety of the experiment was finished around 20 minutes. Before participants could take the test they were presented with an online version of the information sheet for this study (Appendix C) and the consent form (Appendix D). The next page contained a short explanation for the test on the next page. They could familiarise themselves with the guidelines before continuing to the next page and starting the test. The information would remain accessible when on the next page. After completing the test, the participants were presented with the form included in appendix B which contained questions regarding self-assessed musical proficiency, English proficiency and exposure, postal code, and the age of the participant. All

assessments were made using a seven point scale. Appendix B inquired about two types of exposure to English, passive exposure and active engagement. Passive exposure was defined as reading English material, listening to English material, and watching English material. Active engagement was defined as writing English material, conversing in English, and engaging in other activities where the active use of English is required.

When interpreting the results of appendix B, in cases where participants entered multiple numbers where they were asked to provide an average amount of time spent on a certain activity I used the average of all given numbers as data. For example, if a participant indicated that they spent “5/6/7 hours” per week listening to music it would be changed into 6 in the dataset. In cases where answers were not specific enough, for example, in cases where participants answered with “uhh a bit” when asked to provide a number of hours, data was entered as missing in SPSS (IBM Corp., 2017).

Prior research has found that socioeconomic status, abbreviated to SES, influences the development of cognition (Duncan, Kalil & Ziol-Guest, 2013; Hackman, Farah & Meaney, 2010). By including SES in the analysis as a potential factor it can be controlled for. Socioeconomic status was determined by finding the postal code on the SCP socioeconomic map (SCP, 2017). While this is an imperfect method of determining socioeconomic status, it is one of the least invasive ones. This method allows me to obtain a SES value through a question which can be answered by someone without specific knowledge of their own SES. SES was divided into seven levels, ranging from low to high based on the gradient on the SCP map (2017).

3.2 Method for Study 2

3.2.1 Participants

Participants have been sourced online, and from people in my direct environment, their family and their acquaintances. Participants from study 1 were not asked to participate for two reasons. First, because of COVID-19 schools indicated that they were significantly behind on their schedule, it was not possible to have participants complete both

experiments without further increasing the backlog of work in schools, or facing outright rejection. Therefore I only asked participants of study 1 to do what only they can do for this research. Since study 2 imposed fewer constraints on the selection of participants there was no need to ask participants from study 1 to join, it would not have been worth the risk of rejection. Second, it would be ideal to have participants spanning multiple generations, providing me with a larger time frame on which to base the evaluation. Older participants could provide evidence in support of Hartkamp's (2005) findings, whereas younger participants provided insight into the changes in the quality of music education in the years not covered by Hartkamp.

Out of the 44 total replies there were 41 participants ranging in age from 15 to 78 ($M = 3, SD = 18.65$) whose data was valid. Two exclusions were made because participants indicated that they had not attended a Dutch school and a further third participant was excluded since they had not received any music lessons during their secondary education.

3.2.2 Materials and Procedure

The participants were presented with an online questionnaire, after reading Appendix C and filling out the consent form in Appendix D, asking them to evaluate the quality of the music lessons during their secondary education (Appendix E). The first part of the questionnaire contained Likert scale questions asking the participants to rate to what extent they felt they accomplished the goals as detailed in Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw). This part of the questionnaire will be referred to as section A. The second part contained questions regarding the availability of music education in the school of the participant. This will be referred to as section B. The third part, section C, consisted of Likert scale questions asking them to rate their teachers based on the Tripods 7Cs system. The seven components that are assessed are described by Tripod Education Partners (2017) as follows: Care, direct concern for the wellbeing of students, both academically as well as emotionally; Confer, the encouragement and exploration of

students' perspectives; Captivate, teaching engaging lessons which facilitate active participation; Clarify, the ability to clarify explanations and make sure that the lessons are being understood; Consolidate, to help students see the bigger picture and integrate theoretical knowledge; Challenge, to motivate students to persevere and excel; Classroom Management, to keep the classroom in check and sustain a pleasant and productive learning environment. There were also questions about the age and education level of the participants, section D.

4. Results

4.1 Results of Study 1

Comparing the mean percentage of correct answers between HAVO 3, VWO 2, and VWO 3 groups (Figure 1.1) with a one-way ANOVA indicates that there are no significant differences between the three groups for any of the categories of exercises: there was no significant difference in performance in the conjugation exercises ($F(2, 33) = 2.05, p = .14$); there was no significant difference in performance in the superlative exercises ($F(2, 33) = 3.21, p = .05$); there was no significant difference in performance in the countability exercises ($F(2, 33) = 2.11, p = .14$); and there was no significant difference in performance in the word-order exercises ($F(2, 33) = 1.56, p = .23$). The influence of participant group was not investigated further.

Figure 1.1

Mean percentage of correct answers and standard deviation for scores in the four categories of exercises in appendix D per class.

Exercise category	VWO 2 ($n = 18$)	VWO 3 ($n = 11$)	HAVO 3 ($n = 7$)
Conjugation exercises correct	68.65% (29.21%)	83.77% (14.32%)	60.20% (29.17%)
Superlative exercises correct	77.78% (21.58%)	94.55% (9.34%)	82.86% (13.80%)
Countability exercises correct	92.36% (8.72%)	96.59% (8.08%)	85.71% (18.30%)
Word-order exercises correct	82.78% (28.03%)	95.45% (6.88%)	78.57% (21.16%)

In order to see whether performance in the four categories of exercises as they appear in appendix D, conjugation exercises, superlative exercises, countability exercises,

and word-order exercises (Figure 1.2), are reflections of four separate skills or one overarching skill, I performed a reliability analysis. Reliability analysis indicates that the test scores are a reflection of an underlying skill ($\alpha = .81$). The four variables were combined for the remaining tests since the α -value was greater than .80.

Figure 1.2

Mean percentage of correct answers and standard deviation for scores in the four categories of exercises in appendix D and a combined measure of correctness.

Exercise category	Mean (SD) (<i>n</i> = 37)
Conjugation exercises correct	72.56% (25.97%)
Superlative exercises correct	83.16% (19.47%)
Countability exercises correct	92.11% (11.41%)
Word-order exercises correct	85.53% (22.27%)
Total exercises correct	83.05% (16.54%)

A two-way ANOVA shows that there is no significant interaction between socioeconomic status and playing an instrument and the total percentage of correct exercises ($F(4, 25) = .02, p = .89$, Figure 1.3).

There are no significant main effects for SES. The percentage of correct exercises is comparable across all seven SES levels (1 = lowest SES, 7 = highest SES) ($F(5, 25) = .56, p = .83$). There are also no significant main effects for whether participants play an instrument or not on the percentage of correct exercises ($F(1, 25) = .42, p = .79$).

Figure 1.3

*Mean percentage of total exercises correct per level of SES and instrument (*n* = 36).*

Plays an instrument	SES	Mean percentage of correct exercises (SD)
Yes	1 Lowest (<i>n</i> = 0)	-
	2 (<i>n</i> = 1)	100.00% (-)
	3 (<i>n</i> = 3)	82.08% (2.79%)
	4 (<i>n</i> = 2)	66.29% (42.62%)
	5 (<i>n</i> = 2)	93.57% (6.57%)
	6 (<i>n</i> = 6)	77.01% (23.19%)
	7 Highest (<i>n</i> = 0)	-

No	1 Lowest ($n = 0$)	-
	2 ($n = 1$)	95.72% (-)
	3 ($n = 6$)	82.56% (16.22%)
	4 ($n = 2$)	82.05% (17.80%)
	5 ($n = 4$)	81.21% (9.90%)
	6 ($n = 7$)	82.58% (15.23%)
	7 Highest ($n = 2$)	95.18% (4.29%)

A Pearson correlation of the self-assessments of English language skills, percentage of correct exercises, self-assessed musical proficiency, musical experience, musical exposure, daily hours of passive exposure to English outside of school (*DPE*) ($M = 3.37$, $SD = 2.17$), and daily hours of active engagement with English outside of school (*DAE*) ($M = 1.82$, $SD = 2.20$) indicates that there are five significant correlations (Figure 1.4). There is a single significant moderate positive correlation between the percentage of correct exercises and the amount of years that a participant with experience playing an instrument ($n = 15$) has been playing ($r = .52$, $p = .04$). The four other correlations were found for *DPE*, and *DAE*. There is a significant weak correlation between the following: reading self-assessment and *DPE* ($r = .38$, $p = .03$); vocabulary self-assessment and *DPE* ($r = .35$, $p < .05$); vocabulary self-assessment and *DAE* ($r = .39$, $p = .02$); and grammar self-assessment and *DAE* ($r = .34$, $p < .05$). I found no other significant correlations that were relevant for the current study in this test.

Figure 1.4

*Pearson correlation for self-assessments of English language skills, percentage of correct exercises, self-assessed musical proficiency, musical experience, musical exposure, daily hours of passive exposure to English outside of school (DPE), and daily hours of active engagement with English outside of school (DAE). Correlations in **bold** are significant at the .05 level.*

Pearson Correlation	Hours per week spent playing an in- strument (<i>n</i> = 15)	Years of experience playing an instrument (<i>n</i> = 15)	Years of music edu- cation out- side school (<i>n</i> = 15)	Instrument skills self- assessment (<i>n</i> = 15)	Hours per week spent lis- tening to music (<i>n</i> = 35)	Rhythm self-as- sessment (<i>n</i> = 37)	Capacity to remember melodies self-assess- ment (<i>n</i> = 37)	<i>DPE</i>	<i>DAE</i>
Grammar self-assessment	.12	.27	.30	.12	.23	-.03	.07	.29	.34
Vocabulary self-assessment	.15	.25	.20	.12	.20	.14	.18	.35	.39
Fluency self-assessment	.09	.21	.18	.30	.09	.12	-.01	.28	.32
Reading self-assessment	-.10	-.09	-.09	.07	.16	.13	.16	.38	.32
English self-assessment	.04	.07	.04	.04	.14	.07	.18	-.04	-.20
Exercises correct	.38	.53	.48	.22	.31	.07	.13	.06	-.03

4.2 Results of Study 2

In order to see if the self-assessment on a seven point scale of the attainment of the goals as detailed in Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) (Figure 2.1) measure the same construct, namely quality of music education, I performed a reliability analysis. The reliability analysis indicates that assessment of the attainment of the five goals is a measure of overall quality ($\alpha = .86$). A secondary analysis to validate the findings indicated that exclusion of variables would have minimal influence on the Cronbach's alpha. This combined variable will hereafter be referred to as *goal attainment* ($M = 3.34$, $SD = 1.38$). The questions in section C were intended to measure whether the teachers were well-rounded and possessed the proficiencies as detailed in the Tripods 7Cs system (Tripod Education Partners, 2017), by use of a seven point scale (Figure 2.2). The seventh competence, classroom management, was divided into two questions (appendix E, section C). Reliability analysis of these two assessments indicates that they measure the same construct ($\alpha = .83$).

Upon plotting average assessments of *goal attainment* there seems to be a slight increase over time in the attainment of the five goals listed in Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) (Figure 2.3). There is, however, no significant correlation between the age of the participant and the value of the goal attainment variable ($r = -.10$, $p = .53$).

Figure 2.1.

Mean, standard deviation and Cronbach's alpha if deleted for assessments of the attainment of the five goals (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5).

Question pertaining to one of the five competences	Mean (SD) ($n = 41$)	α if item deleted ($n = 41$)
Q1 Investigate & Express	3.37 (1.97)	.82
Q2 Present	3.61 (1.82)	.81
Q3 Observe & Evaluate	3.83 (1.60)	.85
Q4 Audio-Visual Report	2.98 (1.68)	.83

Q5 Reflection 2.99 (1.56) .82

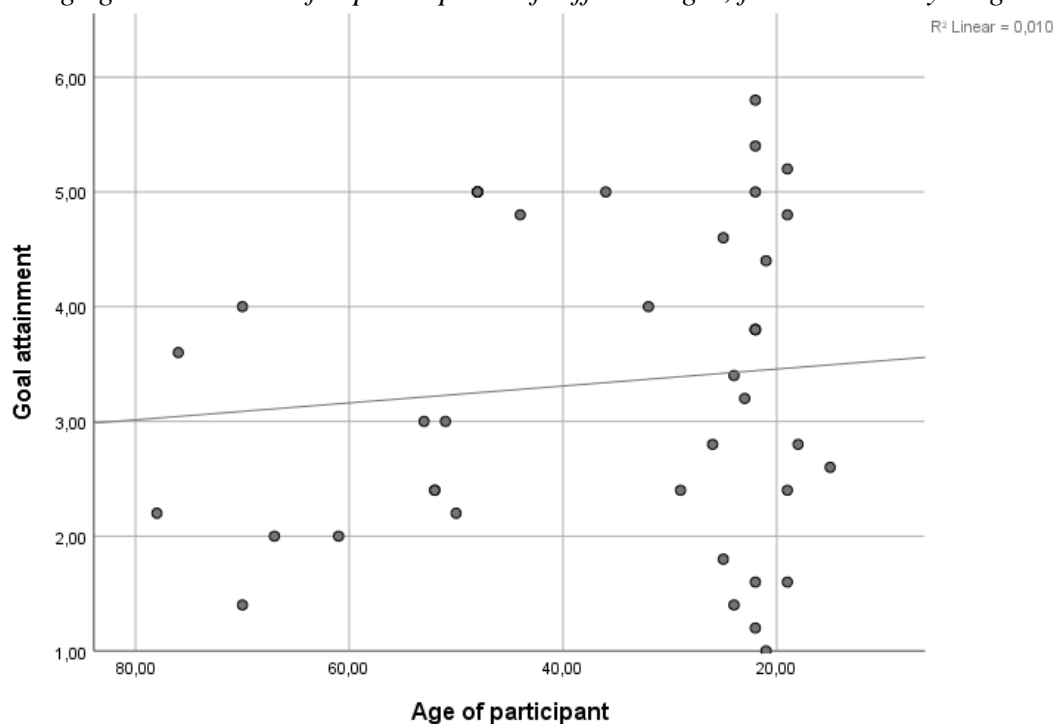
Figure 2.2.

Mean, standard deviation and Cronbach's alpha if deleted for student assessments of teacher.

Competence	Mean (SD) (n = 41)	α if item deleted (n = 41)
Care	3.95 (1.76)	.91
Confer	3.63 (1.79)	.92
Captivate	3.93 (1.79)	.92
Clarify	4.15 (1.77)	.90
Consolidate	3.46 (1.49)	.91
Challenge	3.54 (1.57)	.91
Classroom Management1	4.39 (2.05)	.89
Classroom Management2	3.90 (1.83)	.91

Figure 2.3.

Average goal attainment for participants of different ages, from oldest to youngest.



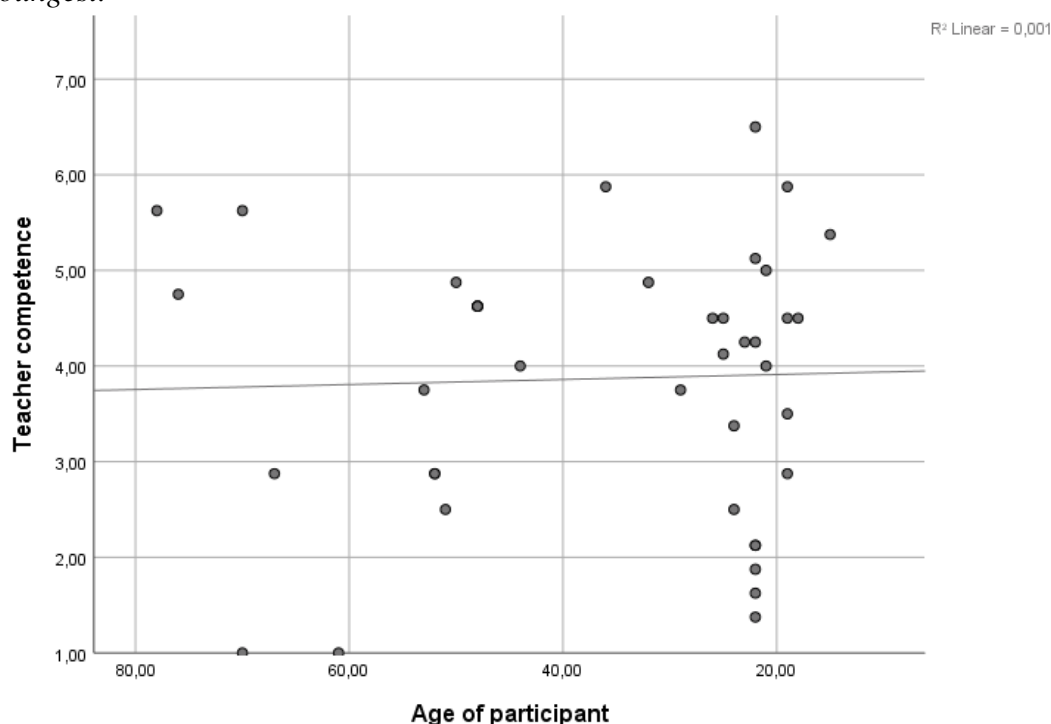
Reliability analysis of the eight different competence variables indicated that they measure the same construct ($\alpha = .92$). A secondary analysis to validate the findings indicated that exclusion of any variable from the reliability analysis would only reduce the

Cronbach's alpha. These eight competence variables will be hereafter be referred to as the combined variable *teacher competence* ($M = 3.87$, $SD = 1.41$).

The graph in figure 2.4 shows a very slight increase in the average teacher competence ratings. Further analysis, however, indicates that there is no significant correlation between the age of the participant and the teacher competence rating ($r = -.04$, $p = .83$).

Figure 2.4.

Average teacher competence ratings for participants of different ages, from oldest to youngest.



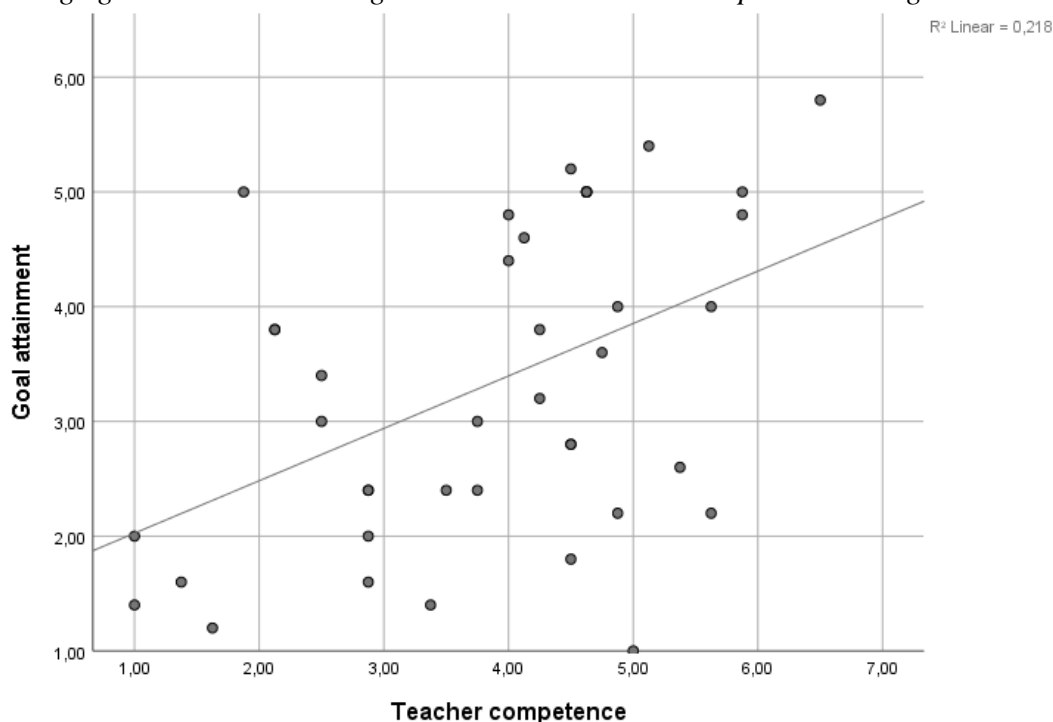
The graph in figure 2.5 shows that higher teacher competence ratings correspond with higher goal attainment ratings. Further analysis confirms a weak positive correlation between goal attainment and teacher competence ($r = .47$, $p < .005$).

Comparing goal attainment ratings and teacher competence ratings between participants whose schools offered the state music exam, and by extension music as an elective, and participants whose schools did not offer the state music exam shows that there are no significant correlations. Among participants from schools which offered the state music exam ($n = 6$) the average rating for goal attainment was 2.8 ($SD = 1.74$). The average rating for teacher competence in this group was 4.54 ($SD = 1.24$). Among participants from

schools which did not offer the state music exam ($n = 35$) the average rating for goal attainment was 3.43 ($SD = 1.31$). The average rating for teacher competence in this group was 3.75 ($SD = 1.42$). Analysis indicates that there is no difference between the two categories of participants for goal attainment ratings ($t(39) = -1.06, p = .31$) and for teacher competence ratings ($t(39) = 1.28, p = .21$).

Figure 2.5.

Average goal attainment ratings in relation to teacher competence ratings.



5. Discussion

5.1 Discussion of Study 1

The first section of the present study is partially in line with expectations. One of the preliminary steps in the analysis, the comparison of the means between different years and education levels of the groups confirmed the expectation that there were no significant differences in the percentage of correct exercises between the groups. The other preliminary step was reliability analysis of the percentages of correct exercises across different categories. The results indicated that they could reliably be combined into a single measure ($\alpha = .81$). Based on these results, I decided to combine the four categories.

A two-way ANOVA testing the interaction between socioeconomic status and whether participants play an instrument indicated that playing an instrument, regardless of SES, did not influence the percentage of total correct exercises (Figure 1.3). It also indicated that there were no significant differences in percentage of correct exercises between the seven levels of SES. This absence of difference can be explained in two ways: either the size of the sample was too small to provide significant results in this ANOVA test; or, the influence of the quality of the student's English teachers eliminates the effect of SES on performance in the exercises. The second explanation is supported by Myrberg and Rosén (2004), who write that quality teachers compensate for the difference in performance between students from different economic backgrounds. Furthermore, they define quality teachers as certified teachers, and it is mandatory for a teacher to be certified in the Netherlands in order to teach in secondary schools (Rijksoverheid, n.d.b). This would result in a significant reduction of the influence of SES on exercise performance since all teachers are certified and thus compensate for the differences in performance caused by differences in SES.

The two-way ANOVA (Figure 1.3) also failed to find a main effect on exercise performance for whether a participant plays an instrument. This is unexpected since Moreno (2009) discusses a link between music and semantic and syntactic processing and Steinbeis and Koelsch (2008) also found that there is a two way interaction between syntax processing and music processing. If musicians perform better than non-musicians in terms of semantic and syntactic processing, as discussed by Moreno, one would expect to find in this experiment that participants who play an instrument achieve a higher percentage of correctness in the exercises than participants who do not play an instrument. This lack of a main effect indicates that playing an instrument is not enough to influence performance on morphosyntactic exercises in these circumstances.

Pearson correlation of the category of participants that play an instrument ($n = 15$) indicates a moderate correlation between the years of experience playing an instrument

and the percentage of correct exercises (Figure 1.4). This indicates that participants who are have musical experience perform better at the exercises. These findings contrast the results of the two-way ANOVA described above, providing more depth to the observation. Playing an instrument does not have a strong enough effect on the performance in morphosyntax exercises. Only within the group of participants who play an instrument does it become apparent that years of experience with an instrument correlate with higher degree of accuracy in morphosyntax exercises. Nevertheless, while the evidence is not causative, it appears likely that long periods of active engagement with music are beneficial for the accuracy with which morphosyntax exercises are completed.

Another noteworthy observation derived from the Pearson correlation in Figure 1.4 is that there do not seem to be any correlations between factors relating to music and any of the self-assessments. For participants who play an instrument, weekly playtime does not correlate with any category of exercise or self-assessment. The number of years of experience with an instrument is apparently a more reliable indicator of performance in morphosyntax exercises. The same figure also shows that passive exposure to music through time spent listening to songs does not correlate performance in exercises or any category of self-assessment, which further cements the idea that active engagement with music is required for there to be a correlation with language skills.

A different Pearson correlation test examining daily passive exposure to English (*DPE*), daily active engagement with English (*DAE*), accuracy in categories of exercises, and English proficiency self-assessments indicated a different set of correlations than those that were found in the analysis of correlations between elements of musical experience and the aforementioned factors relating to English (Figure 1.5). Specifically the finding that vocabulary self-assessment and *DPE* weakly correlate, while elements of musical experience and vocabulary self-assessment do not, is in line with Dahl and Vulchanova (2014), who describe a positive influence of L2 exposure on the acquisition of L2 vocabulary. Out

of the four categories of exercises there only was a significant correlation ($p < .01$) between countability exercises and *DPE*. This could be explained by the aforementioned higher vocabulary self-assessment associated with a greater *DPE*. Participants with a greater *DPE* have a better vocabulary and thus might be more familiar with the words in the exercise and whether or not they are countable.

5.2 Discussion of Study 2

The findings in the second section of the present study contrast with some of the observations and theories in the literature while lending credence to other claims. One of the observations in the present study, while not the main point, supports the validity of the Tripods 7Cs system (Tripod Education Partners, 2017). The reliability analysis (Figure 2.2) indicates that the ratings for the seven competences measure an overarching construct, presumably overall teacher competence. The Cronbach's alpha is higher than initially expected, but this only further cements the idea that the seven competences reflect an overarching phenomenon. This is further supported by the fact that there is a significant weak correlation between the *teacher competence* variable and the *goal attainment* variable, taking into account Myrberg and Rosén's (2004) findings that teacher competence influences student performance and Minister Slob's (2019) remark that quality teachers are a prerequisite of quality education, it is likely that the *teacher competence* variable is an accurate representation of actual overarching teacher competence.

Reliability analysis of the five goals (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5) indicated that it was very likely that attainment ratings of the five goals are measurements of overall education quality. This leads me to believe that the goals, while vaguely described, are five decent goals to strive for when it comes to improving music education. The relatively low overall goal attainment, only 3.34 on average on a seven point scale ($SD = 1.38$), might not be due to the goals themselves, but rather the lack of clear guidelines for a classroom implementation of these goals.

Findings in figure 2.3 pertaining to the change in quality of music education over the years seem to contradict Minister Slob's (2019) observations. Slob is quite positive about the general state of secondary education, stating that while it is currently in a good state, there is room for improvement. The low average ratings combined with the lack of an upward trend in the self-assessment of goal attainment shows a certain dissatisfaction among students with average goal attainment sitting at a meagre 3.34 on a scale of 1 to 7. It is noteworthy that there is no apparent influence of the conception of the five goals in 2006 (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5) on their attainment. This might be interpreted to indicate a certain disconnect between government legislation pertaining to music education in secondary schools and the actual music education. We can only speculate on the reasons for this discrepancy. The lack of a clear trend in terms of goal attainment can be interpreted to indicate that the decline in the quality of music education over the course of the 20th century as described by Hartkamp (2005) has stagnated. Furthermore there are no signs of the deterioration of quality of education when it comes to the perceived competence of the teachers in student ratings (Figure 2.4).

There is a significant interaction between teacher competence and goal attainment ($r = .47, p < .005$), (Figure 2.5). This is not an unexpected finding since Minister Slob (2019) writes that good teachers are an essential prerequisite for quality education. Interestingly, the magnitude of the correlation is lower than expected when taking into consideration the high importance ascribed to the competence of teachers as a factor in determining the quality of education. Myrberg and Rosén (2004) write that other researchers have concluded that the influence of a school on the performance of students is mainly determined by the differences in teacher quality (p. 2). Their own research concluded that the effect of socioeconomic status on the performance of students is balanced by the influence of teacher competence (p. 14-15). This also appears to be the case in study 1 where there is no significant effect of socioeconomic status on the performance in the exercises.

There seems to be no difference between schools where students can take music as an elective and schools where this is not possible. If results are sorted into these two categories there is no significant effect for goal attainment ($t(39) = -1.06, p = .31$) or teacher competence ($t(39) = 1.28, p = .21$). The sample size probably contributes to the resulting lack of significance, with only six participants having received their first two years of music education at schools where music was available as an elective. There is also no significant difference in teacher competence across the two categories. This might however also be due the small size of one of the subcategories.

6. Conclusion

The current study has found some novel correlations and observations. While playing an instrument, or passively listening to music is not enough to influence performance in morphosyntactic exercises, there is a significant correlation between the amount of years of experience with an instrument and the overall performance in the morphosyntactic exercises. Noteworthy is that this correlation does not occur between the amount of passive and active exposure to English and exercise performance, this indicates that musical experience has a different but significant correlation with L2 performance than L2 exposure has with L2 performance. If the correlation between musical experience and performance in the exercises is causative, it would be a powerful tool to bolster the acquisition of an L2 combined with L2 exposure.

The finding that there was no correlation between L2 exposure and performance in morphosyntactic exercises can be explained by both the other observed correlations between *DPE*, *DAE* and the self-assessments, and by the literature. As Dahl & Vulchanova (2014) write, L2 exposure positively influences L2 vocabulary, which in this study is reflected in the self-assessments of vocabulary and reading for greater *DPE* and *DAE*. A greater vocabulary did not seem to be significantly advantageous for completing the exercises in appendix A.

The overall attainment of the skills specified by the government: (1.) eloquent self-

expression, (2) competent presentation of art, (3.) the ability to make knowledgeable observations and evaluations of art, (4.) the ability to create audio-visual reports, (5.) the ability to reflect on oneself and on others (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5), is quite low, a 3.34 ($SD = 1.38$) on a seven point scale. This could partially be due to the disconnect between the five goals and the contents of music lessons in secondary schools, as described by minister Slob (2019), or due to the nature of the goals themselves. It seems to be more likely that the low score is due to a disconnect between the goals and teaching in practice, since the attainment of the goals was nearly identical before their introduction compared to after their introduction. Furthermore, the availability of the central state exam in music does not influence the goal attainment, which further indicates that there is a disconnect between the goals and the lessons as one would expect a higher degree of goal attainment in schools where students have the option to take the state exam.

In the future these goals might change thanks to the efforts of Curriculum.nu, a collective of teachers and experts advising the government on how to revise the curriculum (Rijksoverheid n.d.a). In their most recent version of the proposed changes to the art and culture curriculum the goals are expanded upon (Curriculum.nu, n.d.). The translation from goal to lesson, which is seemingly missing for the current set of goals (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5), is remedied by an extensive overview of the intention behind the new goals and a detailed description of their implementation. Based on the findings in study 2, it is very likely that Curriculum.nu will significantly improve the current music education situation in secondary schools.

The correlation between teacher competence and goal attainment indicates that with greater teacher competence comes greater goal attainment. This is to be expected since both minister Slob (2019) and Myrberg and Rosén (2004) attribute a great deal of importance to teacher competence. The notion that teacher competence eliminates the influence of socioeconomic status on the performance of students put forward in Myrberg

and Rosén's paper would also explain the absence of a main effect for Socioeconomic status on the percentage of correct answers in the exercises in study 1. The existence of a correlation between this study's measures of teacher competence and goal attainment, combined with the high Cronbach's alpha for the seven measures of teacher competence of the Tripods 7Cs system (Tripod Education Partners, 2017), supports the validity of the 7Cs system as a reliable measure of teacher competence. As minister Slob writes, competent teachers do seem to be a prerequisite for quality education.

Improvements to music education in Dutch secondary schools present an opportunity to implicitly improve L2 morphosyntax skills. Since *goal attainment* ratings of the five goals in the curriculum (Kerndoelen onderbouw voortgezet onderwijs 2010 (Ocw) p. 5) are quite low at only a 3.34 on average on a seven point scale, it can be assumed that music education in secondary schools does currently not have the imagined impact on students' knowledge. If music education were to be improved and would motivate students to start learning how to play an instrument, it might have positive effects on their performance in L2 morphosyntax, since musical experience was shown to correlate with a higher percentage of correct morphosyntax exercises.

While the results of study 2 indicate that current music education is unsatisfactory, it might prove beneficial for students to pursue extracurricular music education, since study 1 has shown a significant moderate correlation between L2 morphosyntax skills and musical experience. Until music education in secondary schools adequately contributes to students' musical experience, any other means of obtaining musical experience should be encouraged.

One of the main constraints of the current research was the small sample size for both studies. Larger sample sizes would have garnered more reliable results and allowed for more certainty in the conclusions. The same study with a larger sample size might have yielded further significant results since there were a substantial amount of correlations which were nearly significant. The sample size also influenced the reliability of the

ANOVAs, where a larger sample would have been desirable.

If this research were to be repeated it would be desirable to have participants in study one also fill out the questionnaire that participants in study two filled out, as that would give a clear indication of the correlation between musical experience obtained in schools and performance in L2 syntax. The current research did not combine the questionnaires for participants of study one since, due to the circumstances caused by COVID-19, teachers expressed that they were behind schedule and did not have any time to spare. The inclusion of a second questionnaire in the test material for study one might have deterred what few participants there were.

The findings of both studies open up interesting new avenues for future research. As mentioned in the theoretical background, Bremmer et al. (2011) explain that teaching improvisation is a powerful tool when it comes to music education. Since improvisation is a method of creating affective engagement, an analysis of the influence of improvisation lessons on both music skills and language skills could provide new insights in the emergence of music and language from the need to engage in affective engagement (Livingstone & Thompson, 2009) and could bring with it new evidence linking the acquisition of music and language, which in turn could be adapted to improved teaching methods in both fields.

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Appendix A

[Translation in square brackets]

Je krijgt nu een aantal korte oefeningen en daarna een vragenlijst te zien. [You will now see a number of short exercises and a questionnaire]

Probeer voor de 5 oefeningen (A t/m E) niet meer dan 30 minuten te gebruiken [Try to use no more than than 30 minutes for the excercises]

Grammar test: From Piggott (2019)

A Vul de juiste vorm van het woord in. [Enter the correct form of the word]

Gebruik een vorm van het woord tussen haakjes. Soms moet er nog een woord bij. [use a form of the word in brackets. Sometimes you will need to add an additional word.]

Bijv.: [e.g.]The children ____ (be) at school. __are__

Opgaven: [Exercises:]

1. Everybody likes Tom. He ____ (have) a lot of friends.

2. She never ____ (listen) to me. _____
3. ____ she ____ (live) with her parents? _____
4. You ____ ____ (not drive) very fast. _____
5. Look! Somebody ____ ____ (swim) in the river. _____
6. ____ you ____ (buy) new clothes last week? _____
7. We ____ (see) Rose in town two weeks ago. _____
8. Paul never ____ (go) to a museum when he lived in London.

9. Where ____ she ____ (work) in 1970? _____
10. Michael and his brother ____ (be) here last night.

11. I ____ (eat) a few apples yesterday.

12. Water ____ (boil) at 100 degrees Celsius.

13. Be quiet. The teacher ____ (watch) us! _____
14. Bob often ____ (play) tennis with Chris on Saturdays.

B Maak vergelijkingen. Gebruik een vorm van het woord tussen haakjes. [Make comparisons. Use a form of the word in the brackets.]

Bijv.: Paul is ____ (small) than James. smaller

Bijv.: This is ____ (small) boy I know. the smallest

Opgaven: [Exercises:]

1. This is ____ (big) company in the world.

2. Last Saturday was ____ (warm) than today.

3. Which of those three knives is the ____ (sharp)?

4. Pat behaved ____ (good) than Esther.

5. This hotel is ____ (comfortable) than the other one.

C. Kies tussen some of any. [Choose between some or any.]

Opgaven: [Exercises:]

1. Sorry, I haven't got ____ matches.

2. I have ____ information for you.

3. She didn' t have ____ money.

4. Can I have ____ sugar, please?

D. Kies tussen much, many. [Choose between much, many]

Opgaven: [Exercises:]

1. Did you take ____ photographs when you were on holiday?

2. Have you got ____ work to do?

3. How ____ apples would you like.

4. I' m not very busy today. I haven' t got ____ to do.

E. Zet de zin in de juiste volgorde [Put the sentence in the right order]

Opgaven: [Exercises:]

1.

We

1

to London

2

never

3

been

4

have

5

De beste volgorde is: 1,_____ [The best order is:]

2.

They were

1

a machine gun

2

the first soldiers

3

used

4

who

5

De beste volgorde is: 1,_____ [The best order is:]

3.

We think that

1

your brother

2

a fool

3

still

4

is

5

De beste volgorde is: 1,_____ [The best order is:]

4.

Last Saturday

1

a good film

2

we

3

saw

4

in Brussels

5

De beste volgorde is: 1,_____ [The best order is:]

5.

I know that Paul

1

be

2

will

3

not

4

reading

5

De beste volgorde is: 1,_____ [The best order is:]

6.

Ajax and Liverpool

1

this afternoon

2

on television

3

are

4

De beste volgorde is: 1,_____ [The best order is:]

7.

He told me

1

just

2

he

3

had

4

started

5

De beste volgorde is: 1,_____ [The best order is:]

8.

I

1

always

2

in cold water

3

swim

4

De beste volgorde is: 1, _____ [The best order is:]

9.

We

1

all evening

2

carefully

3

were listening

4

De beste volgorde is: 1, _____ [The best order is:]

10.

which hotel you are staying in

1

don' t

2

remember

3

you

4

?

5

De beste volgorde is: _____ [The best order is:]

11.

doing

1

Paul and Mary

2

that job

3

haven' t

4

been

5

De beste volgorde is: _____ [The best order is:]

EINDE TOETS [END OF TEST]

Appendix B

(Translation below)

Vragenlijst

Bij alle zelfbeoordelingen geldt een schaal van 1 tot 7 waar 1 = zeer slecht en 7 = uitmuntend. Als je bij deel 1 met Nee antwoordt mag je de rest van deel 1 open laten. Houd bij alle open vragen je antwoorden zo kort mogelijk.

Deel 1

- Speel je een instrument of zing je (of deed je dat vroeger)? Ja / Nee
- Hoeveel uur per week speel je ongeveer (bijvoorbeeld 3,5)
- Hoe lang speel je al / heb je gespeeld? (antwoord in jaren + maanden)
- Hoe lang heb je al les / heb je les gehad? (antwoord in jaren + maanden)
- Wat zou je jezelf als cijfer geven voor hoe goed je je instrument bespeelt? (op een schaal van 1 tot 7)

Deel 2

- Hoe lang luister je ongeveer naar muziek in een week? (in uren bijvoorbeeld 3,5 uur)
- Op een schaal van 1 tot 7, hoe goed is je ritmegevoel?
- Op een schaal van 1 tot 7, hoe goed kan je een melodie onthouden?

Deel 3

- Wat is je geboortedatum ?
- Zit je nog op school? En zo ja in welke klas zit je (bijvoorbeeld 2 Havo)
- Hoe oud was je toen je voor het eerst jezelf bezig hield met Engels ?
- Hoe oud was je toen je voor het eerst Engelse les kreeg?
- Op een schaal van 1 tot 7 hoe goed is je Engelse grammatica?
- Op een schaal van 1 tot 7 hoe goed is je Engelse woordenschat?
- Op een schaal van 1 tot 7 hoe goed is je Engelse leesvaardigheid?
- Op een schaal van 1 tot 7 hoe goed is je Engelse spreekvaardigheid?
- Op een schaal van 1 tot 7 hoe goed kan je Engelse teksten lezen en begrijpen?
- Op een schaal van 1 tot 7 hoe goed is je Engels in het algemeen?
- Wat is je eerste taal?
- Hoeveel tijd per dag ben je passief met Engels bezig buiten school? (Engelstalige series kijken, Engelstalige boeken lezen, luisteren naar Engelstalige podcasts etc.)
- Hoeveel tijd per dag ben je actief met Engels bezig buiten school ? (Engelse teksten schrijven, gamen met Engelstalige mensen, bellen met Engelstalige mensen etc.)

Questions

All self-assessments are to be scored on a scale of 1 to 7 where 1 = very poor & 7 = excellent. If your answer to the first question of part 1 is no, you can continue to part 2. Keep all your answers as concise as possible.

Part 1

- do you play an instrument or do you sing (or did you do so in the past)? yes/no
- how many hours do you play music each week?
- for how long have you been playing / for how long did you play?
- for how long have you been receiving music lessons / did you receive music lessons?
- If you had to give yourself a mark for your playing skills, what would that be? (on a scale of 1 to 7)

Part 2

- How long do you usually listen to music in a week? (e.g. 3,5 hours)
- on a scale of 1 to 7 rate your sense of rhythm
- on a scale of 1 to 7 how good are you at remembering a melody

Part 3

- what is your date of birth?
- are you still in school, if so, which year are you in?
- how old were you when you were first introduced to the English language?
- how old were you at the time of your first English lesson?
- on a scale of 1 to 7, how good is your English grammar?
- on a scale of 1 to 7, how good is your English vocabulary?
- on a scale of 1 to 7, how good are your reading skills?
- on a scale of 1 to 7, how fluent are you in English?
- on a scale of 1 to 7, how capable of understanding English written texts are you?
- on a scale of 1 to 7, how would you rate your English in general
- what is your mother tongue?

How much time per day are you passively engaging with the English language outside of school? (Watching English series, reading English books, listening to English podcasts etc.)

How much time per day are you actively engaging with the English language outside of school? (Writing English texts, gaming and communicating with English people, chatting with or talking to English people)

Appendix C

(Translation below)

Information Sheet

Doel van het onderzoek:

Onderzoeken of er correlaties zijn tussen zelf-aangegeven muzikale vaardigheden en taalvaardigheden in een tweede taal, en het evalueren van het Nederlandse middelbare muziekonderwijs.

Delen van het onderzoek:

Een korte toets en een vragenlijst.

Risico's en voordelen:

Het is een normale taaltoets en zal dus het zelfde als een oefenopdracht werken. De vragenlijst heeft als voordeel dat je over je vaardigheden denkt. Er zijn geen risico's verbonden aan het onderzoek.

Procedure voor terugtrekken uit het onderzoek:

Geef een geschreven bericht aan je docent met je naam waarin je vermeldt dat je niet mee wil doen aan het onderzoek. Een reden is niet nodig. De gegevens worden dan verwijderd.

Gebruik van de gegevens tijdens en na het onderzoek:

De gegevens worden tijdens het onderzoek alleen bekeken door mijzelf, de uitvoerende onderzoeker en een assisterende docent van de Universiteit Utrecht. Na het onderzoek zijn de gegevens op aanvraag beschikbaar voor toekomstige onderzoeken, indien je daar toestemming voor geeft. Bij de opgeslagen gegevens horen alleen je reacties op de vragen, je naam blijft voor mij onbekend.

Details van het onderzoek:

-Er is geen sponsor voor dit onderzoek.

-Projectnaam: Music and Language in Education: Musical Experience as an Indicator of L2 Morphosyntactic Proficiency and an Evaluation of Dutch Music Education

-Contactgegevens onderzoeker:

Naam: Roan Balleur

Per mail: r.balleur@students.uu.nl

-Klachten indienen: Een klacht kan je indienen per mail naar bovenstaand mailadres, zet dan in het onderwerp de naam van het project en het woord klacht.

Goals of the research:

This research aims to investigate whether there are correlations between self-assessed musical skills and exposure and skills in a second language, and aims to evaluate the quality of music education in Dutch secondary schools.

Parts of the experiment:

A short test and questionnaire.

Risks and benefits:

It is a standard language test, and will have the same benefits as other practice tests. The benefit of the questionnaire is that it makes you think about your skills. There are no risks involved in this experiment.

Procedure for withdrawal:

Give your teacher a written message with your name in which you state that you wish to be removed from the experiment. There is no need to give a reason as to why. Upon receiving the request your data will be deleted.

Use of data during and after the research:

Over the course of the research the data will only be seen by me, the researcher, and an assisting teacher from Utrecht University. After the research your data will be available to other researchers should a request be made. This only happens if you agree to the sharing of your data in the first place. Data consists of the answers you provide in the test and questionnaire, your name will remain unknown to the researchers.

Other details:

This research is not being sponsored.

Project name:

Music and Language in Education: Musical Experience as an Indicator of L2 Morphosyntactic Proficiency and an Evaluation of Dutch Music Education

Contact details researcher:

Name: Roan Balleur

Mail: r.balleur@students.uu.nl

Complaints :

You can submit complaints to the email address mentioned above. Make sure the subject line is the name of the project + the word complaint.

Appendix D

(Translation below)

Je wordt gevraagd om te bevestigen dat je meedoet aan het onderzoek.

Ik heb de informatie over het onderzoek gelezen. Ja / Nee

Ik begrijp dat ik me op elk moment terug kan trekken uit het onderzoek. Ja / Nee

Ik begrijp dat mijn antwoorden worden gebruikt als gegevens voor dit onderzoek. Ja / Nee

Ik geef toestemming voor het delen van de antwoorden die ik heb gegeven in de vragen en op de opdracht door de onderzoeker met andere onderzoekers die daar naar vragen. Ja / Nee

Ik doe mee aan het onderzoek. Ja / Nee

You will be asked to confirm that you will participate in the experiment.

I have read the information about the experiment. Yes / No

I understand that I can withdraw from the experiment at any time. Yes / No

I understand that my answers will be used as data for this experiment. Yes / No

I give permission to share my answers with other researchers should they request the original researcher to do so. Yes / No

I will participate in the experiment. Yes / No

Appendix E

(Translation below)

Zat/zit je in Nederland op een middelbare school? Ja / Nee

A.

Je krijgt vijf stellingen te lezen. Voor elke stelling moet je op een schaal van 1 tot 7 aangeven in hoeverre je denkt het aangegeven leerdoel te hebben bereikt dankzij de muzieklessen op je middelbare school.

Achter stellingen die misschien moeilijk te begrijpen zijn staat tussen haakjes in eenvoudigere taal uitgelegd wat er met een stelling wordt bedoeld.

Mocht je nog in de onderbouw zitten op je middelbare school, en nog muzieklessen krijgen daar, vul dan in in hoeverre je *verwacht* om de doelen te behalen.

Zit je momenteel in de onderbouw? ja/nee

Heb je nog muzieklessen op school, of zijn die allemaal al voorbij?

Ik heb nog muzieklessen / ik krijg geen muzieklessen meer

1. De leerling leert door het gebruik van elementaire vaardigheden de zeggingskracht van verschillende kunstzinnige disciplines te onderzoeken en toe te passen om eigen gevoelens uit te drukken, ervaringen vast te leggen, verbeelding vorm te geven en communicatie te bewerkstelligen. (Je beheerst muziek goed genoeg om je gevoelens ermee uit te kunnen drukken en te communiceren naar anderen.)

1 2 3 4 5 6 7

2. De leerling leert eigen kunstzinnig werk, alleen of als deelnemer in een groep, aan anderen te presenteren.

1 2 3 4 5 6 7

3. De leerling leert op basis van enige achtergrondkennis te kijken naar beeldende kunst, te luisteren naar muziek en te kijken en luisteren naar theater-, dans- of filmvoorstellingen.

1 2 3 4 5 6 7

4. De leerling leert met behulp van visuele of auditieve middelen verslag te doen van deelname aan kunstzinnige activiteiten, als toeschouwer en als deelnemer. (Je leert in verslagen te vertellen over muzikale activiteiten.)

1 2 3 4 5 6 7

5. De leerling leert mondeling of schriftelijk te reflecteren op eigen werk en werk van anderen, waaronder dat van kunstenaars. (Je leert kritiek en feedback te geven op je eigen muziek en die van anderen.)

1 2 3 4 5 6 7

B.

Beantwoord de volgende vragen: (je mag de vraag leeg laten als je het niet weet)

Tot het hoeveelste jaar was muziekonderwijs op je middelbare opleiding beschikbaar?
(antwoord door een nummer van 1 tot 6 in te vullen)

Tot het hoeveelste jaar was muziekonderwijs op je middelbare opleiding verplicht? (antwoord door een nummer van 1 tot 6 in te vullen)

Tot het hoeveelste jaar heb je muziekonderwijs gevolgd op je middelbare school? (antwoord door een nummer van 1 tot 6 in te vullen)

Bood je school een muziek-eindexamen aan? Ja / Nee

C.

Beoordeel de volgende vragen op een schaal van 1 tot 7

1. Op een schaal van 1 tot 7, had je docent een goed beeld van wat je wel en niet kon?

Totaal niet 1 2 3 4 5 6 7 Heel erg

2. Op een schaal van 1 tot 7, werd het aangemoedigd om je eigen ideeën en meningen bij te dragen aan de les?

Totaal niet 1 2 3 4 5 6 7 Heel erg

3. Op een schaal van 1 tot 7, hoe interessant vond je de muzieklessen?

Totaal niet 1 2 3 4 5 6 7 Heel erg

4. Op een schaal van 1 tot 7, hoe goed was je docent in het geven van uitleg?

Totaal niet 1 2 3 4 5 6 7 Heel erg

5. Op een schaal van 1 tot 7, hoe nuttig was de lesstof in je muzieklessen?

Totaal niet 1 2 3 4 5 6 7 Heel erg

6. Op een schaal van 1 tot 7, werd je uitgedaagd om je best te doen?

Totaal niet 1 2 3 4 5 6 7 Heel erg

7. Op een schaal van 1 tot 7, zorgde je leraar voor een goede sfeer in de klas?

Totaal niet 1 2 3 4 5 6 7 Heel erg

8. Op een schaal van 1 tot 7, waren de lessen georganiseerd en luisterde iedereen goed?

Totaal niet 1 2 3 4 5 6 7 Heel erg

D.

Wat is je geboortedatum?

Welk niveau middelbaar onderwijs heb je gevolgd?

Als je nog op de middelbare school zit, in welk jaar zit je dan?

In welk jaar ben je afgestudeerd van de middelbare school? (Of in welk jaar studeer je waarschijnlijk af?)

Als je nog op de middelbare school zit, in welk jaar zit je dan? (anders mag je dit leeg laten)

Did you receive your secondary education in the Netherlands? Yes / No

A.

You will be presented with five statements. For each statement you have to indicate on a scale from 1 to 7 to what extent you think you achieved the described educational goal thanks to your secondary education's music lessons.

Behind certain statements which might be harder to understand there will be a simplified explanation in brackets.

In the case that you are still in one of the first two years of secondary education, and are still receiving music lessons there, please answer to what extent you **expect** to achieve the goals.

Are you currently in the first or second year of secondary education? Yes / No

Do you still receive music lessons in school?

I still receive music lessons / I no longer receive music lessons.

1. The student learns, by use of elementary skills, to investigate, apply, express themselves, and communicate by means of the eloquence of the arts. (You are competent enough at music to express your feelings and use it to communicate with others.)

1 2 3 4 5 6 7

2. The student learns to present their own art to others, either alone or in a group. (3.) The student learns to observe and evaluate art based on their knowledge of the subject.

1 2 3 4 5 6 7

3. The student learns to observe and evaluate art based on their knowledge of the subject.

1 2 3 4 5 6 7

4. The student learns to report on artistic activities, either as an observer or a participant with the help of audio or visual materials. (You can make reports on musical activities.)

1 2 3 4 5 6 7

5. The student learns to reflect on their own work and that of others, including that of artists. (You learn to provide feedback and criticism on your own music and that of others.)

1 2 3 4 5 6 7

B.

Answer the following questions: (You may leave the field empty if you do not know the answer.)

Up to and including which year of your secondary education was music education available? (answer by entering a number from 1 to 6)

Up to which year was music education mandatory? (answer by entering a number from 1 to 6)

Up to which year did you receive music education? (answer by entering a number from 1 to 6)

Did your school offer the music state exam? Yes / No

C.

Rate the following questions on a scale of 1 to 7.

1. On a scale of 1 to 7, did your teacher have a clear understanding of what you were capable of?

Absolutely not 1 2 3 4 5 6 7 Completely

2. On a scale of 1 to 7, were you encouraged to contribute to the lessons by providing your own ideas and opinions?

Absolutely not 1 2 3 4 5 6 7 Completely

3. On a scale of 1 to 7, how interesting were the music lessons?

Absolutely not 1 2 3 4 5 6 7 Completely

4. On a scale of 1 to 7, did your teacher provide clear explanations of concepts?

Absolutely not 1 2 3 4 5 6 7 Completely

5. On a scale of 1 to 7, how useful was the material used in the lessons?

Absolutely not 1 2 3 4 5 6 7 Completely

6. On a scale of 1 to 7, were you challenged to give your best effort?

Absolutely not 1 2 3 4 5 6 7 Completely

7. On a scale of 1 to 7, did your teacher maintain a pleasant atmosphere in the class?

Absolutely not 1 2 3 4 5 6 7 Completely

8. On a scale of 1 to 7, were the lessons well-organised and did everyone pay close attention?

Absolutely not 1 2 3 4 5 6 7 Completely

D.

What is your date of birth?

Which level of secondary education did you attend?

In case you are still in secondary school, which year are you currently in. (leave empty otherwise)

In which year did you graduate from secondary school? (Or in which year will you probably graduate?)