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The application of a Seamless Learning approach in the Year 9 of the LGR-22 Music Curriculum using the SLED framework: A case study

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A thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy in Music in the Faculty of Humanities, Odeion School of Music at the University of the Free State

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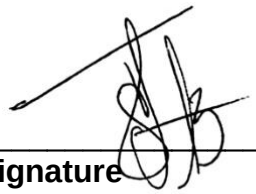

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LETTER OF CONFIRMATION: NATURE OF EDITORIAL INTERVENTION

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I write to confirm that I was engaged as an accredited professional text editor to perform the following editorial interventions on the doctoral thesis of Mr Johannes Coetzer titled 'The application of a Seamless Learning approach in the Year 9 of the LGR-22 Music Curriculum using the SLED framework: A case study':

1. Copy-editing the text (comprising five chapters), which included language and stylistic editing and imposing consistency of usage throughout.
2. Checking the numbering and formatting of the hierarchy of headings and subheadings and the titles of the figures and tables.
3. Styling the quotations and interview excerpts which are displayed separately from the author's text.
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DEDICATION

To all the teachers who dare to transform the world through the power of music education and innovative learning. Your unwavering curiosity, creativity and commitment to progress inspire the continuous evolution of education. This study is dedicated to you, as you embody the essence of Nelson Mandela's belief in the transformative power of education and Dr John Dewey's pursuit of a philosophy of experience. May our journey be as adventurous as Paul Klee's dot that went for a walk. Together, we will be able to forge new paths in the realm of knowledge and understanding.

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ABSTRACT

Despite numerous studies on seamless learning in education, little is known about its application in music education. In this study, I deal with a gap in the literature on the application of a seamless learning approach in the Year 9 LGR-22 Music Curriculum at a primary school in Stockholm, Sweden. To meet the differentiated needs of 21st-century students, a traditional music curriculum was modified using the Seamless Learning Experience Design (SLED) framework. A qualitative case study was used, including classroom observations, semi-structured interviews (with 13 students), end-of-lesson questionnaires (50 students) and end-of-unit reflective questionnaires (181 reflections). To consolidate my findings and develop a coherent narrative, thematic coding together with an inductive approach was used to categorise the themes within the qualitative data. The data analysis indicated that the seamless learning approach offered a range of advantages that allow for a personalised learning experience for students. In this research, I attempt to indicate the significance of teaching and learning approaches in catering to students' content consumption, interaction, creation and presentation preferences and promoting self-directed and student-centred learning environments. Additional advantages of the way a seamless learning approach can improve a traditional music curriculum to meet the needs of contemporary students are also emphasised, rendering the learning environment more dynamic, inclusive and flexible. Helpful recommendations to teachers are provided on how to apply the SLED framework in their subjects with a view to creating pragmatic learning experiences that enhance students' overall learning experience.

Keywords: seamless learning, SLED framework, Seamless Learning Experience Design, Swedish primary school, Grundskola, music education, student engagement, digital tools, personalised learning, self-directed learning, contextual learning, qualitative research

LIST OF ABBREVIATIONS

4G LTE	Fourth generation long-term evolution
5G	Fifth generation
6G	Sixth generation
ADHD	Attention-deficit hyperactivity disorder
AI	Artificial intelligence
COVID-19	Coronavirus disease 2019
CPD	Continuous professional development
DAW	Digital audio workstation
ELD	Expressive language disorder
GAD	Generalised anxiety disorder
GDPR	General data-protection regulation
GHREC	General/Human Research Ethics Committee
HSP	Highly sensitive person
ICT	Information and communication technology
IT	Information technology
LGBTQI+	Lesbian, gay, bisexual, trans, queer, questioning, intersex, asexual and more identities
LGR-22	Läroplan för grundskolan, förskoleklassen och fritidshemmet 2022 (Swedish National Curriculum for Compulsory School Education 2022)
LMS	Learning management system
MET	Music expression test
OSM	Odeion School of Music
SDL	Self-directed learning
SL	Seamless learning
SLED	Seamless Learning Experience Design
UFS	University of the Free State
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VR	Virtual reality
wi-fi	Wireless fidelity
ZPD	Zone of proximal development

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CHAPTER 1

Introduction

Education is the most powerful weapon which you can use to change the world – Nelson Mandela[1]

1.1 INTRODUCTION

In today's changing world it is important to adapt and incorporate technology into education practices. This research delves into the ways in which seamless learning can be applied to the 2022 Swedish National Curriculum for Compulsory School and Preschool Education (LGR-22).[2] It focuses specifically on the music curriculum to boost student involvement and academic achievements. By examining the advantages and disadvantages involved, the study aimed to gain insights into teaching approaches; ultimately aiming to enhance music education by offering creative and tailored learning opportunities for students.

1.2 BACKGROUND

During the COVID-19 pandemic, the world's primary and secondary schools implemented a variety of teaching approaches, such as mobile learning and blended learning, to ensure that students continued with their education.[3] According to Czerniewicz et al (2020: 949), these approaches include learning and blended learning, among other methodologies. Teachers faced challenges when integrating technology into the learning process (Carrillo & Flores, 2020: 480; Hambrock & De Villiers, 2023: 52). The shift towards education highlighted the need for teaching approaches to meet diverse student needs in unconventional circumstances.

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1 Mozelius et al, 2011.
2 Läroplan för grundskolan, förskoleklassen och fritidshemmet (Skolverket, 2022).
3 While these online approaches are often used interchangeably with 'seamless learning', they should not be confused with the former, as each includes subtle differences.

Creating an environment that combines formal and informal learning to enhance an interactive learning atmosphere is known as ‘seamless learning’, as discussed by Looi et al (2019: 17) and Wong and Looi (2011: 2364–2381). This approach enables the transition between types of learning method, including synchronous and asynchronous formats. As noted in previous research, adopting this approach has the capacity to improve learning outcomes and engagement in educational environments such as music education (Wright, 2011: 92–97; Sharples et al, 2012; De Villiers, Hambrock & Power, 2022).

Historically, seamless learning has evolved through two primary ways: the first, emerging in the early 1990s, focused on bridging the gap between academic and student affairs in higher education; and the second, from the mid-2000s, emphasised mobile-assisted learning across formal and informal settings (Wong, 2015). By facilitating learning beyond the constraints of time and place, seamless learning supports future-ready skills through self-directed exploration, collaboration and the integration of mobile devices, social media and learning management systems (Sharples, Taylor & Vavoula, 2007). While this paragraph offers a concise overview, a comprehensive discussion of this approach appears in Chapter 2.

Seamless learning is important because it has the ability to surpass the constraints of education through the use of devices to enhance personalised and continuous learning experiences (Wong, 2015; Looi et al, 2019). Traditional educational approaches often depend on structures and standardised evaluations that may not cater effectively to the learning requirements of students. Seamless learning, in contrast, promotes a more dynamic and responsive educational model that can adapt to the evolving needs of students and the changing educational landscape.

In 2022, Sweden introduced a framework called LGR-22 as a replacement for the previous LGR-11 edition. The updated version aims to enhance the adaptability and inclusivity of education to enable teachers to cater to each student’s needs or requirements. It emphasises the importance of nurturing abilities such as creativity, digital literacy and sustainability. The curriculum encompasses subjects that include science, mathematics, physical education and language studies in Swedish and English. In order to prepare students for their pursuits effectively and comprehensively

in school, curricula emphasise teaching skills such as starting a business and understanding complex issues (Skolverket, 2022: 148–153).

In the Year 9 LGR-22 music curriculum plan students are encouraged to enhance their skills and develop their creativity in and across various contexts (Skolverket, 2022). They are encouraged to refine their singing and instrumental talents to express the different music genres both independently and as part of groups. Furthermore, students delve into music theory and its historical contexts through activities such as performances and composing tasks (Skolverket, 2022). The course emphasises the importance of nurturing creativity and presents a structure that can be applied in environments that enable students to explore aspects of music and its role in shaping identity and societal norms. By examining music from eras and genres and reflecting on how it is portrayed in various forms of media, students acquire a deeper understanding of its impact (Skolverket, 2022).

Figure 1-1 lays out a planned schedule that combines aspects of a music curriculum set up by the researcher, such as history lessons taking up four 45-minute sessions and ending with a history presentation in the fifth lesson. In addition to the content included in the lessons, there is the incorporation of music theory spread across the unit, with 30-minute segments featured in 15 of the lessons. The theory unit will include four quizzes planned for lessons 3, 6, 11 and 15; in addition, a theory booklet is handed in by lesson 17.

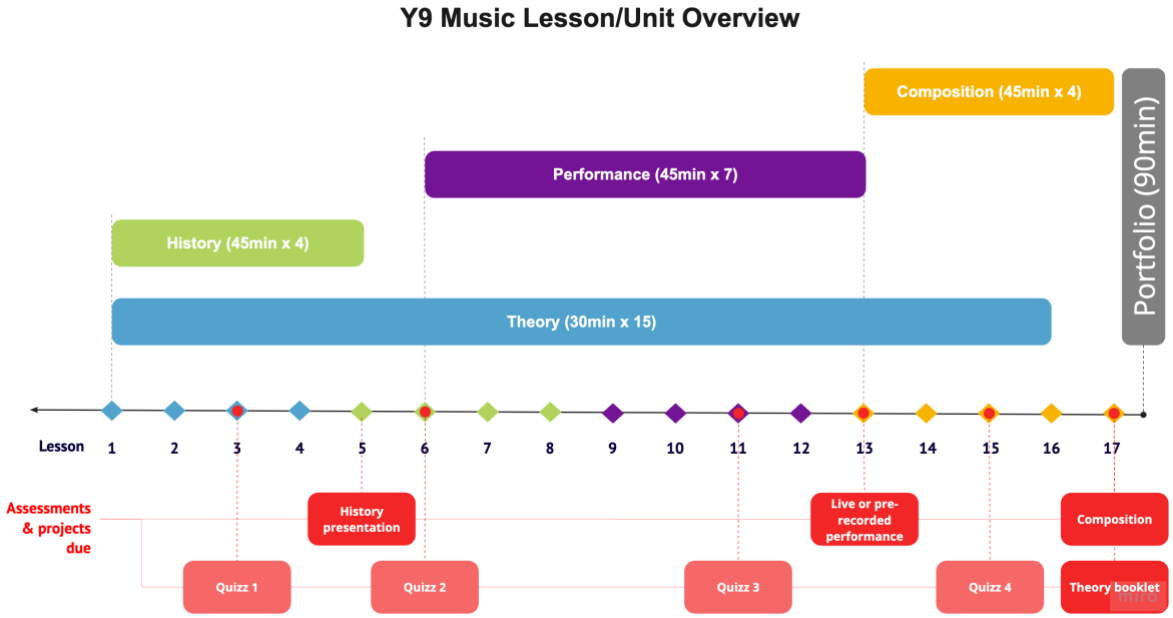

Figure 1-1: Y9 Music lesson and unit overview

Throughout the units, students have seven lessons dedicated to performance from lesson 6 to 12, leading up to a recorded performance assessment in lesson 13. In the final stages of the course the students participate in creative composition activities, with four dedicated lessons to this. The course ends in lesson 17 with two final assessments: a composition assignment and the assembly of a portfolio showcasing their coursework achievements. This holistic approach guarantees an emphasis on theories, historical background, hands-on performance abilities and artistic expression.

Implementing seamless learning faces challenges such as creating flexible resources and helping students to regulate themselves effectively while evaluating results (Looi et al, 2019). Teachers need to use a student-focused approach to teach and oversee device-usage while using assessment approaches (Wong & Looi, 2011; Looi et al, 2019). These challenges underline the importance of teacher training and continuous assistance to ensure that teachers are adequately prepared to facilitate seamless learning settings.

The employment of technology in education introduces an array of unavoidable challenges. To implement technology successfully in educational settings, schools must contend with an array of technical problems that also threaten to compromise

student data, all the while navigating a tight financial landscape (Robertson & Muirhead, 2019; Hambrock & De Villiers, 2023). Schools must devote time and resources to establish the infrastructure for technology and to train teachers. This is all for naught, however, if teachers do not use technology properly. If we expect our young citizens to use technology in the way that we want them to, there must be some form of oversight – a teacher in charge.

Although the advantages of seamless learning are acknowledged, there is an absence of teaching and learning approaches and resources in the academic literature to assist with its integration, especially in music education. The majority of the research centres on educational environments or different fields, which creates a knowledge void regarding the way seamless learning can be directly implemented in the LGR-22 music curriculum.

The Seamless Learning Experience Design (SLED) framework proposed by Hambrock and De Villiers (2023: 52) centred around five key concepts—core, human, positive, practical and design— seeks to provide a structured approach for bridging formal and informal learning contexts. By prioritising elements such as pedagogical innovation, technological support, real-world application and inclusivity, the SLED framework lays the groundwork for a more comprehensive, efficient and flexible educational environment. An in-depth discussion of the SLED framework appears in Chapter 2.

This research aims to apply a seamless learning approach to the Year-9 music curriculum using the SLED framework, exploring the potential advantages and challenges in a music educational context. The study will propose suggestions for its successful application through a pragmatic approach.

1.3 RESEARCH PROBLEM AND OBJECTIVES

The COVID-19 crisis has sped up the use of online learning approaches; however, no research has been done on how seamless learning can be applied to the 9th grade LGR-22 music curriculum. Even though seamless learning has advantages such as increased student involvement and better learning results, no literature exists on how it can be implemented in music education. This research gap presents a problem since the traditional teaching-and-learning approach seldom captivates students or satisfies

their diverse learning needs. This calls for an exploration of how the LGR-22 music curriculum could benefit from the incorporation of seamless learning. By doing so, we can redress these shortcomings and improve the educational practices.

The main research question that underlies this study is:

- How can the Year 9 LGR-22 music curriculum be adapted by applying a seamless learning approach using the SLED framework?

The sub-questions that emerged are:

- What specific modifications can be implemented to adapt the curriculum to support its learning objectives while integrating concepts from the SLED framework?
- What are the benefits of implementing a seamless learning approach in the Year 9 LGR-22 music curriculum?
- What are the advantages and disadvantages of integrating the SLED framework into the Year 9 LGR-22 music curriculum, and how can these aspects be addressed effectively?

1.4 RESEARCH METHODOLOGY

Passey (2020: 1–20) emphasises the importance of having defined frameworks in educational research by stating that a lack of theoretical foundation could lead to constrained research results. This study adopts a pragmatic standpoint that underscores the real-world application of knowledge and the value of hands-on learning. Pragmatism was favoured for its versatility and adjustability as it enables the researcher to concentrate on tangible real-life concerns and resolve them in a hands-on and feasible way. This study seeks to offer insights into learning in real-world settings by integrating an approach with experiential learning and underlining the significance of applying knowledge in practical and meaningful ways. The research design employed in this study was accordingly a qualitative case study approach that incorporated multiple research methods for data collection (Yin, 2017, 2018). These methods include:

- Classroom observations

- Questionnaire 1: End-of-lesson reflections
- Questionnaire 2: End-of-unit reflections
- Semi-structured interviews.

Convenience sampling, as described by Braun, Clarke and Gray (2017), was used to select Year 9 students from the researcher's current school who were both available and willing to participate in the study. Year 9 students were chosen due to the critical stage of their development as they transition from primary education to gymnasium.

The 2023/2024-year 9 cohort were born between 2007-2008 and were 15/16 years old. Year 9 is their last year of compulsory school (Grundskola) before moving on to upper secondary. While some of this cohort may straddle the Gen-Z-Gen-Alpha divide, many belong to the younger Gen-Z spectrum. These students display traits influenced by constant connectivity and online interaction because they grew up in a world where digital technologies were prevalent. Understanding this generational positioning is crucial to comprehending how they use technology and providing valuable insights into the wider ramifications for education.

Creswell and Cresswell (2023) mention different ways to gather data, and this study used a mixture of classroom observations, semi-structured interviews and questionnaires to collect data. The purpose of the questionnaires was to collect data in the form of brief responses and not for statistical analysis. As recommended by Atkinson and Bolt (2010: 1–19), classroom observations were employed to collect data on teaching and learning practices and provide insights into student engagement. Audio recordings of the lessons were used for self-reflection, with the students' permission having first been obtained to do so. An unbiased peer not linked to the research carried out formal interviews with the students to avoid any biases that could stem from the teacher–student relationship. This method aimed to minimise any partiality that might have surfaced due to the interactions between a student and the researcher-teacher.

The semi-structured interview included a set of 12 questions (Addendum I) designed to explore the students' experiences with the music assignments in every unit. The questions focused on

- planning, executing and reflecting on projects;
- the flexibility of completing projects anytime and anywhere;
- the benefits of using handheld devices;
- the use of different apps and programmes;
- networking and collaboration;
- engagement with music experts;
- any technological skills acquired;
- experiences with digital tools;
- motivation levels;
- ownership of learning;
- preparedness for further music studies, and
- aspects of seamless learning that were particularly enjoyable or helpful.

Follow-up questions delved deeper into specific experiences in the various music units: music theory, music performance, music history and music composition.

To gather information on the ways in which students view the seamless learning approach in the Year 9 Music Class, Google Forms questionnaires were used as a tool for data collection from students about their learning experiences in the class. These focused on flexibility, personalisation, technology integration, real-world application, collaboration, and innovation, with the aim of gaining insights that could enhance teaching approaches and the curriculum.

The end-of-units questionnaire (Addendum H) gathered input regarding the students' educational journeys during the course. The questionnaire prompted them with multiple-choice questions related to diverse topics such as the different learning approaches available to them; how they engage with experts; how they tackle challenges in class activities and assessments, and how they measure their progress and network with peers for collaborative learning opportunities. The students were encouraged to share their personal reflections of the course with a view to improving forthcoming music classes and highlighting areas that require further enhancement.

A pragmatic approach emphasises the practical application and relevance of research findings, aiming to redress real-world problems and develop practical solutions (Kelly & Cordeiro, 2020: 2–3). This research used a pragmatic methodology to evaluate the curriculum's application-readiness for a seamless learning approach while trying to understand both the advantages and the disadvantages of seamless learning and exploring the ways in which it influences the students' learning experience.

This research used such an approach to assess the effectiveness of the 9th grade LGR-22 Music Curriculum by promoting seamless learning approach and understanding both their advantages and the obstacles while also exploring how it influences student achievement and involvement in education settings. The research design was qualitative in nature, chosen to provide an in-depth analysis of the research problem. Data-collection methods included classroom observation, semi-structured interviews and two sets of questionnaires. The SLED framework underpinned the study, promoting collaboration and self-directed learning across various contexts of the course.

The following was the proposed plan for the research project, as reflected in this thesis. The first chapter introduced the background to the study by outlining the research problem and enquiries while also explaining why the study is necessary. The second chapter reviews the existing literature that touches on elements of education such as teaching approaches and assessment approaches alongside discussions on curriculum design and the SLED framework. This delves into teaching methodologies such as learning environments and flipped classrooms in addition to seamless learning practices tailored to accommodate various student learning preferences. Chapter three details the approach taken to respond to the research enquiries and encompasses the research structure chosen and how the participants were selected for the study, along with the methods used to gather and analyse the data, the reasoning behind the methods and any constraints encountered along the way. Moving on to chapter four, it entails an analysis of the study's discoveries followed by the interpretation of their meanings. Finally, in chapter five, we arrive at a response to the research question, establishing a correlation between the significance of the findings and the research questions while also providing a comprehensive conclusion to the entire study.

1.5 ETHICAL CONSIDERATIONS

The study was conducted with the approval and permission of the General/Human Research Ethics Committee (GHREC) of the University of the Free State following the submission of the requisite ethical documents under UFS-HSD2023/0634 (Addendum E). Ethical concerns were carefully considered throughout the study to balance the risks and benefits. Prospective participants were provided with an information leaflet (Addendum A), and participation in the study was entirely voluntary. Written informed consent was required from the participants (Addendum B) and their parents (Addendum C) due to the participants' being under 18 years of age. To ensure anonymity, pseudonyms were used, and the study adhered to GDPR-compliant secure storage and access protocols for personal data by authorised individuals, as required for research conducted in the European Union.

1.6 VALUE OF THE RESEARCH

The value of this study lies in its ability to transform music education by pinpointing teaching approaches that captivate and motivate students so as to nurture their talents effectively. This study sought to enhance the quality of music education by investigating seamless learning and promoting collaboration, personalised instruction and the integration of diverse learning approaches, while also providing valuable insights to teachers and comparing traditional and seamless learning approaches. Furthermore, this study has the potential to fill the existing gap in the literature and aid in progressing practices in music education. Ultimately, the seamless learning approach to the LGR-22 music curriculum will be shared through open education platforms such as Open Educational Resources repositories or online communities of practice for music teachers to disseminate the approach widely and enable other teachers to benefit from it.

CHAPTER 2

Literature review

The traditional curriculum undoubtedly entailed rigid regimentation and a discipline that ignored the capacities and interests of children. Today, however, the reaction to this type of schooling often fosters the other extreme-inchoate curriculum, excessive individualism, and spontaneity, which is a deceptive index of freedom. Each is mis-educative because neither of them applies the principles of a carefully developed philosophy of experience. – John Dewey[4]

2.1 INTRODUCTION

This chapter explores traditional and alternative teaching and learning approaches in class music[5] and investigates their advantages and disadvantages. It also discusses the role of technology in teaching practice, including digital tools and innovative approaches. In addition, I explore the ways in which these approaches influence factors such as generational differences and individual learning needs and disorders. Traditional and alternative assessment approaches are discussed in more detail, noting their respective advantages and disadvantages. Later in the chapter, I discuss the concept of 'seamless learning', examining its characteristics and potential advantages and disadvantages. Finally, the framework for SLED framework is presented, with a focus on its key concepts and its potential application to class music.

2.2 TEACHING AND LEARNING APPROACHES IN CLASS MUSIC

The teaching and learning approaches used in music classes are continuously being updated to reflect new developments in technology and pedagogy. Traditionally, music teachers worked with students in a traditional classroom environment using approved textbooks and adhering to a predetermined curriculum (Joshi, 2022). Following this approach, using handwritten notes, the teacher served as the main source of information for assignments, homework and examinations. The advantages and disadvantages of both traditional and alternative teaching and learning approaches

[4] Dewey, 2008: 375.

[5] Class music refers to the application of various pedagogical approaches in music teaching, each of which is based on established teaching and learning theories. These approaches, unique in philosophy and teaching process, may involve the use of specialised materials or instruments (Lehmberg, 2012: 2405).

must be discussed in order to present a comprehensive overview. Although this section discusses each teaching and learning approach separately to establish foundational concepts, they are not intended to be mutually exclusive, and later sections showcases how these approaches in tandem could enhance the musical experiences of students and support their learning in music classes.

2.2.1 Traditional teaching approaches in music

Traditional approaches to class music are based on the belief that music can be taught systematically. According to Pozo, Torrado and Alacid (2022: 22), one such approach commonly used in class is direct teaching. According to Usman and Makassar (2022: 11), the direct-teaching approach uses step-by-step teaching to assist students in acquiring fundamental skills and knowledge. In the end, the teacher tells the students what they are supposed to learn, demonstrates to them the new idea or skill, helps them practise with guidance and then enables them to practise on their own, as in instrumental lessons.

Individual or group instrumental lessons are a common lecture-based traditional instrumental teaching approach in which students learn to read sheet music, play scales and gain technical proficiency on various musical instruments (Fung & Groulx, 2012: 1583; Pozo, Torrado & Alacid, 2022: 22). It allows students to receive guidance from an experienced teacher on musical score decoding and technical control of an instrument (Pozo, Torrado & Alacid, 2022: 22). Students can gradually improve their technical skills, musical expression and overall musicianship by practising regularly and receiving feedback.

Traditional teaching also relies on listening exercises to expose students to a variety of musical styles and genres. Students analyse the elements, historical context and cultural significance through discussions and reflections. According to Thomas (2015), active participation in listening exercises improves advanced listening skills and deepens knowledge acquisition. Analysing musical elements and interpreting emotions improves critical thinking and broadens genre understanding. While listening exercises improve critical thinking and genre understanding, ensemble playing promotes collaboration.

Students can improve their ensemble skills by taking part in conductor-led group rehearsals, such as those for choirs, orchestras or bands. According to Slette (2018: 1), ensemble playing fosters cooperative problem-solving and enhances listening skills. During rehearsals, musicians use visual, auditory and verbal signals to achieve synchronisation (Williamon, 2004: 105–122), which contributes to their musical and social development in a collaborative setting.

Choral singing, an extension of ensemble teaching, provides students with an additional opportunity to develop their musical and social skills. Choral teaching specifically teaches vocal techniques, harmonies and sight-reading through group singing sessions, increasing students' self-confidence, motivation and language skills (Lynch, 2021; Davies, 2022). According to Davies (2022), choral sight-reading provides a low-pressure, supportive environment for all students to practise and it encourages engagement, particularly among the less proficient students.

Understanding the advantages of choral singing for students' musical and social skills development opens the door to experimenting with different teaching approaches. The Kodály Approach is one such approach on which many music education curricula are based. Highlighting this approach offers deeper insight into the successful implementation of the concepts discussed.

In the 1920s, Zoltan Kodály introduced the Kodály Approach in Hungary, which he later formalised in 1945 (Lehmberg, 2012: 2406; Coetzer, 2019: 2–8). Kodály was a firm believer in the universality of music as a language and emphasised singing as its fundamental foundation. To improve students' musical skills, the approach incorporates techniques such as solfège, sight-singing and melodic and rhythmic dictation (Lehmberg, 2012: 2406; Coetzer, 2019: 2–8). Activities involving rhythmic syllables and movement contribute to effective learning, while the approach also fosters aural skills, cultural understanding, language acquisition and motivation (Kumar et al, 2022: 2). Students can improve their understanding of patterns and intervals by practising solfège singing with syllables such as Doh, Re and Mi. The Kodály Approach incorporates traditional folk and art songs, gradually introducing musical notation to students after they have become acquainted with the material. Its goal is to promote joyful and lifelong class music, with teachers playing a vital role in identifying and nurturing students' musical potential (Lehmberg, 2012: 2406). Having explored the

intricacies of the Kodály Approach, it is beneficial to consider another influential class music approach that arose during the same period, known as the Orff Approach.

The Kodály and Orff Approaches developed by Carl Orff and Gunild Keetman are similar in several ways. Both approaches include singing, rhythmic movement, improvisation, composition and music appreciation, providing students with a comprehensive immersive music-learning experience (Lehmberg, 2012: 2406; Coetzer, 2019: 2–8). The Orff Approach teaches nursery rhymes, chants, games and folk songs to students in three stages. According to Herbst (2011: 2–30), these include the exploration of space through movement, sound exploration through voice and instruments and musical form exploration through improvisation. To develop their musical skills, students participate in ensemble plays by imitating the teacher's singing, movement or playing of Orff instruments. Orff's elemental music concept emphasises the unity of music with movement, dance and speech, which are based on small-scale patterns. Schulwerk taps into children's musicality by using the way they play and their natural musical abilities. It encourages children of all skill levels to make music with their hands. The Orff Instrumentation was devised so that children could easily play instruments such as recorders, metallophones and glockenspiels. Overall, Orff Schulwerk creates a calm and stress-free environment where children can learn and play with music (Lehmberg, 2012: 2406; Coetzer, 2019: 2–8). The following section discusses Emile-Jacques Dalcroze's eurhythmics, an approach that combines movement, rhythm and musical expression.

Dalcroze, a Swiss teacher, is renowned for his traditional teaching approach known as eurhythmics, which combines movement, rhythm and musical expression to develop cognitive and kinesthetic awareness (Lehmberg, 2012: 2405; Coetzer, 2019: 2–9). His philosophy emphasises the integration of mind, body and emotions in meaningful learning, drawing inspiration from Plato's concept of education, which encompasses both the body and the soul. By focusing on the movement of the whole body, this approach enhances musical skills and aids in the acquisition of new knowledge. It is based on three key aspects of music: rhythm, solfège and improvisation, which are combined to develop students' auditory musical skills. Through body movements, students can effectively express various musical elements. The approach incorporates ear training, improvisation and eurhythmics to enhance musicality and comprehension.

The Dalcroze Approach fosters simultaneous listening and response to music, creating an immersive and engaging learning experience (Lehmberg, 2012: 2405; Coetzer, 2019: 2–9). The approach that follows focuses on early class music, introducing young students to the violin through listening, imitation and repetition – the Suzuki Approach.

Shinichi Suzuki, a Japanese violinist and teacher, developed the Suzuki Approach to introduce young students to the violin and bring the beauty of music into their lives (Lehmberg, 2012: 2407; Coetzer, 2019: 2–10). Suzuki believed that children as young as five could learn a new ‘language’ and emphasised the importance of early music education in developing their talent. This approach incorporates listening, imitation and repetition to foster musical development. Students begin by listening extensively to recordings of the music they will learn, developing an aural understanding of the pieces. Through imitation and repetition, they gradually acquire technical skills and musical expression. The Suzuki Approach emphasises the role of parents in the learning process, creating a nurturing and supportive environment for children's musical development. The approach is characterised by a positive and encouraging teaching style, fostering a love for music and nurturing each child's potential (Lehmberg, 2012: 2407; Coetzer, 2019: 2–10).

In conclusion, traditional teaching approaches in class encompass various approaches such as the Kodály Approach, the Orff Approach, the Dalcroze Approach and the Suzuki Approach, each with its own unique philosophy and approaches. These approaches have significantly influenced class music, promoted the holistic development of students' musical abilities and fostered a lifelong appreciation and understanding of music. The following section investigates traditional learning approaches in class music, providing as it does an understanding of the current considerations surrounding traditional teaching approaches.

2.2.2 Traditional learning approaches in music

Traditional learning approaches are founded on behaviourist theories, which were developed by prominent psychologists, including Ivan Pavlov, Burrhus Frederic Skinner and Edward Thorndike. For instance, Pavlov's contributions have been pivotal to the field. According to Pavlov (1927), his revolutionary experiments demonstrated how reflexive responses could be conditioned by associating a neutral stimulus with

an unconditioned one, in this way establishing the foundation for what we now term ‘classical conditioning’.

Pavlovian conditioning is another name for classical conditioning. According to Cherry (2023), this is an automatic learning process that operates through the association of various stimuli. It begins when an unconditioned stimulus triggers a natural response, which is then paired with a neutral stimulus. In a practical class music setting, a teacher might play a specific tune (neutral stimulus) before a fun activity (unconditioned stimulus). Over time, students may associate the tune with the fun activity, creating a positive response that can lead to a more enjoyable and effective learning experience.

Subsequent psychologists, including Skinner and Thorndike, expanded on Pavlov's framework. According to Main (2023), Skinner developed a theory arguing that our behaviours are chiefly moulded by reinforcements. Reinforcements can be positive (rewards) or negative (penalties), which respectively encourage or discourage certain behaviours. In parallel, according to Evans (2022), Thorndike's theory, centred on operant conditioning, emphasises the idea that learning occurs because of the consequences of our actions.

In traditional ways of learning, the teacher is the main source of information. This information is usually shared through lessons or direct teaching. According to Muganga and Ssenkusu (2019: 32), this approach, which includes teacher-led lesson content and classroom activities, is still prevalent in education today. However, Pozo, Torrado and Alacid (2022: 35) contend that this approach frequently relegates students to a more passive role in the learning process. Passive learning is a learning approach in which students primarily receive information rather than actively participate in knowledge construction. According to Webb (2012: 2783), this approach is common in class music. Despite the reduced level of active participation from the students, this approach ensures that all students receive the same skills and knowledge, providing a uniform learning experience.

Behaviourist theory provides useful approaches for improving learning in classroom music settings. According to Lefrançois (1999: 50), behaviourist theory supports rote learning. Lazaric (2012: 2899) defines rote learning as the practice of repeatedly memorising information rather than learning it for the first time. This approach is

particularly useful in class music contexts, where students must remember sequences of notes, musical patterns or rhythms. By repeatedly rehearsing these patterns, they become ingrained in memory, which enhances their musical recall skills.

Positive reinforcement is an important tool in behaviourist learning theory because it encourages the practise or maintenance of certain behaviours through praise or rewards. According to Adamek, Darrow and Jellison (2015: 29–37), it is particularly effective in class music, where teachers might praise a student for accurately playing a piece or demonstrating improved performance. An example might be a teacher commending a student for mastering a difficult piece, therefore promoting further practice and improvement.

In conclusion, traditional learning approaches emphasise conditioning and reinforcements in shaping behaviour, based on behaviourist theories from psychologists such as Pavlov, Skinner and Thorndike. These theories find practical application in class music, where approaches such as passive and rote learning are used. Despite the potential passivity, the strategic application of approaches such as positive reinforcement and the practical application of classical conditioning improve students' motivation, skills acquisition and memory. While these approaches provide a solid framework for teaching and learning in class music, they also have specific advantages, which I discuss in the following section.

2.2.3 Advantages of traditional teaching and learning approaches in music

Traditional teaching and learning approaches have been the foundation of education systems around the world for centuries. Despite the rapid advent of digital and interactive teaching approaches, these traditional approaches continue to hold significant value. This holds true especially in the field of music education, where these tried-and-tested approaches foster a structured and systematic learning environment. In this section, I discuss the advantages of traditional teaching and learning approaches in class music settings.

Traditional teaching and learning approaches provide a structured environment that aids systematic learning. According to Joshi (2022), this structured learning approach allows for gradual progress and development, which is particularly suitable for subjects such as music. In a classroom setting, for instance, a music lesson might begin with

foundational music theory, progress gradually to sight-reading and, finally, include complex composition. This systematic learning approach equips students with a comprehensive understanding of each element, enhancing their overall musical capabilities.

Another advantage of the traditional teaching approaches is their uniformity. According to Webb (2012: 2783), these approaches ensure that all students are exposed to the same content, resulting in a consistent learning experience. In a class music setting, all the students would learn the same scales, music theory and historical context, ensuring an equal opportunity for all to excel.

Discipline and regular practice are integral aspects of the traditional teaching and learning approaches. According to Pozo, Torrado and Alacid (2022), these traditional approaches prompt students to practise consistently. In the context of a music class, this discipline could take the form of daily practice sessions. These consistent efforts contribute to the ongoing development and enhancement of a student's musical capabilities and comprehension of the subject.

Rote learning, often associated with traditional teaching approaches, promotes mastery through repetition. According to Lazaric (2012: 2899), students repeatedly practise sequences of notes, musical patterns or rhythms until they become second nature. In a class music setting, repetition could involve playing the same piece until the student has mastered it, providing a strong foundation for further musical exploration.

Traditional teaching approaches also use positive reinforcement to encourage student progress. According to Adamek, Darrow and Jellison (2015: 29–37), teachers can use praise or rewards to encourage the practice and improvement of musical skills. In class music, this reinforcement could take the form of applause after a well-played piece, providing motivation for students to continue on their musical journey.

The enhancement of listening and critical thinking skills is another advantage. According to Thomas (2015), listening exercises used in traditional teaching approaches promote advanced listening skills. Analysing musical elements and interpreting emotions improves critical thinking and broadens the understanding of genre. In a class music setting, students might be encouraged to listen to and analyse

a variety of compositions, deepening their understanding of musical structure and form while also refining their critical listening skills.

Traditional teaching approaches, such as ensemble playing, which encourages cooperative problem-solving and improves listening skills, also foster collaboration and social skills. According to Slette (2018), this contributes to musical and social development in a collaborative setting. For example, in class music, students might participate in a school band or choir, developing valuable social skills and learning to work together to create harmonious music.

Individual or group instrumental lessons can help students to enhance their technical skills and overall musicianship. According to Pozo, Torrado and Alacid (2022: 22), these lessons provide students with individual feedback on their performance. An example from a class music setting could involve a teacher offering specific advice on a student's rhythm or timing during a group performance, enabling the student to refine these areas in future practice sessions. Thus, this approach promotes continual, personalised musical growth.

The traditional approach to teaching in class music supports a variety of successful pedagogical approaches, such as the Kodály, Orff, Dalcroze and Suzuki approaches. According to Lehmberg (2012: 2406) and Coetzer (2019: 2–10), these unique approaches, each with their own unique philosophy, can promote the holistic development of students' musical abilities and foster a lifelong appreciation of music.

Eurhythmics, a traditional approach combining movement, rhythm and musical expression, fosters simultaneous listening and response to music. According to Lehmberg (2012: 2405) and Coetzer (2019: 2–9), this approach creates an immersive and engaging learning experience that enhances musicality and comprehension. Students can participate in eurythmic activities in class music, enhancing their understanding of rhythm and musicality while creating a deeper connection between movement and sound.

The Suzuki Approach, an approach that nurtures potential and fosters a love for music, creates a supportive environment for children's musical development. According to Lehmberg (2012: 2407) and Coetzer (2019: 2–10), this approach nurtures each child's potential and fosters a love for music. In a class music setting, the implementation of

the Suzuki Approach would provide students with a nurturing learning environment, one that fosters their musical development and inherent love for music.

In conclusion, traditional teaching and learning approaches offer numerous advantages for class music settings. They provide a structured and systematic approach that ensures uniform knowledge dissemination, promotes mastery through repetition and reinforcement, enhances critical thinking and social skills, and nurtures each student's potential and love for music. Despite the advent of newer, more interactive teaching approaches, the advantages of traditional teaching and learning approaches remain relevant and valuable in class music settings.

2.2.4 Disadvantages of traditional teaching and learning approaches in music

Traditional teaching approaches, despite their longevity, carry several disadvantages, which are particularly evident in class music. These approaches, which frequently promote passive learning, limit creativity and exclude modern resources, can hinder personalised learning experiences. In this section, I highlight the need for a reform of these ingrained practices in class music by discussing a few of their disadvantages.

Traditional teaching is based on learning that is centred on the teacher. This means that teachers are frequently the primary individuals who instruct students, leaving the students with primarily passive roles. According to Muganga and Ssenkusu (2019: 32), and Pozo, Torrado and Alacid (2022: 35), this approach is prone to several problems. For example, in a music class, if students are simply told how to play a musical piece without engaging in discussions about its structure or history, this can lead to a lack of critical thinking (Webb, 2012: 2783). Furthermore, if the approach does not correspond to a student's learning preferences – for example, an auditory student may struggle with sheet music – it may lead to unequal engagement.

Traditional teaching approaches, which rely heavily on direct teaching, are not without their own set of problems. These approaches could be beneficial in laying down the fundamental skills of music, such as learning how to read sheet music or play basic chords on a guitar. However, Kährik, Leijen and Kivestu (2012) and Usman and Makassar (2022: 11) note that this approach might hinder creativity and personal expression. For instance, if students are always directed to play music as it is written,

they might not be given the opportunity to explore their own interpretations or compose their own pieces, which could limit their musical development.

Rote learning, another aspect of traditional teaching approaches, presents its own disadvantages. According to Lazaric (2012: 2899), it can assist in memorising sequences of notes, which could be helpful for beginners learning a new piece. However, over-reliance on this approach might hinder students from understanding and appreciating the underlying concepts of music. For instance, if a student is instructed to simply memorise a Beethoven piece without understanding the thematic development, tonal changes or historical context, their appreciation of the complexity of the composition could be lost. Lazaric (2012) states students may also struggle when attempting to apply rote-learning knowledge to real-world scenarios. These approaches may not adequately develop the imagination, diverse memory approaches and physical intelligence, resulting in limited individual expression and creativity in musical performance.

Behaviourist approaches that focus on reinforcements and conditioning also have their disadvantages. Statements of such approaches by Main (2023) and Evans (2022) indicate that the outcome could be superficial learning. A student may learn to play a piece flawlessly to receive a reward or praise, but this could result in a lack of intrinsic motivation. For example, a student might practise a piano piece diligently for a recital to win their teacher’s or parents’ approval but may not enjoy the process or continue practising after the event.

Another disadvantage of the traditional approach is the lack of technological integration. Despite the increasing importance of technology in the classroom, Clauhs, Franco and Cremata (2019: 56) report that traditional class music still relies heavily on face-to-face teaching. This approach typically relies on handwritten notes, assignments and examinations (Joshi, 2022). Students may be limited to using pencil and paper to compose music or record performances rather than digital platforms. This may limit their exposure to modern tools and platforms, which could be invaluable in today's music classes.

Traditional teaching can also be rigid in its curriculum and approach, adhering to approved textbooks and standardised lessons. According to Joshi (2022), this may

make it difficult to tailor lessons to each student's specific needs, interests or cultural background. For instance, a curriculum focused on Western classical music might not cater to students interested in exploring non-Western music genres. Holley (2017) states that focusing on a few well-known pieces leaves other genres unexplored, potentially limiting or prejudicing students' understanding of the music world.

The potential lack of cultural diversity in traditional class music is a significant disadvantage. Savage (2019: 1–12) and Webb and Bracknell (2021: 71–86) argue that over-emphasising Western classical music in traditional teaching approaches risks marginalising diverse musical traditions. This emphasises the importance of incorporating diverse cultural perspectives and fostering an inclusive and equitable learning environment in the music class.

Improvisation skills are also often overlooked in traditional teaching approaches, which is yet another a significant disadvantage. According to Larsson and Georgii-Hemming (2018: 49), the emphasis on technical skills and well-known repertoires may hinder the development of students' creative talents. This suggests a need for a shift from traditional approaches to cultivate the creative potential in music students and engage them with the improvisational nature of various music genres.

Ensemble and choral teaching, while beneficial for improving musical and social skills, also present disadvantages. It is possible that the approaches offered by Slette (2018: 1), Lynch (2021) and Davies (2022) do not pay close enough attention to each student's specific requirements for learning and development. For example, a shy student might find it hard to voice their struggles with a part of a piece when rehearsing in a choir due to the fear of slowing down the group.

While the approaches of Kodály, Orff, Dalcroze and Suzuki, as described by Lehmberg (2012: 2406) and Coetzer (2019: 2–10), provide advantages for class music, they may not cater to each student's unique student preference. According to Lindner and Schwab's (2020: 10) definition of inclusive education, it is critical to accommodate all students' diverse content consumption, interaction, and creation and presentation preferences. Furthermore, the effectiveness of these approaches is dependent on the presence of teachers who have been specifically trained in them. For example, rural schools frequently face a shortage of such specialised teachers, limiting students'

access to these pedagogical techniques. Finally, despite their inherent advantages, these approaches may fall short of expectations regarding inclusivity and practicability due to their limited adaptability and reliance on specialised teaching expertise.

Finally, limited accessibility to musical instruments poses a significant challenge in traditional music teaching. As described by Fung and Groulx (2012: 1583), and Pozo, Torrado and Alacid (2022: 22), traditional approaches such as individual or group instrumental lessons might be accessible only to those with specific resources. A student from a lower socio-economic background, for example, might not have access to a violin or a piano, making it difficult for them to participate fully in lessons or to practise at home.

In conclusion, traditional approaches to class music, though rooted in established practices, contain several disadvantages that may hinder optimal learning experiences. These approaches frequently promote passive learning, limit creative potential and fail to accommodate the full range of individual learning preferences. In addition, they frequently lack the integration of modern technological resources and may neglect the significance of diversity in music and cultural representation. The inherent rigidity of these approaches discourages student-centred approaches and makes it difficult to tailor the curriculum to each student's individual needs and interests. Moreover, these approaches tend to marginalise improvisational skills, overlook individual student needs in ensemble and choral teaching, and present accessibility challenges, particularly for previously disadvantaged students. Hence, there is a critical need to shift from these traditional approaches in class music towards more progressive, inclusive and personalised approaches that better align with current pedagogical perspectives and meet the varying needs of modern students.

2.2.5 Alternative teaching approaches in music

In the ever-evolving landscape of music education, significant challenges have come to the fore (López-Íñiguez, Pozo & Pérez Echeverría, 2022: 4). Traditional teaching approaches may no longer adequately prepare students for the demands of the 21st century (Lópes-Íñigues, Pozo & Pérez Echeverría, 2022). To respond these challenges, alternative teaching approaches have gained prominence, including differentiated teaching, personalised teaching and multimodal teaching, all of which

are underpinned by the enduring principles of Barak Rosenshine (Bačlija Sušić & Županić Benić, 2017: 6749). In addition, the flipped-classroom approach emerges as a promising solution to integrate innovative teaching approaches into traditional curricula, empowering students with self-directed learning opportunities and fostering collaborative engagement (Torrado, Echeverría & Pozo, 2022: 261–274). I now explore these alternative teaching approaches and their potential to reshape music education, equipping students with the skills and motivation needed for lifelong learning and a profound appreciation of music.

2.2.5.1 Differentiated teaching

Differentiated teaching in the context of music education is a dynamic approach that tailors instruction to meet the distinct needs, interests and abilities of individual students. According to Tomlinson (2001), it encompasses a holistic perspective on teaching and learning, emphasising the importance of affirming each student's uniqueness while facilitating their growth and development. In class music, differentiated teaching proves its worth by helping students to engage with music in ways that resonate with their personal learning preferences and foster their musical potential and enjoyment. According to Adamek, Darrow and Jellison (2015: 29–37), it transcends the boundaries of background, ability or preference and significantly enhances the learning experiences and outcomes of all students.

In various musical settings and scenarios such as music ensembles differentiated teaching approaches find practical application. According to Darrow (2012: 41–43), teachers can implement differentiation by offering students music parts or arrangements that align with their skill level and interests, allowing students to choose their preferred instruments or vocal roles, and diversifying teaching approaches, including direct instruction, peer tutoring, cooperative learning or self-directed exploration. At its core, differentiated teaching in music education celebrates and respects the diverse identities and talents present in music classrooms. Its implementation not only enhances the quality and effectiveness of music instruction but also ensures that every student can progress towards their musical aspirations, nurturing a lifelong love for music.

2.2.5.2 Personalised teaching

Offering personalised teaching and accommodating diverse student learning preferences proves to be an effective approach to supporting student learning and ensuring equal advantages for success in class music. By providing personalised teaching, teachers can achieve multiple benefits. According to Shaw (2016: 45), this approach helps students to feel more engaged, motivated and supported in their learning journey and fosters a deeper sense of connection with and investment in the subject-matter. Moreover, by recognising and valuing the diverse needs and strengths of all students, teachers contribute to creating a more inclusive and equitable learning environment that promotes student success and achievement.

2.2.5.3 Multimodal teaching

Multimodal teaching in class music is an approach that uses multiple modes of communication and representation to enhance learning. Modes are the ways of expressing and interpreting meaning, such as language, image, gesture, sound and music (Tomlinson, 2001: 2). One of the early pioneers of multimodal teaching in class music was Carl Orff, who developed an approach that integrated music, movement, speech and drama. Orff believed that children learn best through active exploration and improvisation, using various musical instruments, body percussion, vocalisation and storytelling (AOSA, 2013).

Multimodal teaching is important in the 21st century because it reflects the diverse and dynamic ways of communication and expression in the digital age. It can also foster creativity, collaboration, critical thinking and problem-solving skills that are essential to lifelong learning (Tomlinson, 2001: 2). One of the tools that can support multimodal teaching in class music is social media. Social media platforms such as YouTube, Facebook, Instagram and TikTok allow students to create, share and consume multimodal content related to music.

2.2.5.4 Rosenshine's teaching principles

American teaching researcher Barak Rosenshine, a professor at the University of Illinois at Urbana-Champaign, is well known for his contributions to the field of education. The areas of teaching design and the improvement of efficient teaching

approaches are where Rosenshine's influence is most apparent. According to his research, he has formulated ten essential teaching principles, a result that has demonstrated a significant capacity to enhance the learning outcomes of students. These principles have been widely adopted by teachers all over the world, and they have been instrumental in guiding their teaching approaches and, as a result, in fostering improvements in student-learning outcomes (Rosenshine, 2010: 1.32, 2012: 12–39; Sherrington, 2019).

Rosenshine's teaching principles are based on three types of research: cognitive science, master teachers' classroom practices and studies that instruct students in learning approaches. The ten principles are as follows:

(1) Begin a lesson with a short review of previous learning.
(2) Present new material in small steps with student practise after each step.
(3) Ask a large number of questions and check the responses of all students.
(4) Provide models, examples, and non-examples of the concepts and skills.
(5) Guide student practise.
(6) Check for student understanding.
(7) Obtain a high success rate.
(8) Provide scaffolds for difficult tasks.
(9) Require and monitor independent practise.
(10) Engage students in weekly and monthly review.

These principles have been shown to be effective in promoting student learning and can be applied in a variety of teaching settings (Rosenshine, 2010: 1.32, 2012: 12–39; Sherrington, 2019).

Rosenshine's teaching principles, rooted in cognitive science and learning approaches, are renowned for their versatility and widespread acceptance in the field of education. According to Rosenshine (2010: 1.32), these principles find practical application in primary education by fostering active student engagement, delivering clear instruction and scaffolding learning tasks. In secondary education (Rosenshine, 2012: 12–39), teachers can employ these principles to nurture critical thinking, encourage independent practice and empower students to monitor their learning progress. In tertiary education, teachers benefit from these principles by designing

effective lessons, offering opportunities for student practice and feedback, and promoting deep learning experiences (Sherrington, 2019). Furthermore, these principles seamlessly adapt to online and blended-learning environments, where technology aids in providing models, examples, feedback and progress monitoring.

2.2.5.5 Flipped-classroom

Implementing alternative teaching approaches in class music presents a significant challenge in integrating them with the formal curriculum and assessment practices. One potential solution, as proposed by Torrado, Echeverría and Pozo (2022: 261–274), is to embrace a flipped-classroom approach. In this approach, students access online materials and engage in activities before the class and then, during the class, they participate in active and collaborative learning under the guidance of the teacher. This way, students can benefit from both self-directed and social-learning experiences in the context of class music.

The flipped-classroom is essentially an educational approach that combines online and offline learning approaches. Students prepare for class by accessing pre-recorded lessons and study materials in advance. Then, during the actual class time, they are involved in hands-on activities and collaborative projects. This approach, as advocated by Peng and Wang (2022: 1–9), and Ng, Ng and Chu (2021: 49–50), can be integrated into the class music environment. It not only fosters a student-centred atmosphere, but also promotes interactive learning, ultimately enhancing students' understanding and appreciation of music.

The flipped-classroom model offers numerous advantages in music education. According to Ng, Ng and Chu (2021: 45–46), it allows students to learn at their own pace by accessing pre-recorded lessons when convenient, preparing them for in-class problem-solving and composition tasks. In addition, as highlighted by Campillo-Ferrer and Miralles-Martínez (2021: 2–3), it fosters engagement and collaboration, in this way improving critical thinking and communication skills.

Teachers can provide personalised support and adapt their teaching approaches by spending more one-on-one time with students. Moreover, the flipped classroom leverages digital tools and resources, offering access to lesson materials and interactive technologies (Peng & Wang, 2022: 1–9; Lv, 2023: 2). In summary, the

flipped-classroom model revolutionises music education by promoting self-directed learning, enhancing teacher–student interactions and using digital resources effectively.

Implementing the flipped-classroom approach for teaching music involves a series of steps. According to Peng and Wang (2022), this approach is crucial to effective implementation. The first step involves establishing the learning objectives and outcomes. This initial phase sets the foundation for targeted teaching and learning.

The second step in this approach is the creation of pre-class activities and materials. These resources, according to Peng and Wang (2022), facilitate student engagement and self-paced learning. Subsequently, the approach requires designing in-class activities and projects, which is the third step. In-class activities, as highlighted by Peng and Wang (2022), promote the application of knowledge and active learning.

The fourth step in this approach centres on providing feedback and assessments. This step is essential, as noted by Peng and Wang (2022), to gauge student progress and understanding. Finally, the fifth step involves evaluating the effectiveness of the flipped-classroom approach, as discussed in the study by Lv (2023).

In conclusion, the exploration of alternative teaching approaches highlights a notable shift in the realm of music education. Traditional teaching approaches are being subjected to increased examination due to their perceived inability to adapt to shifting societal dynamics and adequately equip students with pertinent competencies (López-Íñiguez, Pozo & Pérez Echeverría, 2022). This closer assessment has spurred teachers and researchers to delve into innovative approaches that better align with the demands of the 21st century. In particular, differentiated teaching emerges as a significant alternative, one designed to cater to individual students' needs and cultivate skills such as critical thinking and collaboration (Tomlinson, 2001; Adamek, Darrow & Jellison, 2015). The idea of personalised instruction also emphasises the significance of modifying instruction to consider a variety of student preferences, in this way fostering inclusivity and personalised support.

Integrating multimodal teaching is another noteworthy avenue, capitalising as it does on the diverse modes of communication available in the digital era (Tomlinson, 2001). This approach facilitates more comprehensive and meaningful learning experiences

by incorporating multiple modes of expression. The principles of effective teaching put forward by Rosenshine, based on cognitive science and informed by classroom practises, offer a flexible framework that can be used in a variety of educational contexts (Rosenshine, 2010, 2012). Furthermore, Dweck's (2009) idea of a growth mindset, which fosters traits such as resilience and adaptability that are favourable to lifelong learning, fits well with these principles.

As the following section discusses alternative learning approaches, it is important to note that technology has played a pivotal role in fostering the adoption of the flipped classroom approach. This approach promotes collaborative participation and self-directed learning, allowing students to access materials online before engaging in interactive in-class activities (Ng, Ng & Chu, 2021: 45–64; Torrado, Echeverría & Pozo, 2022: 261–274).

2.2.6 Alternative learning approaches in music

The landscape of education is undergoing a transformative shift, gradually moving away from traditional teaching and learning approaches. In this evolving educational paradigm, diverse student learning preferences are taking centre stage, with approaches such as active, brain-based, experiential, project-based, culturally responsive, personalised, self-directed, multimodal and interdisciplinary learning carving their distinct niches.

Each of these alternative learning approaches represents a unique way to engage and educate students, catering to their multifaceted needs. These approaches, which range from cultivating a growth mindset, as advocated by psychologist Carol S Dweck, to embracing experiential learning principles as advocated by John Dewey, offer a rich tapestry of teaching possibilities. By exploring and implementing these alternative learning approaches, teachers can empower students with dynamic tools that inspire a lifelong love for music and foster comprehensive learning.

2.2.6.1 Growth mindset

Carol S Dweck, a prominent psychologist, introduced the concept of a growth mindset, underscoring the expansion of abilities through diligent effort. Embracing a growth mindset leads to increased resilience, adaptability and success (Matthews, 2007: 1–

9). Dweck (2009) provides practical insights into cultivating this mindset, advocating the view that challenges offer opportunities for growth, that learning from setbacks and failures is essential, and that prioritising the learning process over immediate outcomes is key. Her concept underscores the significance of effort in skill and intelligence development. This perspective resonates with the principles of the flipped-classroom approach, which fosters proactive learning and resilience (Dweck, 2009: 4; Torrado, Echeverría & Pozo 2022: 261–274).

Measuring the characteristics associated with a growth mindset is a feasible endeavour. Dweck (2009: 1–2) is of the opinion that individuals who value learning over grades tend to engage in effective study habits, adept time management and sustained motivation. Dweck's research provides tangible evidence of these traits, which are indicative of a growth mindset. To nurture this mindset among students, teachers can take several steps. As Dweck (2009: 2–4) suggests, introducing the concept is the initial essential step. Moreover, the effectiveness of resources such as Brainology which enlighten students about the brain's potential and adaptability cannot be understated. In addition, Dweck advocates that effort be praised over innate talent, and providing constructive feedback and creating a classroom environment that cherishes learning and growth.

In consonance with resilience and adaptability, the growth mindset aligns closely with another educational concept: the flipped-classroom approach. This approach champions proactive learning and places a premium on valuing the learning process (Torrado, Echeverría & Pozo, 2022: 261–274). Both concepts stress the importance of putting in effort, nurturing proactive attitudes and developing resilience. Collectively, they share a common objective: to enhance adaptability and resilience in students (Dweck, 2009: 4; Torrado, Echeverría & Pozo, 2022: 261–274).

2.2.6.2 Active learning

Active learning is a teaching approach that positions students at the heart of their learning journey and it has been shaped and influenced by the insights of visionary pioneers throughout history. From the philosophical perspectives of John Dewey (1859–1952) to the sociocultural theories of Lev Vygotsky (1896–1934), the constructivist framework of Jean Piaget (1896–1980), the cognitive contributions of

Jerome Bruner (1915–2016), the transformative ideas of Paulo Freire (1921–1997) and the student-centred philosophy of Carl Rogers (1902–1987), active learning has drawn inspiration from these notable figures. Collectively, these thinkers have paved the way for modern teachers and researchers to cultivate environments in which students become active participants in their learning, engaging with material through experience, collaboration and critical thinking.

Implementing active learning approaches in the music classroom can help students to engage more deeply with the material and develop a better understanding of the concepts being taught. Thomas (2015) found that interactive lessons and student-led discussions are particularly effective approaches to promoting active learning in class music. Interactive lessons involve engaging students in a dialogue with the teacher, asking questions and providing opportunities to share their perspectives and experiences. This approach can help students to feel more invested in the learning process and facilitate the transfer of knowledge from the teacher to the student. Thomas (2015) also suggests that student-led discussions encourage students to take on more responsibility for their learning by actively participating in discussions, debating ideas and sharing their own insights. By doing so, they can learn from one another and develop critical-thinking and communication skills that are valuable both inside and outside of the classroom.

2.2.6.3 Personalised learning

Personalised learning is an alternative teaching approach that aims to tailor teaching to the unique needs and interests of individual students (Shemshack & Spector, 2020: 2). This approach recognises that each student has their own learning preference, pace and level of understanding and seeks to accommodate these differences through flexible and adaptive teaching (Lindner & Schwab, 2020: 2). Through personalised learning, students are given more autonomy and control over their learning, which allows them to focus on areas where they need the most support and to progress at their own pace (Shemshack & Spector, 2020: 3). This can result in a more efficient and effective learning experience, as students are able to work at a level that is challenging but not overwhelming (Lindner & Schwab, 2020: 2).

Research has also shown that personalised learning can lead to improved academic outcomes and increased student engagement (Shemshack & Spector, 2020: 3). By providing students with more choice and control over their learning, they are more likely to be motivated and invested in the process (Lindner & Schwab, 2020: 3). O, addition, personalised learning can help to promote equity and inclusivity in the classroom, because it allows for the needs of individual students to be responded to in a way that is culturally responsive and sensitive to diverse backgrounds and learning needs (Shemshack & Spector, 2020: 3). Overall, personalised learning is a powerful tool for promoting student learning and creating more positive and effective learning environments (Lindner & Schwab, 2020: 3).

2.2.6.4 Brain-based learning

The endorsement of brain-based learning by Dr Eric Jensen represents the blending of neuroscience and education. With a pragmatic orientation, Jensen's work empowers teachers to harness the brain's inherent processes for optimal learning results. Through his impactful books, he steers a revolutionary approach that acknowledges varied student learning preferences and underscores the interplay between emotions, stress and cognitive faculties (Jensen, 2008; Jensen & Mcconchie, 2020).

Brain-based learning is a teaching approach that leverages knowledge of how the brain works to enhance the learning process. It recognises that the brain is the primary organ for learning and that effective learning occurs when teaching is tailored to the way the brain naturally processes information (Fleur, Bredeweg & Van den Bos, 2021: 1–11). To this end, brain-based learning considers the cognitive, emotional and social aspects of learning, creating an environment that fosters engagement and retention According to Van Duijvenvoorde et al (2022: 2), experience-dependent learning can contribute to brain development by modulating brain connectivity, activation or structure. They argue that it is important to differentiate between experience-independent maturational processes and experience-dependent learning in cognitive domains. They also suggest that methodological approaches and research designs that bridge brain and behavioural research on learning may help to unravel questions about learning interventions, computations and difficulties. While the article does not specifically discuss music education, it notes that learning a new skill or acquiring knowledge can

have an impact on the brain structure and function, which may be relevant to the study of music and its effects on the developing brain.

The brain-based approach employs a range of teaching approaches that support brain functioning. According to Marope (2016: 187–190), the brain-based approach is a key teaching approach that supports brain function through multisensory teaching, active learning opportunities, movement and novelty in learning experiences. Marope (2016) also emphasises the importance of catering to the needs of individual students to optimise learning outcomes and help students to reach their full potential.

Brain-based learning recognises that the brain is not a passive receiver of information but an active organ that seeks to create meaning from new experiences. By providing learning experiences that are rich in sensory input, meaningful and relevant to student's lives, and which offer opportunities for active engagement, teachers can enhance the brain's natural learning processes (Van Duijvenvoorde et al, 2022: 3). When students feel valued, safe and connected to their learning community, they are more likely to be motivated, engaged and successful students. It is important to note that brain-based learning recognises the active role the brain plays in creating meaning from experiences. This understanding is consistent with experiential learning principles, which emphasise hands-on, real-world experiences as a foundation for effective education.

2.2.6.5 Experiential learning

John Dewey, a pioneering figure in education, advocated experiential learning, aligning education with students' interests and needs (1986: 241–252). Dewey emphasised that education should foster intellectual, social and moral growth, underscoring the importance of reflection to connect theory and practice and develop critical thinking skills. According to Dewey, experiential learning involves concrete engagement, reflection, abstraction and application (Kolb, 1984: 21). Kolb and Kolb (2005: 193–212) explain that experiential learning is rooted in hands-on experience, reflective observation and the practical application of knowledge in authentic settings. This approach is founded on the belief that learning is an active process of enquiry and self-discovery, in contrast to the passive absorption of information.

In the context of music education, experiential learning offers tangible advantages. Students immersed in music can benefit from composing, performing and analysing music in real-world contexts. According to the research of Kolb (1984: 21–38), experiential learning promotes profound and enduring learning outcomes, fostering personal and professional development. Students become more motivated, engaged and satisfied, with an increased ability to transfer knowledge to new situations. Morris (2020: 1–39) proposed an enhanced approach to experiential learning, emphasising contextual experiences, reflective observation, context-specific conceptualisation and practical experimentation. This approach holds promise for designing effective interactive learning environments.

2.2.6.6 Project-based learning

Project-based learning is a learning approach that has gained significant traction due to its potential to enhance student engagement and to cultivate critical thinking skills. According to Kokotsaki, Menzies and Wiggins, (2016: 267–277), project-based learning involves tasking students with projects that necessitate the exploration and application of musical concepts in meaningful and pertinent contexts. These projects range from the composition of musical works or the execution of musical performances to the creation of music-related applications or research into the historical progression of music genres.

Project-based learning enables students to assume responsibility for their learning journey while also fostering collaboration with peers and developing research and presentation skills. According to Almulla (2020: 11), through the incorporation of music into real-world issues and topics, project-based learning provides students with an opportunity to employ their musical skills in a pragmatic and purposeful manner. Almulla notes further that project-based learning enables students to assume responsibility for their learning journey while also fostering collaboration with peers and developing research and presentation skills.

2.2.6.7 Culturally responsive learning

Gloria Ladson-Billings, a pioneer of Culturally Responsive Teaching and Learning, coined the phrase ‘culturally relevant pedagogy’ in 1995. Her definition of multicultural education included the intellectual, social, emotional and political empowerment of

students using cultural references to convey knowledge, skills and attitudes (Ladson-Billings, 1995: 469). Rather than merely integrating diverse musical genres, Ladson-Billings emphasised the need to challenge dominant ideologies and power structures that marginalised and oppressed students of colour experience. She described three criteria for culturally relevant pedagogy: academic achievement, cultural competence and critical consciousness (Ladson-Billings, 1995: 476–481).

In the context of classroom music, culturally responsive learning is an educational approach that seeks to honour, appreciate and celebrate the diversity of cultural backgrounds, experiences and identities. Recognising that music is not just a universal language but rather a cultural and social practice influenced by its creation and performance contexts, culturally responsive learning acknowledges that students have distinct musical learning, expression and communication approaches that are connected to their cultural and linguistic resources. As a result, culturally responsive learning strives to provide class music that holds relevance, meaning and engagement for all students, irrespective of their cultural or ethnic origins (Shaw, 2012: 75, 2016; Barton & Riddle, 2021: 2).

The significance of culturally responsive learning in class music lies in its potential to elevate the quality and equity of music education for all students. By connecting music to their personal, social and cultural lives, culturally responsive learning can nurture students' musical growth, creativity, expression and appreciation. Moreover, it can bolster their sense of belonging, identity and agency by validating their musical cultures and languages as valuable and legitimate sources of knowledge and expression. In addition, culturally responsive learning equips students to become discerning, empathetic citizens capable of understanding, respecting and collaborating with individuals from diverse musical backgrounds and perspectives (Barton & Riddle, 2021: 18–22).

To implement culturally responsive learning in class music, teachers must adopt an interdisciplinary and all-encompassing approach that integrates music with other disciplines and contexts of knowledge. One viable approach is experiential learning via ‘interdisciplinary units’, defined as learning experiences requiring students to apply the knowledge and skills from various subjects to solve genuine problems or create meaningful projects (Nieto & Bode, 2018: 346). Shaw (2012: 75–81) promotes a

culturally responsive approach to classroom music by advocating repertoire selection that reflects students' diverse backgrounds, interests and global musical traditions. Such an approach can enrich students' musical encounters, broaden their musical comprehension and kindle creativity and self-expression in their musical pursuits.

2.2.6.8 Multimodal learning

The digital age has brought about new opportunities and challenges for education, as students are exposed to a variety of modes and media for accessing and creating knowledge. According to Philippe et al (2020: 4220–423) and Yeo and Nielsen (2020: 2), multimodal learning is a pedagogical approach that recognises the diversity of students' learning preferences and needs and leverages multiple modes of representation and expression to enhance learning outcomes. Multimodal learning involves the use of different types of resource and different media, such as video, audio, images and interactive activities, to facilitate learning. These resources and media can help students to connect with the content in a more personalised and meaningful way and develop skills and approaches for navigating, communicating and collaborating in the digital world.

Multimodal learning can also support students who struggle with traditional learning (Philippe et al, 2020: 423; Yeo & Nielsen, 2020: 4). Traditional learning may focus mainly on textbooks and classroom lessons, which may limit students' opportunities to explore and create knowledge in different modes and contexts. By incorporating multimodal learning, students are provided with a more diverse and interactive learning experience, which can increase their motivation, engagement and understanding of the content (Philippe et al, 2020: 436; Ryoo & Winkelmann, 2021: 52). Multimodal learning can also be used in conjunction with interdisciplinary learning to provide students with a more comprehensive and well-rounded education.

2.2.6.9 Interdisciplinary learning

Interdisciplinary learning, a contemporary approach to education, integrates insights and approaches from multiple academic disciplines to establish a unified and coherent learning journey. According to Weller (2021), this approach contrasts with conventional ones that segregate subjects such as maths, science or language and instead aims to connect concepts across diverse domains. This holistic approach facilitates students'

recognition of the practical applicability of their studies, enhancing engagement and comprehension as a result.

The practical advantages of interdisciplinary learning become apparent as students prepare themselves for future careers and navigate global complexities. According to Pareek (2023), interdisciplinary learning entails combining insights from various disciplines, allowing students to build a comprehensive understanding of the world and acquire versatile skills tailored to dealing with complex issues. This approach provides students with the ability to navigate challenges effectively in a variety of fields, positioning them to excel in a job market and global landscape marked by rapid change. Therefore, the incorporation of interdisciplinary learning not only improves students' adaptability but also synchronises their education with the needs of a constantly changing world, supporting its rising prominence in modern education.

In conclusion, the evolving landscape of education is witnessing a remarkable shift towards alternative learning approaches that prioritise the diverse needs and preferences of students. This transformation has been driven by visionary teachers and researchers who have advocated learning approaches such as growth mindset, active learning, personalised learning, self-directed learning, brain-based learning, experiential learning, project-based learning, culturally responsive learning, multimodal learning and interdisciplinary learning. Each of these approaches offers a unique lens through which to view education and provides valuable tools with which to empower students on their learning journeys.

The concept of a growth mindset, introduced by psychologist Carol S Dweck, underscores the importance of perseverance, effort and embracing challenges as opportunities for growth. This mindset aligns with the principles of active learning, which position students at the centre of their educational experiences, promoting engagement and critical thinking. Personalised learning recognises that each student is unique and it seeks to tailor education to individual needs, fostering motivation and inclusivity. Self-directed learning empowers students to take control of their learning, cultivating essential skills for lifelong learning and adaptability.

Brain-based learning delves into the science of how the brain processes information, offering insights into creating effective learning environments. Experiential learning

encourages students to engage actively with the material through hands-on experiences, connecting theory with practice. Project-based learning immerses students in real-world tasks, promoting collaboration and problem-solving skills. Culturally responsive learning acknowledges the importance of cultural diversity in education and strives to create inclusive environments that validate students' cultural identities.

Multimodal learning harnesses the power of digital resources and various modes of representation to enhance learning outcomes, catering to students' diverse preferences. Finally, interdisciplinary learning transcends traditional subject boundaries, encouraging students to synthesise knowledge from multiple disciplines and foster critical thinking and creativity.

These alternative learning approaches collectively represent a paradigm shift in education, one that seeks to empower students with the skills, mindset and adaptability needed to excel in an ever-changing world. As teachers and researchers continue to explore and implement these approaches, the educational landscape stands to become more dynamic, inclusive and effective.

2.2.7 Advantages of alternative teaching and learning approaches in music

Alternative teaching and learning approaches are gaining traction among teachers, aiming to elevate student engagement and outcomes. Lindner and Schwab (2020: 2) note the increasing popularity of approaches such as project-based learning, flipped classrooms and personalised learning. These approaches prioritise active learning, collaboration and critical thinking, diverging from traditional approaches reliant on standardised lessons and rote memorisation (Hirsh et al, 2022: 16).

The advantages of these alternative approaches are significant, encompassing as they do heighten student motivation, improved knowledge retention and the cultivation of essential 21st-century skills such as communication, problem-solving and creativity (Howe & Watson, 2021: 2). Furthermore, by tailoring instruction to individual students' unique needs and interests, teachers are contributing to diversity, inclusivity and equity in the classroom (Lindner & Schwab, 2020: 3). Consequently, teachers are increasingly integrating these alternative approaches into their curricula to better equip students for success in our rapidly evolving world (Howe & Watson, 2021: 3). These

approaches offer a promising path for teachers to engage students, nurture critical skills and establish more equitable learning environments.

Differentiated teaching, a compelling alternative approach, stands as a potent catalyst for student engagement. This approach recognises each student's distinct interests, preferences, and strengths, customising instruction to cater to their individual needs. According to Bačlija Sušić and Županić Benić (2017), this personalised approach not only deepens student engagement but also ignites a heightened enthusiasm for learning. For instance, project-based learning empowers students to work on real-world projects that resonate with their interests, bolstering their intrinsic motivation to learn. In addition, alternative teaching approaches can promote the growth mindset concept, which posits that intelligence and abilities can be developed through effort and practise (Dweck, 2016). Experiential learning, too, fosters a growth mindset by underscoring the value of learning from failures and using feedback for improvement (Cents-Boonstra et al., 2020: 773). By championing a growth mindset and accentuating the importance of effort and practice, alternative teaching approaches have the potential to elevate students' motivation to learn and attain their objectives.

Multimodal teaching creates an environment where students can explore their creative potential by integrating various modes of expression, including music, movement, speech and drama. According to Tomlinson (2001: 2), this approach encourages students to think beyond conventional boundaries and experiment with diverse artistic mediums. For example, Carl Orff's pioneering work demonstrated the benefits of multimodal teaching by incorporating music, movement and storytelling, as a result enhancing students' creativity and engagement (AOSA, 2013).

Personalised teaching empowers students with autonomy over their learning journey, permitting them to select activities aligned with their preferences. Tetzlaff, Schmiedek and Brod (2020: 863–882) affirm that this autonomy fosters a sense of ownership and responsibility among students. When granted the freedom to choose learning paths that resonate with them, students are more likely to take charge of their education. As articulated by Edmondson, Boyer and Artis (2012), self-directed learning empowers students to assume control of their education, nurturing self-awareness and autonomy. This approach encourages students to set goals, monitor progress and make independent decisions, cultivating their sense of responsibility and self-direction.

Likewise, personalised learning enables students to proceed at their own pace, with teachers providing tailored support based on the students' individual learning needs. Educational experts contend that this approach encourages greater autonomy and self-direction as students are urged to take responsibility for their own learning.

In the 21st century, alternative teaching approaches, particularly differentiated teaching, emphasise the development of skills beyond traditional subject-matter. Bačlija Sušić and Županić Benić (2017: 6742–6751) assert that these approaches equip students with essential skills such as critical thinking, problem-solving, communication and intercultural awareness. The research underscores that students acquiring such skills are better prepared for the challenges of a rapidly evolving world.

Alternative approaches, including differentiated and personalised teaching, respond to the diverse learning needs of students, ensuring that every student is accommodated (Adamek, Darrow & Jellison, 2015; Tetzlaff, Schmiedek & Brod, 2020: 863–882). According to Adamek, Darrow and Jellison (2015), this commitment to inclusivity fosters a learning environment in which all students, regardless of their background or abilities, have equal opportunities to thrive. Research substantiates the idea that diverse teaching approaches promote equitable outcomes for all students (Adamek, Darrow & Jellison, 2015).

The flipped classroom approach encourages students to engage with lesson materials before class, facilitating a deeper understanding. According to Torrado, Echeverría and Pozo (2022), this pre-class engagement equips students with a foundational understanding of the content, allowing them to participate actively in more in-depth discussions and collaborative activities during class time. This engagement results in a more profound comprehension of the subject-matter (Torrado, Echeverría & Pozo, 2022: 261–274).

Personalised teaching and the flipped classroom offer the flexibility to cater to students' diverse schedules and learning preferences (Tetzlaff, Schmiedek & Brod, 2020; Ng, Ng & Chu, 2021). According to Ng, Ng and Chu (2021), these alternative approaches provide students with the flexibility to learn at their own pace and according to their individual needs. Such flexibility enhances students' ability to balance their education

with other commitments and optimises their learning experience (Ng, Ng & Chu, 2021: 45–64).

The growth mindset philosophy, which aligns with alternative teaching approaches, promotes the idea of continuous learning. According to Dweck (2009), this mindset encourages students to embrace challenges, put in effort and view setbacks as opportunities for growth. Similarly, Rosenshine's (2010) principles for effective teaching emphasise ongoing learning and adaptation, preparing students for lifelong learning (Dweck, 2009; Rosenshine, 2010).

Personalised learning tailors education to individual needs, equipping students with skills for lifelong learning. According to Shemshack and Spector (2020), students learn to adapt, stay curious and continue learning beyond formal education settings, aligning with the principles of continuous growth advocated by Dweck and Rosenshine.

Multimodal teaching employs various modes of communication, catering to different learning preferences and enhancing engagement. According to Tomlinson (2001), this approach capitalises on the diversity of students' learning preferences, ensuring that everyone can connect with the content. In addition, the flipped classroom's interactive nature encourages collaborative participation, fostering engagement by allowing students to contribute actively to discussions and activities (Torrado, Echeverría & Pozo, 2022: 261–274).

Experiential learning encourages self-reflection and personal growth by involving students in hands-on experiences and reflective observation. According to Kolb (1984), experiential learning involves students in hands-on experiences and reflective observation. This approach enables students to participate actively in learning through direct experiences and encourages them to contemplate these experiences critically. As a result, students develop self-awareness and the ability to evaluate their learning processes; fostering self-awareness and continuous improvement becomes a fundamental aspect of experiential learning, contributing to students' personal growth.

Project-based learning promotes collaboration while students work together on real-world projects (Almulla, 2020). Through teamwork and sharing ideas, students also develop effective communication skills and learn to collaborate with diverse peers.

Multimodal learning employs various media and modes for communication, enriching students' ability to convey ideas effectively. Philippe et al (2020: 421–442) suggest that multimodal learning enhances students' capacity to express ideas effectively by using a variety of communication tools and media. By engaging with diverse resources, students develop skills for navigating and communicating in a multimedia-driven world.

Culturally responsive learning nurtures empathy by acknowledging and valuing diverse backgrounds. As noted by Ladson-Billings (1995), culturally responsive learning emphasises the importance of appreciating different perspectives, in this way enhancing students' cultural awareness and their ability to collaborate effectively in a multicultural society. This approach fosters empathy and a deeper understanding of various cultures and backgrounds.

Experiential learning serves as a catalyst for nurturing critical thinking skills through its immersive hands-on experiences, reflective observation and real-world application, which prompt students to engage in analytical thinking and innovative problem-solving. According to Kolb (1984), experiential learning encourages students to participate actively in learning through direct experiences, fostering analytical thinking and innovative problem-solving in the process. This approach deepens their capacity to dissect and take on issues in authentic contexts, nurturing both critical and creative thought processes.

Similarly, project-based learning cultivates essential problem-solving abilities and adaptability by immersing students in real-world projects, preparing them to navigate challenges, collaborate effectively and innovate in response to dynamic and intricate matters. Kokotsaki, Menzies and Wiggins (2016: 267–277) emphasise that project-based learning equips students with vital problem-solving skills and adaptability by involving them in real-world projects. This experience prepares them to face real challenges, collaborate efficiently and devise innovative solutions in complex situations.

In addition, alternative teaching approaches elevate students' critical thinking skills by providing opportunities for higher-order thinking and problem-solving activities. For instance, project-based learning prompts students to grapple with real-world complexities, fuelling their creativity and critical analysis while devising possible

solutions (Okolie et al, 2021). Alternative teaching approaches can significantly enhance students' information retention by providing interactive and engaging learning experiences. For instance, project-based learning engages students in real-world projects that align with their interests, enabling them to apply learned concepts practically. According to Maros et al (2021: 1–9), project-based learning allows students to apply acquired knowledge actively in real-life scenarios, enhancing their ability to remember and apply what they have learned. Similarly, flipped classrooms combine pre-class video lessons with hands-on activities, fostering multifaceted engagement and self-paced learning. As Almulla (2020: 1–15) suggests, flipped classrooms promote active learning and independent pacing through pre-class video lessons and hands-on activities, contributing to improved information retention. Personalised learning further aids retention by adapting to individual paces and needs. In summary, improved retention through alternative approaches is an essential component of effective education because it fosters a deeper understanding of the material and learning, ultimately positively influencing academic achievements and lifelong success (Kokotsaki, Menzies & Wiggins, 2016: 267–277).

In conclusion, alternative teaching and learning approaches such as the flipped-classroom, project-based learning and personalised instruction are revolutionising the educational landscape. These approaches go beyond conventional rote learning and place an emphasis on inclusivity, critical thinking and active engagement. They help students to develop critical 21st-century skills, deeper knowledge retention and intrinsic motivation. These approaches support equity, give students ownership over their education and foster self-directed learning and adaptability by meeting a range of learning needs. Culturally responsive education promotes empathy and global awareness, whereas multimodal and experiential learning enhance the creativity of critical thinking and problem-solving skills. When combined, these approaches produce a comprehensive student-centred model that equips students for a complex world. As teachers hone these techniques, they promote a more dynamic, inclusive and successful education system, one that underscores the value of creative pedagogy.

2.2.8 Disadvantages of alternative teaching and learning approaches in music

Alternative teaching and learning approaches in music education have numerous advantages, including increased student engagement and better learning outcomes. However, it also brings about technical challenges that teachers must deal with. Implementing differentiated teaching approaches, which involves tailoring instructional materials to individual student needs, presents a valuable opportunity for enhancing learning outcomes. However, it comes with its own set of challenges, as pointed out by Tomlinson (2001). The creation of custom materials demands a significant investment of time and effort from teachers, which can lead to overloaded schedules and potential burnout. To help teachers navigate these challenges effectively, schools should explore approaches that support teachers in managing their workload. By doing so, they can ensure that differentiated teaching remains sustainable and beneficial to both teachers and students.

Teaching approaches that require an array of resources can significantly enhance the learning experience. However, they often encounter disadvantages due to the need for various materials and technology. Bennett (2023) noted that this demand for diverse resources can strain schools with limited budgets, potentially undermining the effectiveness of these teaching approaches. These resource constraints could result in unequal access to educational opportunities among students, impeding the full realisation of these teaching approaches. To resolve this matter, schools should explore avenues for securing adequate resources and funding to ensure that teaching approaches remain accessible and equitable for all students.

The implementation of alternative teaching approaches sometimes involves responding to student resistance and feelings of being overwhelmed by the autonomy and responsibility associated with these approaches. As highlighted by Tetzlaff, Schmiedek and Brod (2020: 863–882), certain students may struggle to adapt to self-directed learning. Student resistance can be a barrier to effective implementation, necessitating that teachers provide adequate support and guidance. By assisting students in overcoming resistance and successfully adapting to self-directed learning, teachers can enhance the effectiveness of alternative teaching approaches.

Incorporating student-centred teaching approaches into multimodal teaching can introduce disadvantages related to maintaining traditional teacher authority. As discussed by Peng and Wang (2022: 1–9), this shift towards student-centred approaches may pose difficulties in classroom management and discipline. Striking a balance between innovative teaching approaches and maintaining effective classroom management is essential to ensuring that students benefit from both student-centred and traditional approaches. And by effectively managing the transition to student-centred approaches, teachers can create a classroom environment that combines innovation with discipline, ultimately enhancing the learning experience for their students.

In conclusion, alternative teaching and learning approaches in class music offer exciting opportunities for enhancing student engagement and critical thinking. However, these approaches also present a range of challenges, including questions related to accessibility, teacher training, technical difficulties, resource constraints, student resistance and maintaining classroom authority. To harness the benefits of these approaches fully, schools and music teachers must respond to these challenges proactively. This entails ensuring equitable access to technology, providing adequate teacher training and support, offering technical assistance, managing increased preparation workloads, addressing resource constraints, and finding a balance between innovative teaching approaches and maintaining effective classroom management. By dealing with these challenges head on, teachers can create inclusive, engaging and effective class music programmes that empower all students to develop their musical talents and thrive in the ever-evolving landscape of music education.

2.2.9 Conclusion: traditional and alternative teaching and learning approaches

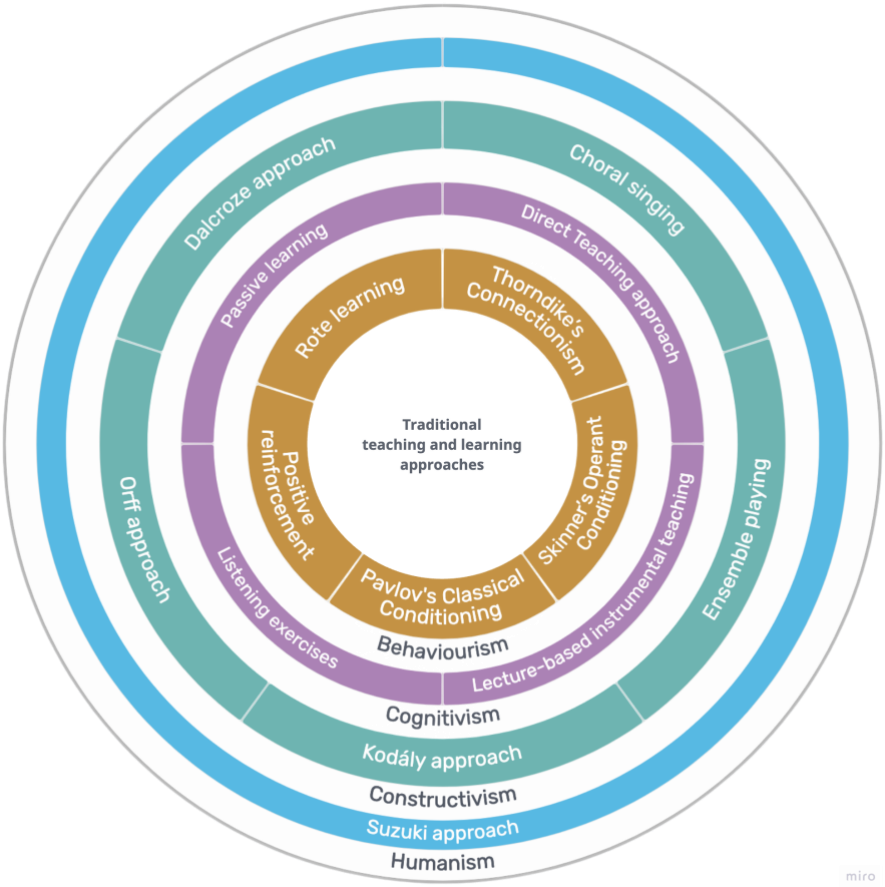

Figure 2-1: Author's visualisation of traditional teaching and learning approaches[6]

In conclusion, traditional teaching and learning approaches in music education – such as the Kodály, Orff, Dalcroze and Suzuki approaches – are grounded in systematic instruction and behaviourist principles such as classical conditioning, operant conditioning, and rote learning. As illustrated in Figure 2-1, these approaches promote a structured and sequential learning process, emphasising technical proficiency, listening skills and ensemble collaboration. However, while effective in developing fundamental musical skills, these approaches can sometimes restrict creativity and individual expression. The diagram also highlights how traditional approaches are influenced by various educational theories – behaviourism, cognitivism, constructivism

[6] This figure illustrates the categorisation of different traditional and learning approaches from the outermost layer to the centre. (For example the Suzuki approach is classified under Humanism).

and humanism – each contributing to a comprehensive but often teacher-centred framework. As music education advances, there is a need to adopt more progressive, inclusive and technologically integrated approaches to cater to the diverse needs and learning preferences of modern students, while maintaining the strengths of traditional practices. These approaches cater to diverse student learning preferences and emphasise skills such as critical thinking, creativity and adaptability. The integration of humanistic and constructivist theories, as seen with the growth mindset and experiential learning, supports the holistic development of students, preparing them for lifelong learning.

This discussion illustrates how various educational frameworks converge to create a multifaceted and student-centred learning environment. The layering of approaches suggests that effective teaching approaches in music education are not isolated but rather interconnected, drawing from a broad spectrum of pedagogical approaches. By leveraging these diverse approaches, teachers are better able to cater to individual learning needs and foster a more inclusive, dynamic and adaptive music education system. This integration of theory into practice reinforces the shift towards a more nuanced and flexible approach to teaching music in the 21st century. The diagram highlights how alternative approaches can work in harmony to reshape the future of music education by adapting to the needs of today's learners.

2.3 INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING

As noted by Pozo, Torrado and Alacid (2022), the integration of information and communication technology (ICT) in music education spans a variety of approaches, including online platforms, educational apps and game-based learning. According to Light (2009), ICT is defined as the role of technology in education. However, Ratheeswari (2018) offers a more expansive definition of ICT, referring to it as those technologies that enable information access through telecommunication, with a focus on communication tools such as the internet, wireless networks and mobile phones. The quality of instruction and teacher-training programmes may be affected by this broader viewpoint. It emphasises how important ICT is becoming to traditional teaching approaches.

ICT in education encompasses the hardware, software, networks and media used for managing information (Sarkar, 2012: 32). This technology serves to reduce the 'Digital Divide', which is influenced by socio-economic factors. UNESCO has been actively exploring the educational potential of ICT since the late 1990s. This effort involves dealing with aspects such as hardware provision, financial considerations, infrastructure development (including wi-fi and mobile data), software implementation, and comprehensive teacher training. These initiatives aim to ensure fair access to digital education and to prepare students adequately for the digital age.

In the context of education, ICTs play a vital role in closing the gap between the demand for learning and the available resources. This is especially crucial when there is a high demand for education but where resources are limited. Sarkar (2012) highlights the significant potential of ICTs in expanding educational opportunities: they can benefit underserved populations, including remote communities, ethnic minorities, individuals with disabilities and those facing constraints related to cost or time.

2.3.1 Hardware for digital education

In the context of online music education, the availability and functionality of essential hardware are important. Nocar, Tang and Bártek (2016) point out that adequate computer hardware, such as laptops and tablets, is essential to digital teaching. Webcams, headphones with microphones and additional tools such as second monitors enhance online engagement and instructional efficiency. These components enable dynamic teaching approaches, ensuring active student participation in the music class. Without proper devices, the quality of music education is compromised.

Webcams are crucial tools in online music education. Händel et al. (2022) emphasise their role in enabling video conferencing integration, active student engagement and collaboration during presentations and group projects. Without webcams, achieving real-time visual communication in online music lessons would be much more difficult. These devices enhance interactivity, enriching the overall online music learning experience.

The viability of online music education is also dependent on internet access. According to Yuan (2023: 3), online music classes, which rely on digital platforms, streaming and communication tools, are possible only with a reliable and sufficient internet

connection. Insufficient internet access can lead to disruptions and hinder the learning experience. Without dependable internet access, the delivery and reception of online music lessons would be severely compromised.

To facilitate smooth communication in online music education, headphones with microphones are essential. As emphasised by Ramadevi et al (2023: 1578), these specialised headphones empower teachers to embrace interactive teaching approaches in virtual classrooms, ensuring crystal-clear audio exchanges. This adoption significantly improves the overall standard of the educational process and gives students access to an immersive environment. Without headphones with built-in microphones, audio communication in the context of online music education may be compromised, impeding the learning process.

A second monitor or display is an asset in the context of online music instruction. Seidel (2023) states that it could allow teachers and students to optimise their online approaches by using one monitor for video-conferencing and another for demonstrations, note-taking and accessing online resources. This setup enhances the efficiency of online music classes. Without a second monitor or display, the multitasking and engagement potential of online music education would be limited.

Smartphones can be a valuable addition to the toolkit of online music teachers. According to Waddell and Williamon (2019), they can provide an additional camera, especially for demonstrations, and can be mounted on tripods for stability and flexibility. The integration of smartphones expands the opportunities for effective online music approaches.

2.3.2 Software for digital education

Browser-based digital audio workstations (DAWs) are now indispensable tools in both music production and education, significantly transforming the way students engage with music creation. Buffa and Vidal-Mazuy (2023: 545) note that online DAWs enable the recording, editing and manipulation of audio, offering features such as virtual instruments and mixing tools. They provide students with a hands-on experience, enhance their understanding of music theory and foster the development of technical and critical thinking skills. Moreover, DAWs serve as a platform to educate students about diverse career opportunities in the music industry.

The incorporation of DAWs into education not only empowers students with interactive learning experiences but also promotes creativity and technical expertise. Özer and Demirbatir (2023) note that by integrating these tools into music curricula, students gain practical knowledge in music production and audio engineering, resulting in a comprehensive understanding of the subject. DAWs' versatility enables students to explore various music genres, encouraging them to experiment with different sounds and styles.

BandLab is another widely used collaborative music-making software that serves as a free digital audio workstation which empowers students to create, share and collaborate on music projects. It encompasses features such as a built-in MIDI editor, a virtual instrument library and multi-track recording capabilities. BandLab also offers a social platform for sharing music, allowing students to connect with fellow musicians and receive feedback on their work (BandLab, 2015). Whether students are in the same physical space or located in different parts of the world, BandLab facilitates real-time collaboration.

Soundtrap, a web-based music-creation platform, offers a comprehensive set of tools and features for composing, recording and mixing music. It includes a virtual instrument library, loops and samples, and multi-track recording capabilities. A notable advantage of Soundtrap is its real-time collaboration functionality which enables students to invite others to join their projects and work together (Soundtrap, 2019). This platform is an ideal choice for music teachers aiming to provide students with a collaborative music-creation environment. A summary of the online digital audio workstations can be seen in Table 2-1:

Table 2-1: Author's table of online digital audio workstations

Online digital audio workstations			
Software	**Purpose**	**Function**	**Available at**
BandLab	BandLab serves as an online collaboration tool accessible through web browsers. It requires an internet connection for operation. Its primary purpose is to facilitate remote music creation and mixing, offering convenience and mobility through mobile devices. In addition, it offers unlimited storage space and the ability to collaborate with other musicians and producers for recording and mixing projects (Bandlab, 2015).	It operates as an online platform accessible via web browsers, enabling students to collaborate on music projects remotely.	www.bandlab.com
Sound trap	A web-based music creation platform is known for its real-time collaboration functionality, which enables students to invite others to join their projects and work together. This platform is an ideal choice for music teachers aiming to provide students with a collaborative music creation environment (Soundtrap 2019).	It offers a comprehensive set of tools and features for composing, recording and mixing music. It includes a virtual instrument library, loops and samples, and multi-track recording capabilities.	www.soundtrap.com
Garage Band	GarageBand is a versatile digital audio workstation (DAW) that serves as a creative hub for musicians and producers. Its primary purpose is to provide a student-friendly platform for music creation, recording and production. It empowers students to explore their musical ideas, regardless of their experience level, by offering a wide range of virtual instruments, recording capabilities and audio editing tools (Garageband, 2020).	GarageBand provides a comprehensive toolkit encompassing virtual instruments, loops and samples, along with multi-track recording capabilities. This feature-rich platform equips students with essential tools for composing, recording and mixing music seamlessly.	www.apple.com/mac/garageband/
Flat.io	The purpose of Flat.io is to facilitate the creation, editing and collaborative composition of music in a user-friendly, real-time online environment, making music notation accessible to musicians, educators and students (Flat.io, 2024).	Flat.io enables real-time, interactive music composition and collaboration, allowing users to create and edit musical scores together seamlessly.	www.flat.io

Digital storytelling in an early childhood classroom can merge narrative storytelling seamlessly with various forms of media, including music, visuals and text. According to O'Byrne et al (2018), students can use tools such as GarageBand to create original music compositions inspired by specific stories, enhancing their creative writing and musical skills. This approach extends to composing soundtracks for movie or television scenes, as explained by Robin (2016: 20). According to Robin, this practice deepens students' grasp of music's role in visual storytelling and imparts essential concepts in music composition and orchestration. Moreover, students engage in creating music videos, as noted by Robin (2016: 21), where they synchronise visual narratives with original musical compositions using tools such as iMovie or Adobe Premiere. This experience enhances their comprehension of the way music and visuals collaborate in conveying emotions and storytelling, while also equipping them with valuable video production, editing, music composition and recording skills. Ultimately, digital music storytelling enriches class music education by nurturing creativity and promoting a holistic understanding of the relationship between music, visuals and narrative storytelling.

Music video production is another approach to class music that combines both music and the visual arts. East (2021) reminds us that music video production has become a more accessible and valuable component of music education due to the proliferation of online video platforms and readily available digital tools. In response to this trend, teachers can employ various approaches to integrate music video production effectively into their curricula. One approach is to use online resources to teach students the art of music video production and visual storytelling, empowering them to create and share their own music videos with a broader audience.

To implement music video production in the classroom, teachers can provide students with essential training in video-editing software such as Adobe Premiere Pro (2024) or iMovie (Apple, 2024). These applications allow students to import music tracks and create accompanying visual sequences, fostering the development of their video-production skills. In addition, as noted by Udemy (2019), students are exposed to important aspects of video production such as shot composition, pacing and storytelling. This hands-on experience equips them with proficiency in digital tools widely used in creative industries, preparing them for potential careers in music, film

and multimedia production. A summarised list of music video-editing software can be seen in Table 2-2:

Table 2-2: Author's table of music video-editing software

Music video editing			
Software	**Purpose**	**Function**	**Available at:**
Canva	Canva's free music video-maker is designed to empower students to produce visually stunning music videos that complement any genre of music. It offers the ability to blend video clips, photos and text seamlessly to create fluid and engaging visuals that align with the music's theme. Whether students seek a conceptual or narrative approach, Canva aims to turn their dream music video ideas into reality (Canva, 2024).	Students can seamlessly blend multimedia elements to craft engaging narratives, elevating music tracks and turning creative visions into reality (Canva, 2024).	www.canva.com
iMovie	iMovie is designed for consumers and amateur videographers, aiming to simplify the creation of polished and engaging videos (Apple, 2024).	iMovie offers video-editing tools such as clip editing, audio enhancement, transitions, text overlays and colour correction. It also provides features such as video stabilisation, green-screen effects, templates and easy sharing, making it an accessible platform for creating professional-quality videos (Apple, 2024).	www.apple.com/in/imovie
Adobe Premiere Pro	Adobe Premiere Pro is professional video-editing software designed for filmmakers, video editors and content creators. It offers a comprehensive set of tools for video-editing, including cutting, trimming, adding effects and colour correction (Adobe, 2024).	Adobe Premiere Pro provides a wide range of video-editing functions, such as timeline-based editing, audio editing, visual effects, motion graphics, and more. It is widely used in film and video production (Adobe, 2024).	www.adobe.com

Music listening and analysis software is a valuable tool for music teachers looking to engage students in active listening and music analysis. According to Bello and Garcia (2021: 2), music teachers can use listening and analysis software for music such as that of Sibelius and Finale to develop interactive music listening activities with notation, recordings and analysis tools. These programs can help students to develop a deeper understanding of musical structure, form and style, and cultivate critical listening skills.

Sibelius (2023) and Finale (2023) are two popular music notation software programs that offer built-in features for music listening and analysis. Sibelius, for example, includes an audio engine that allows teachers to import and play back audio recordings alongside a score. In addition, Sibelius includes features such as notation editing, transposition and playback controls, making it an ideal tool for creating interactive listening activities. Finale, on the other hand, includes a tool called 'Smart Music Accompaniment' that allows teachers to create interactive accompaniments to solo repertoire. This feature provides students with the opportunity to practise with a virtual accompanist, enhancing their listening and performance skills (Schäfer, Smukalla & Oelker, 2013: 3). The following Table 2-3 showcases a list of music notation and analysis software:

Table 2-3: Author's list of music notation and analysis software

Music notation and analysis			
Software	**Purpose**	**Function**	**Available at:**
Sibelius	Enables interactive listening activities by importing audio recordings alongside a score, enhancing students' understanding of musical structure and style (Sibelius, 2023).	Includes notation editing, transposition and playback controls for creating interactive listening exercises and developing critical listening skills (Sibelius, 2023).	www.avid.com/sibelius
Finale	Offers a 'Smart Music Accompaniment' tool to create interactive accompaniments, enhancing students' listening and performance skills during solo repertoire practice (Schäfer et al., 2013).	Provides students with a virtual accompanist for practice, leading to improved listening and performance abilities (Schäfer et al., 2013).	www.finalemusic.com
Flat.io	Flat.io is a web-based music notation software that allows students to create, edit and share sheet music and compositions digitally (Flat.io, 2024)	Students can compose and annotate music, collaborate with others in real-time and access a wide range of musical symbols and notation tools (Flat.io, 2024).	www.flat.io
Musictheory.net	Musictheory.net is a web-based music theory practising site that allows students to practice different theoretical concepts online.	The site is especially useful for students and teachers as it provides a structured approach to learning music theory and offers customisable tools to reinforce various music theory concepts	www.musictheory.net

Virtual music ensembles enable remote collaboration among students, which is especially relevant during times such as the COVID-19 pandemic when in-person rehearsals are limited. According to Cayari (2021), these ensembles leverage tools such as Zoom, Discord, JamKazam and Ninjam, facilitating real-time musical collaboration from different locations. Virtual ensembles offer students opportunities for collaborative music-making, skills development and exposure to various musical styles. They also foster critical skills such as communication and problem-solving. Consequently, virtual music ensembles provide a versatile and crucial resource for students to continue their musical pursuits even in remote or challenging circumstances (Barnett, 2021; Cayari, 2021: 38–46).

Virtual lessons have become increasingly popular in recent years due to the convenience and accessibility they offer. Students can take music lessons with a teacher from anywhere in the world using video-conferencing software such as Zoom, Skype or Google Meet. This not only allows for flexibility in scheduling, but also provides students with access to a wider range of teachers and musical styles that they may not have had access to otherwise (RE Learn & Develop, 2023). Virtual lessons can also be more affordable than in-person lessons, as there are no additional costs associated with travelling to and from a teacher's studio.

While virtual lessons may lack the in-person interaction that traditional lessons offer, they can still be a valuable tool for class music: teachers can provide students with personalised teaching, feedback and guidance, just as they would in an in-person lesson (RE Learn & Develop, 2023). In addition, virtual lessons can help students to develop skills in self-motivation, time management and independent learning, as they must take responsibility for practising and preparing for each lesson on their own (RE Learn & Develop, 2023). Overall, virtual private lessons are a convenient and effective option for students looking to advance their musical skills and knowledge.

Virtual reality (VR) is gaining prominence in class music education, offering students immersive experiences to deepen their understanding of musical concepts and history. According to Serafin et al (2016), VR technology enables students to explore virtual concert halls, engage in interactive performances and compose music in simulated environments. These VR tools could bridge the gap between traditional classroom teaching and real-world musical encounters, providing students with unique

opportunities for engagement and learning. In addition, VR facilitates highly realistic simulations, allowing students to attend virtual concerts and interact with virtual musicians and instruments, deepening their appreciation of music.

Moreover, VR technology fosters collaboration and community-building among students. As highlighted by Innocenti et al (2019), VR brings together students from different locations in shared virtual spaces. This could enable collaborative music creation and break down geographical barriers. It promotes a sense of connection and cooperation among students while also extending the accessibility of musical performances to wider audiences, fostering cultural exchange and mutual understanding. These collaborative and remote-learning platforms are summarised in Table 2-4:

Table 2-4: Author's list of collaborative and remote-learning software

Virtual collaboration and remote-learning software			
Software	**Purpose**	**Function**	**Available at:**
Virtual Ensembles	Facilitates real-time musical collaboration, skills development and exposure to various musical styles (Cayari, 2021).	Enables students to engage in collaborative music creation, develop critical skills and foster a sense of connection and cooperation, especially in remote or challenging circumstances (Cayari, 2021; Barnett, 2021).	www.meet.google.com
Virtual Lessons	Offers flexibility and access to diverse teachers and musical styles while developing skills in self-motivation and independent learning (RE Learn & Develop, 2023).	Provides personalised teaching, feedback and guidance, helping students prepare for a variety of musical careers (RE Learn & Develop, 2023).	www.relearndevelop.com
Virtual Reality	Offers immersive experiences for understanding musical concepts and history, bridging the gap between classroom teaching and real-world encounters (Serafin et al., 2016).	Allows students to attend virtual concerts and interact with virtual musicians and instruments, fostering an appreciation for music and cultural exchange (Serafin et al., 2016; Innocenti et al., 2019).	www.artsandculture.google.com

Gamification, an alternative approach in education, integrates game elements such as rewards, leaderboards and progress tracking into the learning process to boost student engagement. According to Rivera and Garden (2021), this approach creates a more immersive and interactive learning experience. Traditional approaches, in contrast, often rely on lecture-based teaching and conventional assessments such as tests and quizzes. Whereas these approaches can be effective, they may not always engage students as effectively or support long-term learning and retention.

Moreover, gamification has been found to help students develop critical skills such as problem-solving, critical thinking and collaboration, which are increasingly vital in our rapidly changing world. According to Rivera and Garden (2021), this approach aligns with the demands of contemporary education and prepares students for success in diverse dynamic environments. In summary, gamification offers an alternative approach to education that enhances engagement and facilitates the development of essential skills. A list of virtual collaboration and remote learning software can be seen in Table 2-5:

Table 2-5: Author's list of virtual collaboration and remote learning software.

Virtual collaboration and remote learning			
Software	**Purpose**	**Function**	**Available at:**
Gamification	Enhances student engagement with game elements in learning, promoting critical skills such as problem-solving and collaboration (Rivera & Garden, 2021).	Provides interactive learning experiences that prepare students for success in diverse dynamic environments, fostering a more engaging and immersive educational approach (Rivera & Garden, 2021).	www.kahoot.com
Musictheory.net	Free online resource offering music theory lessons, exercises and tools for musicians at all levels. The site covers fundamental topics such as scales, intervals, chords and key signatures, plus more advanced topics such as harmonic functions and chord progressions. It includes interactive exercises that help users to practice ear-training, note-reading, and rhythm skills.	Especially useful for students and teachers, as it provides a structured approach to learning music theory and offers customisable tools to reinforce various music theory concepts.	www.musictheory.net

In conclusion, by giving students hands-on experience with digital audio workstations (DAWs), teachers are able to foster teamwork using real-time collaboration tools; fuse creative disciplines with digital music storytelling and video production; deepen comprehension through music listening and analysis software; enable remote collaboration with virtual ensembles, and provide flexibility through virtual lessons. In these ways, the integration of digital tools in music education has transformed learning. These digital tools are now fundamental to modern music education because they foster creativity and give students the skills they need for a variety of careers in the music industry. Future musicians and artists are shaped in this dynamic, engaging learning environment. Despite this transformative potential, though, funding and cost considerations should be considered.

2.3.3 Wi-fi network

Technology integration into educational settings is greatly facilitated by using Wireless Fidelity (wi-fi). As Zhu, Yu and Riezebos (2016) point out, in our increasingly digital age, the dependability on, accessibility with and the efficiency of wi-fi networks are critical to ensuring continuous connectivity for educational needs. As technology continues to shape alternative educational approaches, a clear understanding of the role of wi-fi networks is essential to establishing effective and smart learning environments.

Access to wireless networks and network stability are critical factors in integrating technology into teaching and learning. Verizon (2021) states that there are various approaches for connecting to the internet, including wi-fi routers, mobile hotspots and fourth-generation long-term evolution (4G LTE) and fifth generation (5G) home internet, each of which comes with both benefits and drawbacks. Wi-fi routers enable simultaneous connections from multiple devices, but this can result in constrained bandwidth and slowed speeds when many devices share the same network. Smooth learning experiences are greatly facilitated by wi-fi networks' dependability and accessibility.

Cost-effective wi-fi is crucial to students who have to access online learning, especially considering the expense and connectivity challenges associated with personal mobile data. Heng, Sol and Pang (2023) found that while some students use wi-fi at home,

universities, coffee shops and workplaces, the majority still rely on mobile data. Affordable wi-fi solutions are essential to sustainable and accessible technology integration, particularly in rural areas with limited LTE availability and high costs, if seamless connectivity for effective online education is to be ensured.

Dealing with challenges in wi-fi accessibility and stability is crucial to seamless learning. Institutions often report wi-fi problems with signal variations and uncertainties about student access at home, emphasising the need to enhance the wi-fi infrastructure. Stable, cost-effective internet solutions are essential for smart learning environments, promoting effective and sustainable technology integration. This is exemplified in a study by Chowdhury et al (2020), who discuss the early stages of sixth generation (6G) development and technologies such as advanced antenna systems, millimetre-wave communications and intelligent networking, offering potential solutions to wi-fi connectivity challenges in educational settings.

2.3.4 Teacher and student support

Effective teacher training and support are pivotal to integrating technology into education, ensuring teacher readiness and motivation. Simultaneously, student support services such as counselling and tailored digital literacy efforts are essential to guiding students, bridging the digital divide and ensuring seamless technology integration in education.

The proper orientation of teachers is required for to implement mobile-based seamless learning. Sung, Chang and Liu (2016) emphasise that effective teacher orientation is essential to implementing mobile-based seamless learning, ensuring readiness and motivation, and preparing teachers for effective training and a seamless transition into blended learning environments. During orientation, teachers can evaluate their level of readiness and discover the specifics of successfully training others. It lays the groundwork for a more seamless transition into the blended learning environment by preparing teachers in this way.

Differentiating training for teachers is a subtle way of underscoring the significance of their readiness. According to Alvarez (2020: 116), teachers should be equipped with the abilities and knowledge necessary to improve the quality of the students' overall educational experience. This recommendation assumes that teachers have the

necessary training to make a significant contribution to the educational process, highlighting their critical role in seamless learning.

Overcoming technological barriers requires tailored support measures. As per Taylor and Newton (2013: 3), students recommend that orientation information be made available to those with low levels of computer literacy, informational sessions should be given to prepare students for new technologies, and targeted support should be provided to develop the technical skills essential to their respective subject areas. These suggestions emphasise the importance of providing students with the necessary tools and knowledge to navigate the digital landscape effectively and with confidence.

The current digital divide between teachers and students tends to prevent seamless learning. Hiew and Chew (2016: 8) note that while teachers may oppose the use of mobile devices in the classroom, students frequently have greater exposure to ICT, usually thanks to their devices. To close the digital divide, teachers must participate in professional development programmes and students must receive structured guidance.

Various academic fields use mobile technology in different ways. According to research by Wu et al (2012), mobile technology is more prevalent in professional subjects and applied sciences, while other fields lag behind them. To promote seamless learning across various subject areas and guarantee equitable access to technology-enhanced learning opportunities, tailored approaches and support are crucial.

A comprehensive student support framework covers various facets of education. Krause, McEwen and Blinco (2009: 10) state that this includes recruitment, advising, learning, assessment, technology literacy and institutional management. Such a holistic approach ensures that students receive comprehensive support throughout their educational journey, catering to their diverse needs and fostering an environment conducive to effective seamless learning.

2.3.5 Conclusion to the integration of information and communication technology in teaching and learning

In summary, the integration of ICT into music education marks a significant transition towards student-centred and active learning approaches. This integration of various digital tools and platforms, ranging from online resources to digital audio workstations and virtual ensembles, has enriched the learning experience by promoting personalised engagement and empowerment among students.

However, the effective implementation of technology in education necessitates paying meticulous attention to numerous aspects. Adequate provision of hardware components, including computers, webcams, internet access, headphones and second monitors, is imperative for the seamless delivery of online music education. The selection and deployment of software tools significantly influence the quality of engagement and learning outcomes, reinforcing the importance of judicious choices in this regard.

Furthermore, it is important not to undervalue the financial aspect of technology integration. This is because technology-driven educational initiatives cannot be sustained without creative funding models, flexible resource allocation and long-term financial planning. When creating detailed plans and budgets for technology integration, it is crucial to investigate a variety of cost drivers, including infrastructure, devices, digital content and human capital.

Accessible and reliable wi-fi networks are crucial to the educational process because they play a key role in ensuring continuous access to online learning resources. For students in underserved areas in particular, cost-effective wi-fi solutions that are adapted to deal with problems related to data costs and access disparities are essential.

A fundamental part of the success of technology integration initiatives is the support systems for teachers and students. Teachers need to be prepared, trained and engaged in ongoing professional development because they are the designers of learning environments. To prepare teachers for their roles effectively, it is essential to have access to technical support systems, collaborative planning, tailored training programmes and participation in policy formulation.

The provision of all-encompassing support to students, including technical assistance, counselling, learning approaches, assessment techniques and technology literacy is equally important. The elimination of the digital divide, increased computer literacy among students and equitable access to technology-enhanced learning opportunities are top priorities. Recognising the differences in teachers' and students' technological readiness and exposure highlights the importance of tailored approaches and structured guidance.

In conclusion, incorporating technology into music education has enormous potential to improve engagement, foster creativity and advance skills development. However, careful planning, sufficient funding and a solid infrastructure are needed for its effective implementation. The creation of effective and inclusive learning environments that equip students to thrive in the dynamic digital era requires teachers to deal with these dimensions in their entirety.

2.4 STUDENT FACTORS AND CONSIDERATIONS

To develop effective pedagogical approaches and cultivate a nurturing academic atmosphere, it is critical for instructors to possess a comprehensive understanding of the multifaceted elements and considerations that influence students' learning experiences. Teachers are faced with the intricate task of catering to the distinct requirements of every student, which entails acknowledging generational differences, technological influences and individual student preferences. Through an examination of critical variables that include motivation levels, learning disorders and attention spans, teachers can customise their methodologies to augment student engagement, academic achievement and general welfare.

2.4.1 The learning impact of different generations

The social and technological contexts of different generations, particularly Generation Z (1997–2007) and Generation Alpha (2010–2025), have a significant impact on their learning preferences. Generation Z, also known as Zoomers or iGen, is the first generation raised entirely in the digital age, with early access to the internet and mobile technology (De Witte, 2022). They come from a variety of families, with higher rates of foreign-born parents, single-parent families, mixed-race families and LGBTQ+ parents

(Twenge et al, 2019: 329). A list of the learning impacts of different generations can be seen in Table 2-6:

Table 2-6: Author's list of learning impacts of different generations

The learning impacts of different generations		
Aspects of Learning	**Generation Z (1997–2007)**	**Generation Alpha (2010–2025)**
Technological Context	Born and raised entirely on the internet, with access to the Internet and mobile technology.	Digital natives who have never known a world without smartphones and social media.
Key Characteristics	Digital literacy, creativity, curiosity, social awareness, multitasking and online collaboration are all important skills.	Technologically savvy, diverse and global-minded.
Learning Preferences	Learning that is interactive, personalised, and experiential is preferred. Feedback, autonomy, choice and social responsibility are all important.	Prefer active, engaging and personalised learning. Seek skills relevant to their lives, e.g., critical thinking and problem-solving.
Challenges	Face unprecedented challenges such as climate change, inequality, polarisation and increased stress and mental health issues.	There are concerns about the way technology will affect social skills and attention spans.
Teaching Approaches	Use of visuals, concise presentations, diverse learning formats, a flipped classroom model, active learning and soft skill integration.	Design learning spaces to support well-being, creativity and collaboration. Adopt student-centred pedagogies, e.g., active learning, enquiry-based learning, project-based learning, and personalised learning.
Additional approaches	Allow personal device integration, personalisation, support and guidance.	Incorporate gratitude, mindfulness and resilience techniques to support mental well-being.

2.4.1.1 Generation Z (1997–2007)

Generation Z displays unique characteristics. McCrindle and Wolfinger (2009: 7) mention digital literacy, creativity, curiosity and social awareness as their defining traits. This generation excels in multitasking and online collaboration, preferring interactive, personalised, experiential learning to passive approaches. According to De Witte (2022), Generation Z places a high value on feedback, autonomy and choice in education, with a notable concern for academic performance and future job prospects.

Comprehending Generation Z's learning approaches holds great significance for several reasons. According to Dimock (2019: 5), this generation is the first to have grown up entirely in the digital age; their attitudes towards technology and social media are therefore poised to influence the future of education and the workforce. As a result, it is critical to provide them with the skills, knowledge and competencies required for success in a rapidly changing and complex environment. Furthermore, as Rose Lee (2015) points out, Generation Z is distinguished by a constant connection to technology, broad curiosity and a preference for personalised, interactive and relevant learning encounters. They actively seek educational opportunities that reflect these values, emphasising social responsibility, diversity and collaboration. As a result, it is critical to tailor learning environments, approaches and content to meet their specific needs and interests. Finally, Generation Z faces unprecedented challenges, including climate change, inequality, polarisation and misinformation. Furthermore, they face higher levels of stress, anxiety and mental-health issues than previous generations. As students who can navigate uncertainty, solve problems and make a positive impact on the world, it is critical that their well-being, resilience and sense of agency be nurtured. Teachers may want to consider implementing the following approaches to better serve the needs of students from Generation Z.

Incorporating visual aids such as images, videos, infographics and animations can prove highly effective. Preville (2018) explains that these visual aids engage students, enhancing their grasp of musical concepts by illustrating notations, offering historical context and demonstrating musical techniques dynamically. Interaction with visuals aids information retention and fosters a more profound appreciation of music. Therefore, teachers are encouraged to integrate visuals into their teaching to enrich the learning experience.

Maintaining succinct and targeted slideshow presentations is also essential. As noted by Schukei (2020), long lectures and thick slide decks can cause students to become disengaged, which reduces the quality of the learning process. Clear and concise teaching materials are beneficial to students, regardless of the subject-matter. Short and focused presentations enhance student attentiveness and information retention, ultimately boosting educational effectiveness.

Encouraging and facilitating student learning requires a variety of flexible learning formats. According to Miranda (2020), it can be beneficial to combine a variety of approaches such as social media, podcasts, games, blogs and online quizzes. These diverse approaches give the educational process dynamism and interactivity, in addition to accommodating different student preferences. By accepting this diversity, teachers can create a more stimulating and productive learning environment that fosters students' in-depth comprehension and appreciation of the material.

The flipped-classroom model, a burgeoning trend in music education, emphasises self-paced learning. Bergmann and Sams (2012) suggest that students should be able to access course materials online before class, enabling more profound discussions, hands-on exercises and personalised feedback during face-to-face sessions. This instructional shift grants students the autonomy to explore musical concepts at their own pace, fostering active engagement in class activities. Furthermore, the flipped-classroom approach enhances musical skill acquisition and knowledge by merging technology with conventional teaching and promoting interactive, student-centred music education.

Promoting active learning in music education is crucial to fostering teamwork, engagement and problem-solving. According to Patiño, Ramírez-Montoya and Buenestado-Fernández (2023), it is a highly efficient approach: students are encouraged to collaborate and share ideas through interactive discussions, group projects and ensemble performances. These approaches increase student engagement and in doing so improve musical skills while also developing essential communication and collaboration skills, and providing students with valuable life skills in addition to musical growth.

An essential part of teaching music is incorporating soft skills such as leadership, teamwork, communication and critical thinking into the curriculum and the evaluation procedures. Rukman et al (2023) emphasise that these skills substantially enhance the educational experience for music students. By integrating these proficiencies into the music curriculum, students not only augment their musical aptitude but also obtain vital life skills that are highly coveted in the current competitive workforce. For instance, leadership skills are developed when students take on roles in music ensembles which require effective communication and teamwork if performances are to be harmonious.

Using a range of assignment formats is vital to accommodating students' different student learning preferences and aptitudes. Lane et al (2022) suggest that teachers adopt a flexible approach in which they provide assignments in written, oral, visual and digital formats, in this way enabling students to select the most suitable mode of demonstrating their comprehension of musical concepts. This approach promotes inclusivity, increases student engagement and fosters creativity in the music classroom. Allowing students to choose their preferred assignment format creates a dynamic and adaptable learning environment that empowers them to express their musical knowledge and skills in accordance with their individual student learning preferences and strengths.

Tablets and smartphones are among the personal electronic devices that are increasingly being used in classrooms. According to Farr (2023), these devices can be used to improve music education by giving students access to interactive music theory tools, educational apps and digital sheet music. This enhances the learning environment and improves students' educational experiences, and therefore strengthening the music education system. It does this by fusing traditional instruction with contemporary technology.

Personalising education is crucial. Concina (2023) asserts that a more relevant and engaging learning environment results from developing an awareness of students' interests, experiences and goals. According to Schukei (2020), students are more committed to their musical education when the educational goals are aligned with their personal goals. Personalisation in music education fosters a deeper connection between students and the subject-matter, which tends to promote their musical growth.

Offering support and guidance to students is essential. Schukei (2020) suggests that chat and help options should be offered to them: students who are looking for clarification on musical concepts, practice techniques or coursework challenges can benefit greatly from these resources. By providing individualised support and promoting student involvement in music education, the integration of easily accessible communication channels such as online chats or help desks fosters a more diverse and inclusive learning environment. This approach enhances the overall learning experience and tends to lead to greater musical proficiency.

Personalised attention and feedback for students to improve their learning are essential components of effective education. According to Yu et al (2023: 42), individualised attention and instruction that is specifically designed to fit the needs and skills of each student is crucial. This approach ensures that students receive the necessary guidance and support to overcome challenges and realise their full potential in music education. Constructive criticism and achievement recognition encourage a feeling of achievement and commitment, which in turn results in increased competence and zeal.

Using approaches that promote positivity and assist students' mental health is essential in the classroom. Francis (2023) emphasises the value of resilience, mindfulness and gratitude in reaching this objective. By using these approaches, students are better equipped to deal with the pressures of school and mental health issues. By implementing these techniques, music teachers create a caring and encouraging atmosphere that enhances students' musical abilities while also promoting their emotional and psychological growth.

2.4.1.2 Generation Alpha (2010–2025)

Generation Alpha, born between 2010 and 2025, is often referred to as ‘digital natives’ due to their upbringing in a technology-saturated world. According to Patel (2021), they've never known life without smartphones and social media, making them exceptionally tech-savvy and offering a unique worldview compared to previous generations. Growing up in a more interconnected world, they also exhibit greater diversity and global awareness. However, concerns arise regarding their social skills and attention spans due to their extensive exposure to technology and the internet. Society must respond to these challenges and support these students in thriving in an ever-evolving digital landscape.

Teachers can support the diverse learning needs of Gen Alpha students by creating learning environments that prioritise well-being, creativity and collaboration. According to Hosid (2021), the physical environment has a significant impact on academic performance, motivation and engagement, necessitating cosy, nurturing and adaptable spaces for these students. Natural elements such as plants, sunlight and fresh air, as highlighted by Hosid (2021), restore attention, reduce stress and improve

physical health, fostering an environment conducive to creativity and overall well-being. Hosid (2021) also advocates flexible learning environments that promote independence, teamwork and pride in education through movable walls, adjustable furniture and diverse activity zones. Thoughtful integration of technology is critical, providing access to data, communication, and tailored learning opportunities, but it is also critical to strike a balance that supports human interaction while aligning with specific learning objectives in the field of music education.

By using student-centred teaching approaches that prioritise enquiry-based, project-based, active and individualised learning, teachers can also adapt to the learning needs of Gen Alpha students (Ziatdinov & Cilliers, 2021: 8). These approaches can help Gen Alpha students develop the skills and competencies required for the 21st century while engaging them in meaningful and relevant learning experiences. Some of the advantages of these approaches are:

Active learning, according to Qureshi et al (2021: 22), involves students in diverse activities such as class meetings, presentations and real-life experiences. This approach enhances students' commitment to education, positively affecting their behaviour towards the course and fostering a more dynamic learning experience. Overall, active learning is a valuable approach that can improve engagement and learning outcomes, although its specific opportunities can vary based on context and implementation.

Enquiry-based learning encourages students to explore questions and problems through their own investigation and discovery. As noted by Ziatdinov and Cilliers (2021: 6), this approach cultivates curiosity, creativity, collaboration and problem-solving skills. It adds depth and engagement to the music education experience, encouraging students to be proactive in exploring and understanding musical concepts.

Project-based learning involves students working on real-world projects, applying their knowledge and skills to create tangible solutions. As emphasised by Johnson, Johnson and Smith (2013) this approach enhances students' communication, teamwork, research and presentation skills. It offers a hands-on and practical dimension to music education, encouraging students to develop vital skills through real-world applications. By actively engaging in real-world projects, students not only apply their musical

knowledge but also gain valuable communication, teamwork, research and presentation skills, making project-based learning a valuable component of music education.

Adapting the curriculum, pace and approach to each student's individual needs, interests and learning goals is known as personalised learning. According to Shemshack and Spector (2020: 12), personalised learning is “instruction in which the pace of learning and the instructional approach are optimised for each student's needs”. Tetzlaff, Schmiedek and Brod (2020), propose a dynamic framework for personalised education comprising five key components: (1) student profiles, (2) learning objectives, (3) instructional approaches, (4) progress monitoring, and (5) learning environments. These components are intended to work together to provide each student with a personalised learning experience. When the learning process is personalised, students become more engaged and motivated to learn, which can improve academic performance.

Gen Alpha is a unique and diverse generation that has grown up in a digital and connected world. According to Jukić and Škojo (2021), they have different learning needs and expectations than previous generations, and they require different approaches to education and learning. Accordingly, teachers need to adapt their teaching approaches and curricula to meet the needs and expectations of Gen Alpha students by designing teaching spaces that support their well-being, creativity and collaboration, and by adopting student-centred pedagogies that emphasise active, enquiry-based, project-based and personalised learning. By doing so, teachers can help Gen Alpha students to develop the skills and competencies that they need for the 21st century while engaging them in meaningful and relevant learning experiences.

2.4.2 Factors affecting students' learning experiences

Motivation, attention span and neuropsychiatric disabilities can have an impact on the learning experience in music education. Darrow (2012) emphasises the need for music teachers to understand and accommodate the diverse needs of students with learning disabilities. Evans and Bonneville-Roussy (2016) underscore the role of self-determined motivation in enhancing practice and task preference in university music students. Wilson and McCrary (1996) highlight the positive impact of specialised

training on music teachers' attitudes towards students with learning disabilities. Cogdill (2015) suggests that teachers can foster positive beliefs about music potential and increase student motivation through various approaches. These are some factors that can affect students' learning experiences in music education; they are discussed below.

To create a welcoming, encouraging and productive learning environment and to help students reach their greatest potential, it is essential to recognise and respond to diverse individual needs (Pritchard, 2017: 3). The differences in students' needs have a big impact on their experiences and performance in the classroom. White et al (2020) categorise motivation in education comprising as intrinsic and extrinsic factors, which refers to a student's internal desires and goals for academic participation. Intrinsic motivation arises from the enjoyment of an activity, whereas extrinsic motivation is driven by external rewards (White et al, 2020).

Teachers play a pivotal role in cultivating motivation by encouraging initiative, assigning challenging tasks and promoting critical thinking as ways of encouraging better learning outcomes (Wardani et al, 2020). It is essential to comprehend the different factors that affect motivation, such as individual needs and preferences, in order to maintain and improve student engagement (Said & Al-Homoud, 2004). Clear goals motivate students to practise consistently, refine their approaches and improve their overall proficiency.

Studies on teaching approaches and motivation reveal some valuable insights. Bagaskara, Nur and Herdiana (2022) highlight the importance of understanding individual motivations, whereas Cudney and Ezzell (2017) find that tailored approaches that are aligned with students' learning preferences can boost motivation. Winn (2002) emphasises the role of socio-economic factors in shaping student motivation, acknowledging the broader context in which students navigate their academic journey.

Research consistently indicates that there is a positive correlation between student motivation and academic success. Gupta and Mili (2017) identify a significant positive relationship between academic motivation and achievement, particularly in high achievers. Similarly, Haider et al (2015) pinpoint intrinsic and extrinsic motivation as

pivotal factors in academic performance. Dishon-Berkovits (2014) underscores the importance of assigned learning goals in improving academic performance, further highlighting the central role of motivation in student success.

Exploring motivation reveals its pivotal role in creating a conducive learning environment, with both intrinsic and extrinsic factors influencing teaching approaches. Transitioning to attention spans, rooted in William James's insights, offers insights into cognitive resources. In music education, applying these principles becomes crucial to fostering proactive and cooperative learning aligned with the zone of proximal development (ZPD). Understanding motivation and attention spans not only enhances academic engagement, but also holds significant implications for the personalised growth of music students.

William James (1842–1910) transformed the study of attention spans by portraying it as a diverse yet limited resource (James, 2007). James's research on attention spans influenced later attentional process research, which confirmed and expanded his theories (Unsworth et al, 2012: 1765–1772). This completely changed the way we think about cognitive attention spans. James's ideas had a significant influence on the instructional approaches employed by schools for individuals with limited attention spans, resulting in enhanced learning outcomes. To help students focus and reduce distractions, teachers divided lessons into sections and mixed activities, using visual aids and technology.

Lev Vygotsky (1896–1934), a well-known psychologist and educational theorist, first introduced the concept of the ZPD in the early 20th century (Vygotsky, 1978: 87–86). The ZPD, an essential component in the field of education, delineates the disparity between a student's autonomous capabilities and their potential accomplishments with the assistance of a more knowledgeable individual. Vygotsky promoted the idea that students achieve optimal learning outcomes when operating within their ZPD, and that providing suitable assistance and scaffolding can facilitate their maximum growth and development.

The ZPD had a significant impact on the development of cooperative learning and peer mentoring (Harland, 2003). Teachers can help students to surpass their individual capabilities by determining their ZPD (Fani & Ghaemi, 2011), employing focused

assistance such as breaking down complex tasks, providing prompts or cues and offering feedback and reinforcement (Wass & Golding, 2014) and conducting assessments to determine students' ZPD.

The ZPD, rooted in social constructivism (Vygotsky, 1978), highlights the role of social interaction in learning. Applied in music education, it facilitates personalised learning, accommodating individual differences (Lasmawan & Budiarta, 2020; Payong, 2020). Encouraging proactive, self-directed cooperative learning tailored to students' backgrounds, the ZPD in music education yields personalised experiences that foster optimal growth (Luckin & Boulay, 1999). In line with the sociocultural approach (John-Steiner & Mahn, 1996), ZPD-guided interactive learning environments prioritise both social and individual knowledge formation.

In this study, references to various diagnoses are included because the student cohort involved had formally diagnosed conditions, including but not limited to the examples mentioned in the following paragraphs. However, these diagnoses are mentioned in the literature solely to examine the factors and considerations that have influenced this study’s approach to supporting student participants. While the study did not seek to verify diagnoses through medical records, its focus was on students' lived experiences in the music classroom.Navigating the complex landscape of cognitive complexities is necessary to move from attention spans to neuropsychiatric disabilities. Understanding cognitive processes starts with William James's ideas about attention span. These ideas lead to conditions such as attention deficit hyperactivity disorder (ADHD), highly sensitive persons (HSPs), expressive language disorder (ELD), dyslexia, and generalised anxiety disorder (GAD). These conditions make it hard to stay focused and process information in a normal way, so they need to be taught in special ways. The shift towards neuropsychiatric disabilities emphasises the importance of recognising individual differences and implementing inclusive approaches grounded in neuroscientific research.

ADHD is a neurodevelopmental disorder distinguished by challenges with time management, organisation and concentration (Barkley & Peters, 2012; Prior, 2023). The academic achievements of students are notably affected as they encounter difficulties in fulfilling assignment requirements and comprehending classroom

instruction. The individualised needs of students with ADHD may necessitate further accommodation and support in the music classroom.

HSPs are exceptionally sensitive to sensory stimuli, emotions and social cues (Acevedo et al, 2014). While it is not a formal diagnosis as per DSM-5, understanding HSPs in music education is crucial because their heightened sensitivity can affect their musical experiences and classroom interactions. Associated with elevated stress levels and physical symptoms (Benham, 2006), this trait involves subjective sensitivity in both exteroceptive and interoceptive sensory processing (Ujiie & Takahashi, 2022). Some studies suggest that the construct of sensory processing sensitivity may be multidimensional (Ershova et al, 2018).

In education, being an HSP can significantly affect a student's learning and well-being. These students may struggle in over-stimulating environments, which can lead to difficulties with focus and emotional management (Prior, 2023). Research recommends environmental adjustments, such as gradual lighting shifts (Choi & Suk, 2020) and giving attention to colour and contrast (Gellhaus & Olson, 1993; Lang, 2002) in order to create a flexible and supportive learning environment.

Personalised support – such as physical activity, mindfulness exercises, outdoor time or additional breaks – may prove advantageous to exceptionally sensitive students (Korinek, 2020). Teachers have a vital role to play in comprehending and adapting to the distinct requirements of these students (Morrison & Allen, 2007). It is crucial to acknowledge that the well-being of teachers can have an impact on their capacity to sustain ideal classroom environments (Jennings, 2014). ELD, which hampers effective communication in both spoken and written language, is an additional condition that has an impact on students' learning.

ELD is a communication disorder that affects either spoken or written expression (Leonard, 2009; Prior, 2023). Distinctions between ELD and receptive language disorder are debated, as evidence suggests that expression deficits often coexist with limitations in language knowledge or language processing (Leonard, 2009). Since the study of ELD is still relatively new, pioneers such as Dr Mabel Rice are leading ongoing research into its genetics and neurobiology (Del Tufo, Earle & Cutting, 2019: 1–27).

ELD significantly affects academic success, social interactions and communication, causing challenges in effective expression, frustration, relationship-building and overall academic performance (Prior, 2023). In music education, students with ELD may experience difficulties with rhythm and language skills (Fritz & Peklaj, 2019). Whereas music education has proven effective in enhancing social communication and language skills (Liang, 2021), its potential benefits to students with ELD warrant further exploration.

Teachers play a crucial role in supporting students with ELD through adapted teaching approaches, including visual aids, simpler language, task breakdowns and extra support (Miller, 1991; Starling et al, 2012; Washington & Warr-Leeper, 2013; Chow, Walters & Hollo, 2020). Teacher training and specific instructional techniques, such as language modification and visual supports, have shown positive effects on language abilities in students with language impairments (Starling et al, 2012; Washington & Warr-Leeper, 2013). These findings underscore the importance of tailored approaches to support students with expressive language disorders.

Another diagnosis that has an impact on students' learning is dyslexia. Dyslexia is a learning disorder that affects reading, writing and spelling abilities. It is characterised by challenges with phonemic awareness, decoding and word recognition. Regardless of their level of intelligence, a considerable proportion of individuals with dyslexia exhibit intelligence that falls within the normal range or exceeds it. Dyslexia first garnered significant recognition in the late 1800s, but it was not until the mid-20th century that it gained widespread attention. Notable figures such as Samuel T Orton and Anna Gillingham played pivotal roles in advancing our understanding of this condition (Farrell, 2022: 54; Kirby & Snowling, 2022; Skeide, 2022: 45–60). Dyslexia has a substantial effect on both academic and emotional well-being, affecting self-esteem and emotional health and causing anxiety specifically related to mathematics (Gibson & Kendall, 2010; Glazzard, 2010; Nalavany, Carawan & Brown, 2011; Jordan, McGladdery & Dyer, 2014).

Dyslexia can have a substantial effect on students' reading and rhythm-processing skills, especially in the context of music education. Studies have demonstrated that dyslexic students may encounter difficulties in phonological awareness, a critical skill for reading and music (Cancer et al, 2020). These circumstances can result in

misinterpretations and psychological strain, emphasising the necessity for heightened consciousness and assistance (Subramaniyan et al, 2020). Moreover, there is a correlation between dyslexia and diminished musical rhythm skills, which subsequently have an impact on reading proficiency (Boll-Avetisyan, Bhatara & Höhle, 2020).

Research shows that dyslexic students face higher anxiety levels and academic challenges (Carroll & Iles, 2006; Mortimore & Crozier, 2006). Dyslexic individuals exhibit neurophysiological variations, including extended auditory responses, which can influence their abilities in music and language (Christiner et al, 2022). Teachers, aware of the signs of dyslexia, can provide targeted interventions such as structured literacy instruction, assistive technology and extended time for assignments (Kotzé, 2019). A positive and supportive learning environment helps to alleviate anxiety and stress (White, 2007). In transitioning from dyslexia to GAD, it is essential to recognise that dyslexic students' academic struggles and heightened anxiety may be related to broader mental health issues, which emphasises the need for a supportive learning environment.

GAD is defined by an excessive and enduring state of worry that manifests in physical symptoms such as restlessness, irritability and sleep disturbances (Thobaben 2005; Tyrer & Baldwin, 2006; Gale & Davidson, 2007). GAD is often not diagnosed properly because there is too much emphasis on physical symptoms. However, GAD can be treated effectively using psychological therapies and medication. A notable example of such therapy is cognitive-behavioural therapy (CBT), which Beck and Leahy developed. Various studies (Tyrer & Baldwin, 2006; Hoge, Ivkovic & Fricchione, 2012; Carpenter et al, 2018) have shown the effectiveness of such treatments.

GAD has a substantial impact on social interactions and academic performance, resulting in challenges with concentration, task completion and active engagement in classroom discussions (Song et al, 2010). The persistent nature of GAD leads to elevated healthcare expenses, as ineffective coping approaches contribute to diminished self-worth and heightened academic pressure (Frydenberg, 1999; Allgulander, 2012).

GAD can have a significant impact on the music classroom, especially on improvisation and performance. According to Edmund and Keller (2019), improvisation can induce

feelings of self-consciousness and anxiety, indicating the necessity for a classroom environment that fosters support. Blair and Van der Sluis (2022) highlight the prevalence of music performance anxiety and the lack of effective music-education interventions. Creating a safe and supportive learning environment for students with GAD is therefore crucial (Orsillo, Roemer & Barlow, 2003; Manassis, 2012; Prior, 2023). This includes providing a peaceful space for breaks, defining routines and expectations and collaborating with students on anxiety-reduction approaches such as mindfulness and deep breathing.

Accommodating students with GAD may involve longer due dates, altered assignments or lighter workloads to support their self-efficacy and reduce their anxiety (Manassis, 2012). Close collaboration with parents and mental-health professionals is crucial to providing appropriate and consistent support. Recognising diverse needs, modifying teaching approaches and considering the physical, intellectual and emotional aspects of the learning environment are essential to effective learning outcomes (Hutchinson, 2003; Thompson & Wheeler, 2010; Byers et al, 2018). Being open to change is crucial to promoting safe and calm learning environments.

The focus now shifts from neuropsychiatric disabilities to the dynamics of the classroom and the factors that can affect how well students learn. While focusing on the classroom, the teacher and the music curriculum, this section explores the various elements that have an impact on a student's learning experience in a school setting. The importance of well-structured classrooms, different pedagogical approaches and adequate teacher preparation are all discussed. In addition, the importance of a well-organised music curriculum is highlighted, which should incorporate activities such as developing aural skills, participating in ensembles and practising critical listening.

The size of the classroom is one of the most important factors that affects how well different teaching approaches work. Larger class sizes can be difficult because they affect motivation, the way teachers work, the way the classroom is run and how students are graded (Çakmak, 2009; Wright, Bergom & Bartholomew, 2017). It is common for these bigger classes to move towards a more structured lecture-based style, which might not work for students who learn best when they can work together or do things with their hands.

It is important to be flexible when dealing with larger class sizes. Peer-instruction classes are better than traditional lectures because they keep grades stable as the class size grows (Liao, Griswold & Porter, 2017). A mix of lecture, discussion, jigsaw, case study and team projects work well for larger classes (Carpenter, 2006). In bigger classrooms, technology-based teaching and personalised learning are useful (Wright et al, 2019: 54) and putting the focus on student-centred learning makes the teaching–learning more effective (Wright, Bergom & Bartholomew, 2017: 55).

Teachers can handle large classes better if they use active student-centred approaches and flexible learning spaces (Mulryan-Kyne, 2010; Kariippanon et al, 2019). Creativity in the classroom and flexible scheduling can help with big-class management problems, despite the difficulties. Therefore, the number of students in a classroom has a substantial effect on how well they are taught, especially when there are many of them. This means that teaching approaches must be adapted to fit the needs of the students. To provide a good learning environment, the physical and organisational aspects of the classroom must be carefully considered.

It is very important for teachers to set rules and routines for their classrooms. Structured teaching and classroom routines are emphasised in many studies. According to Håkansson (2015), structured teaching is an important part of good practice and the growth of students' learning. Structures that are clear and consistent can help students to understand and remember things. According to Lester, Allanson and Notar (2017), routines for managing the classroom are very important for making it a safe place to learn because they affect students' behaviour, motivation and participation. Routines also help students to feel safe and focused while they are learning because they give them a sense of stability.

The way the seats are set up in the classroom is also very important. Rows can help with individual work, especially for students who are being disruptive (Wannarka & Ruhl, 2008). However, this setup might not work as well for group discussions because it makes the learning environment more focused on the teacher than on the students (Handayani, 2020). According to Ibiloye (2021), seating arrangements should be based on a balance between cost, class characteristics and instructional goals. Pair-desk modules are one option that can be used in this situation. Espey (2008) found

that the shape of desks can affect the way students feel about team-based learning, which suggests that desk arrangements do affect collaborative learning.

The relationships between teachers and students have a significant impact on the learning and growth of students, affecting their level of involvement, drive, academic performance and overall well-being (Murray-Harvey, 2010; Furrer, Skinner & Pitzer, 2014). These relationships are more influential in the academic domain than parent–child relationships (Martin et al, 2007); therefore, fostering positive teacher–student relationships is crucial to student success.

Teachers use diverse approaches to establish and enhance relationships, with a focus on technology, communication and inventive assessment approaches (Van Valkenburgh & Gierhart, 2022). Theisen-Homer (2020) distinguishes between instrumental and reciprocal teacher–student relationships, emphasising their influence on educational experiences and power dynamics. Collaborative techniques are highly efficient in fostering positive connections (Ryan & Deci, 2017). Research highlights the importance of these relationships in creating an inclusive educational environment (Fuentes-Abeledo et al, 2020; Pastore & Luder, 2021).

Teachers must engage in continuous professional development (CPD) to effectively incorporate technology into their teaching practices (Love et al, 2020). Customising CPD materials, particularly in intricate domains such as classroom management, is essential (Jayanti & Wahyudin, 2019). Teacher education should prioritise providing teachers with the necessary skills to incorporate technology effectively into their teaching while emphasising the mutually beneficial relationship between technology and pedagogy (Djoub, 2019).

In the era of globalisation and rapid technological advancement, educators must consistently improve their knowledge and skills (Seng, 2019). Flourishing in education in the 21st century necessitates being able to adjust to new circumstances and possess a high level of skills in using technology. The shift towards project-based and personalised learning requires a re-evaluation of teacher training, with a specific emphasis on improving teachers' proficiency in these approaches (Colón-Ortiz et al, 2020). Adaptive technologies play a crucial role in enabling individualised learning and fostering long-lasting teacher education (Marienko et al, 2020).

Teacher training plays a pivotal role in elevating teaching effectiveness, encompassing key elements such as learning objectives, curriculum, performance standards, independence and ongoing assessment (Melara-Gutiérrez & González-López, 2021). According to Fuentes-Abeledo et al (2020), student–teacher practicums may have gaps. Teachers should be trained to prioritise reflective teaching, collaborative learning and personal interests (Astaíza-Martínez, Mazorco-Salas & Castillo-Bohórquez, 2020). Active learning requires teachers to stimulate and expand students' cognitive frameworks, facilitating learning in the ZPD (Garton, 2021). This holistic view emphasises the importance of comprehensive teacher training for effective and impactful teaching.

Teacher productivity is affected by workload, leadership, job satisfaction, pay, competence, organisational climate, discipline, cultural commitment, work ethic, creativity, education and supervision (Gistituati, 2020). These factors require increased responsibility, prompting ‘triage’ in teacher task allocation (Stacey, Wilson & McGrathChamp, 2020). Scholars suggest using study guides and instructional videos to reduce lesson planning and grading time (Lambrechts, Kamat & Frattura, 2020; Akmal, Fitriah, & Fadhilah, 2022). Finding comprehensive solutions to these challenges is crucial to optimising teacher productivity.

Research suggests that project-based learning and online platforms such as Google Classroom and Moodle can reduce a teacher’s workload and at the same time promote student-centred education (Taskiran, 2021; Yuliansyah & Ayu, 2021). In addition, asynchronous online discussion boards boost creativity and content comprehension (Carr, 2020). According to Abidin and Saputro (2020), combining automation and social structures in online learning empowers students to take a proactive role in their education (Celina et al, 2020). Google Classroom and Moodle improve this transition by streamlining instruction and improving teacher and student experiences.

Through the inclusion of aural skills, critical listening, music theory, individual practice, ensemble skills, music literacy and exposure to diverse styles, the significant impact of music education on students' holistic learning experiences is emphasised. The knowledge that a meticulously designed curriculum has the potential to enhance cognitive development, emotional intelligence and cultural awareness underscores the

significance of carefully integrating music education into the larger educational framework.

According to Beach and Bolden (2018), critical listening can be used as a guiding mechanism to help students recognise and interrogate the messages conveyed through musical texts. This approach aims to improve students' understanding and appreciation of music while also preparing them to engage in meaningful dialogue with the musical material. By combining critical listening techniques such as referring to past knowledge, challenging the goals and viewpoints of composers and considering alternative interpretations, they argue that incorporating critical listening practices into the music curriculum can have a significant impact on students' musical agency and empowerment in the teaching context (Beach & Bolden, 2018: 43–50).

Independent practice is crucial in the acquisition of musical skills. According to Williamon (2004), it provides students with the opportunity to hone their instrumental or vocal abilities outside of formal instruction. This supplementary exercise strengthens their existing knowledge and enhances their overall performance capabilities. To ensure optimal individual practice, it is crucial to choose and apply suitable practice approaches carefully. These approaches seek to affect the musician's motivation, emotions and method of choosing, arranging, incorporating and practising new knowledge and skills. While these approaches are usually applied consciously, with repetition they can become automatic (Williamon, 2004: 85–104).

2.4.3 Conclusion of student factors and considerations

In conclusion, student factors and considerations play a pivotal role in shaping the educational landscape and influencing the success of students. It is essential to acknowledge the varied student learning preferences, and strengths of students in order to develop inclusive and effective teaching approaches. The complexity of student needs in a modern educational setting is influenced by factors such as generational characteristics, attention spans, learning disorders and motivation levels. By adopting a pedagogical approach that focuses on the needs of each student, employs interactive teaching approaches and incorporates technology, teachers can establish stimulating and nurturing learning environments.

Furthermore, it is crucial to cater to the specific requirements of Generation Z and Generation Alpha students, who possess innate digital skills and exhibit distinct traits and learning difficulties, to cultivate significant learning experiences. By encouraging collaboration, creativity and well-being in the classroom, teachers could empower students to cultivate crucial skills for the modern era, all the while fostering their emotional and psychological development.

Amid the swift advancements in the digital era, teachers must maintain their ability to adjust and react to the shifting requirements of students. Teachers can foster a dynamic and inclusive educational environment that supports students in achieving their academic goals and realising their full potential by giving priority to flexibility, innovation and personalised approaches. By recognising and attending to the various factors and considerations that affect students, teachers can instil a deep and enduring passion for learning in their students and enable them to thrive in both their academic endeavours and their personal growth.

2.5 ASSESSMENT APPROACHES

In the realm of music education, various assessment approaches are employed to evaluate students' musical abilities. Traditional approaches, rooted in teacher-led approaches during concerts and lessons, prioritise precision, comprehension of musical elements and ensemble work. Aural skill assessments focus on transcription proficiency and critical listening, while rote memorisation exercises gauge historical knowledge retention and assessments cover composition, analysis and sight-reading. These approaches collectively nurture diverse musical competencies. However, a shift towards alternative approaches aims for a more inclusive, student-centred approach. This section explores the traditional and alternative assessment approaches.

2.5.1 Traditional assessment approaches to music

Student performances in recitals and private lessons are assessed using rating scales or rubrics to gauge accuracy, expressiveness and overall performance (Zhukov, 2015). These assessments track student progress, comprehension and ensemble skills based on teacher-defined learning objectives (Hansen & Imse, 2016). Rubric-based assessments focus on technical accuracy and musical knowledge, contributing to skill

improvement (De Luca & Bolden, 2014; Wesolowski, Wind & Engelhard, 2016). Collaborative ensemble work and musical proficiency are also assessed using rating scales and other tools (Pellegrino, Conway & Russell, 2015). However, the traditional emphasis on technical proficiency in music education may disadvantage non-Western classical music students (Mellizo, 2020).

Traditional music assessments assess various skills, including aural proficiency and sight-reading. Buonviri (2019) emphasises the importance of aural skill practice and proposes approaches to enhance adaptability and effectiveness, such as the Music Concept Memory Exercise (Tabuena, Morales & Perez, 2022). Aural skills assessment, including sight-singing, dictation and error detection, focuses on transcribing the music heard. Buonviri (2019) suggests integrating aural skills practice throughout music courses, starting early, and incorporating relevant material into instruction. Sight-reading assessments employ various activities, including tapping, echo singing, playing from memory, improvisation and sight-singing, as well as memory-based tests (Pratt, 1993). This allows students to demonstrate their ability to interpret and perform unfamiliar pieces accurately and expressively.

Traditional music assessments historically relied on rote memorisation to gauge students' music knowledge. Multiple-choice, short-answer and essay tests often necessitate repetitive memorisation of music theory, composition, music history and related topics (Leonhardt, 2005). While rote memorisation exercises improve historical retention (Tabuena, Morales & Perez, 2022), students have shown a preference for historical context before music (Halpern, 1992; Fisher, 2008). Shehan (1987) suggests that auditory and visual channels be used simultaneously to enhance learning and retention. However, the excessive emphasis on rote memorisation in traditional approaches may hinder deeper comprehension, impeding the development of comprehensive understanding and analytical thinking (Grey, 2020).

Music analysis entails comprehensive examinations of musical compositions using music theory concepts and terminology. Pascoe (1999) describes the Music Analysis Test as a pencil-and-paper format where students respond to taped-music excerpts, demonstrating their understanding of elements such as structure, melody, harmony and rhythm. Comparatively, music analysis and sight-reading tests offer concrete evidence of comprehension (Tabuena, Morales & Perez, 2022), with developmental

progression in students' understanding as they advance in instructional levels (Marín, Scheuer & Pérez-Echeverría, 2013).

Music-history assessments require students to complete concise written assignments that explore the historical context and significance of composers and musical compositions. While traditional music-history instruction typically emphasises the chronology of Western art music, Baumer (2015) suggests that these assignments provide engaging advantages to delve into composer biographies and musical genres. Yussuf and Olúbòmęhìn (2018) highlight the importance of preserving cultural values and heritage through music-history assessments.

Music composition assignments challenge students to create authentic compositions showcasing their expertise in elements such as harmony, melody, form, texture and style. Scott (2004) defines performance-based assessments as encompassing a range of activities, such as improvisation, composition, singing, instrument playing and tasks requiring music description, analysis and assessment. Traditional assessments are critical to developing critical listening skills (Walzer, 2015), prioritising interpretation and analysis over sound perception (Thompson, 2019), and improving students' ability to comprehend and analyse music compositions (Beach & Bolden, 2018).

Traditional music assessments often lack sufficient feedback, hindering students' comprehensive understanding of their performance (Scott, 2012). This approach tends to provide final assessments post-instruction, limiting discussion and under-using feedback for future learning, therefore impeding holistic growth as musicians. In addition, the one-size-fits-all assessment approach fails to accommodate diverse student learning preferences and abilities, disadvantages certain students and limits their success (Mellizo, 2020).

Teacher-led assessments may be biased and subjective, despite their importance (Lehman, 1998; Maranzano, 2000). Insufficient administrative support further complicates the grading process for music teachers (Russell & Austin, 2010), while concerns persist about traditional assessment approaches interfering with students' engagement and creativity (Sheridan & Byrne, 2002). Moreover, traditional grading and assessment approaches demand significant time and energy of teachers,

potentially have an impact on instructional quality and cause heightened stress (Goolsby, 1999; Maranzano, 2000).

Exploring alternative assessment approaches becomes essential to understanding students' musical abilities comprehensively. Alternative approaches offer inclusive assessments that accommodate diverse talents and student learning preferences while assessing creativity and critical thinking. These approaches foster deeper connections with music, enhance student engagement and motivation, and align with the shift towards student-centred learning in music education.

2.5.2 Alternative assessment approaches of music

Alternative assessment approaches deviate from the standardised approaches, promoting inclusivity and personalised learning by accommodating diverse learning needs and fostering creativity (Fautley & Daubney, 2019). The use of student-centred approaches, such as portfolios and performance-based tasks, revolutionises the process of assessment by providing a thorough assessment that goes beyond mere test scores (Colwell & Richardson, 2002). The field of music education is witnessing a noticeable transition towards adopting authentic, formative and student-centred assessment approaches. This shift acknowledges the intricate nature of students' musical encounters (Fautley & Daubney, 2019). Teachers are increasingly employing these approaches to incorporate the varied abilities and imaginative expressions of students (Colwell & Richardson, 2002).

Authentic assessments, which are created to replicate real-life tasks, provide a solution to concerns about academic dishonesty (Heilweil, 2020; Senoran, 2020). Studies on technology-based assessments have shown a lack of clarity regarding their influence on rates of cheating (Watson & Sottile, 2010). However, teachers could employ approaches to reduce the likelihood of cheating. Power promotes the use of genuine assessments to increase student involvement and discourage academic dishonesty (Power 2019, 2020).

These assessments simulate authentic tasks, such as playing the piano or creating online modules (Harrison, 2020). Power (2020) advocates problem-based learning in teacher education in which students generate solutions to their own problems. As an example, students work together on a freely available digital textbook, which helps

them to develop their academic writing abilities and encourages peer learning (Power, 2019). Such approaches cultivate intrinsic motivation, diminish cheating temptations and improve comprehension and retention (Power, 2019).

Reflective journals aid students' self-expression and comprehension of their musical journeys (Zhukov, 2015). They support diverse assessment approaches in higher education, including self-assessment and peer assessment (Zhukov, 2015). Reflective logs such as listening logs foster goal-setting and information exchange, although they may be time-consuming (Freeman, 2001; Babcock, 2007). Nonetheless, they enhance feedback literacy and metacognitive awareness, ultimately improving learning experiences (Chen, 2019; Coppens, 2023).

The use of recordings for self-assessment and peer assessment challenges traditional classical music assessment, as students can monitor their progress and identify areas for development (Zhukov, 2015). However, peer and self-assessment approaches are prone to bias and inaccuracies, including potential over- or under-grading (Kulkarni et al, 2013). Despite these challenges, Kulkarni et al (2013) suggest ways of dealing with biased grading and implementing data-driven approaches to improve accuracy.

Assessment projects such as music videos, audio recordings and multimedia displays are used to showcase the technical skills and creative expressions of students (De Vito et al, 2019). DeVito highlights the importance of modifying instruction to suit exceptional students and references Sheridan's research on inclusive Kodály Approaches in 2019. Technology-driven assessments in music education, although promoting digital literacy and creativity (Dunbar, 2018) can also introduce challenges related to accessibility and the need for a balanced approach. It is essential to prioritise meeting the technological requirements of students while also using technology to improve their involvement and educational experience (Lebler, 2012).

Collaborative assessment projects serve as activators to develop students' communication and teamwork skills. Cangro (2015) states that these important results highlight how important it is to provide advantages for music students to collaborate on creating, performing and responding. This aligns with the notion that collaborative projects not only encourage cooperation but also enable the development of crucial interpersonal and communicative skills among students in music education.

Performance portfolios, as a tool for tracking musical growth, have been found to be effective in promoting self-awareness and reflective thinking (Mills, 2009). They are also flexible and can serve the needs of both the curriculum and the individual (Mullin, 1998). However, their creation can be time-consuming and stressful for students and may initially be perceived as an extra burden (Elango, Jutti & Lee, 2005). To respond to these challenges, students may benefit from guidance and support from teachers, and also the incorporation of self-reflection and regular feedback into the portfolio process (Çimer, 2011).

Music improvisation prioritises spontaneous musical creation over the final performance outcome (Gruenhagen & Whitcomb, 2014; Norgaard, 2017). Proper activity sequencing in improvisational learning ensures a structured progression, allowing students to gradually develop skills (Kratus, 1995). This systematic approach fosters creativity, active listening and confidence among students (Griffin & Jacob, 2013) as they are guided through a developmentally appropriate pathway of musical exploration and skill acquisition.

Interdisciplinary unit assessments, weaving music with languages, arts, mathematics or history, bridge academic disciplines and boost critical thinking (Cuervo, 2018). By blending musical concepts with other subjects, students deepen their understanding and connect their learning to real-world contexts (Carrier et al, 2011). This holistic approach encourages the application of knowledge across diverse domains with a view to developing a comprehensive understanding (Cuervo, 2018).

Real-time feedback, delivered through various technologies, has been shown to be a valuable tool for both students and teachers, fostering in-the-moment learning and skill development (Mandouit, 2018). Digital tools can further enhance the impact of feedback by capturing and tracking its effects, rendering the feedback process more visible and impactful for students (Winstone, 2019). Real-time feedback has also been successfully used in a virtual teaching environment to improve non-verbal communication skills, with participants demonstrating increased mindfulness of their body postures (Barmaki & Hughes, 2015).

Podcasting offers students numerous advantages. It develops skills in music production, storytelling and engaging with audiences globally (Bolden, 2015). Podcast-

creation fosters reflective thinking, promotes metacognitive skills and empowers independent learning (McLoughlin, Lee & Chan, 2006; Nie, Cashmore & Cane, 2008). Approaches such as enhanced podcasts with images and reference materials enhance the learning experience (Dale, 2007).

These approaches go beyond technical proficiency, accommodating diverse talents and student learning preferences for equitable assessment (Tai et al, 2022). Studies advocate inclusive assessment approaches, highlighting their role in challenging assumptions and showcasing inclusive approaches in contemporary designs (Tai et al, 2022). Ventouris, Rousoulioti and Iliopoulou (2022) emphasise the prevalence of alternative approaches such as self-assessment, portfolios and projects in education promoting inclusivity. Morris (2019) underscores the importance of inclusive assessment in education, noting student support for change, especially among those with diverse learning needs, while acknowledging the reservations that require fairness and effectiveness in implementation to be pursued.

Alternative assessment approaches in music education prioritise holistic evaluation, emphasising creativity, critical thinking and a comprehensive grasp of music. Barbot and Lubart (2012) introduce the musical expression test (MET) to assess musical creativity and identify different product-based ‘creative styles’. Payne et al (2019) underline the role of effective assessment practices, stressing reliable measures, the use of feedback and the need for transparent assessment processes. These approaches inherently promote holistic evaluation by nurturing creativity, critical thinking and deep musical understanding.

According to various studies, one advantage of alternative assessment approaches in music education is their alignment with student-centred learning. Scott (2012) and Payne et al (2019) both emphasise the importance of assessment in supporting and improving learning outcomes, with Payne emphasising its impact on improving student performance and guiding instructional decisions. Furthermore, De Vito et al (2019) investigated the value of alternative assessment approaches in helping to understand students' musical experiences and preferences, particularly those students with disabilities. Collectively, these studies emphasise how alternative assessment approaches in music education can align with student-centred approaches, enriching their overall learning experience.

Alternative assessment approaches, notably reflective learning, present a distinct advantage by significantly enhancing student engagement and improving learning outcomes. Reflective-focused assessment approaches effectively promote self-regulated learning and individuality among students (Wood & Kurzel, 2008; Mahdavinia, Tabatabaei & Rahimi, 2011). However, their implementation may pose challenges, necessitating approaches that respond to student concerns and facilitate engagement in the assessment process.

Real-time feedback in alternative assessment approaches has been shown to benefit students significantly across different academic tracks (Blau, 2019). According to McKendree (1990), this kind of feedback can improve performance and foster the development of new skills. It is especially effective when it is goal-directed. Additional ways of increasing the efficacy of feedback are to customise it based on response certainty and unique student learning preferences (Vasilyeva, De Bra & Pechenizkiy, 2008). Real-time feedback from online summative assessments can motivate students to act and enhance their learning objectives.

Alternative assessment approaches, particularly project-based assessments, have been found to foster creativity in students. Cahyani (2021) underscores the effectiveness of project-based learning in improving students' creativity, particularly in engaging them in real-world problems and directly involving them in the learning process. Boubouka and Papanikolaou (2013) add to this by demonstrating the effectiveness of peer assessment in improving students' project-based learning deliverables. These studies collectively highlight the synergy between project-based assessments, student creativity, and engagement, emphasising the positive outcomes that can be attained, as observed through project-based learning approaches.

Students' digital literacy is improved when technology is used in alternative assessment approaches, according to research (Smith & Qayyum, 2015; Kaeophanuek, Jaitip & Nilsook, 2018). Balajthy (2007) suggests that teachers can enhance their comprehension of student achievement by using computer-based and web-based tools for reading and literacy assessment. These studies imply that the purposeful use of information tools can enhance assessment design and student learning.

Differential assessment approaches are advantageous in meeting the needs and learning preferences of individual students, as several studies have demonstrated. Irwin and Hepplestone (2012) emphasise the importance of flexibility in assessment. According to Janisch, Liu and Akrofi (2007), alternative assessments can empower students and provide a more thorough understanding of their abilities. These findings support the notion that alternative assessments can provide a more personalised and inclusive assessment process.

Lebler (2015), Zhukov (2015) and De Vito et al, (2019) have all mentioned alternative approaches to assessment in music education that create connections to the outside world by combining music with other academic subjects. These approaches prioritise comprehending the experiences and preferences of students, encouraging lifetime musical engagement and working together with them to develop assessment criteria. They also emphasise the importance of using technology for assessments and also peer and self-evaluation.

Teachers face pressure to complete an increasing load of paperwork, making alternative assessments such as portfolios and reflective logs time-consuming (Flowers et al, 2005; Tisani, 2008). Despite the challenges they can present, such as non-completion and resistance, portfolio assessment is recommended, warranting further investigation of its potential (Afrianto, 2017). Limitations of resources can hinder alternative assessment approaches, especially for students with weaker IT skills (Arifuddin, 2021). Despite common resistance from teachers, with adequate resources and support, they can adopt alternative assessment approaches more positively (Aschbacher, 1994; Flowers, 2005; Watt, 2005; Nasri et al, 2010).

2.5.3 Conclusion of assessment approaches

In conclusion, both traditional and alternative assessment approaches in music education offer distinct advantages and disadvantages. Although traditional approaches prioritise technical proficiency and historical knowledge, they are often hindered by biases and inflexible frameworks. In contrast, alternative approaches prioritise inclusivity and creativity, but they may face challenges due to limited resources and inconsistencies in grading.

To overcome these constraints and promote a more inclusive learning atmosphere, it is crucial to incorporate alternative assessment types into music education. By integrating both conventional and unconventional approaches, teachers of music can foster a more captivating and enlightening educational encounter. The purpose of this integration is to bridge the divide between learning that focuses on proficiency and pedagogies that are personalised and inclusive.

The primary objective of transitioning to a seamless learning approach is to incorporate these various methodologies effectively and seamlessly. This innovative blend seeks to harness the strengths of both paradigms, promoting proficiency while nurturing creativity and inclusivity.

Looking ahead, the following section delves into the principles of seamless learning, explore its potential to revolutionise teaching and learning practices, and pave the way for a more dynamic and effective educational landscape.

2.6 SELF-DIRECTED LEARNING APPROACH

Self-directed learning (SDL) is essential in our rapidly changing world, because it empowers individuals to take charge of their learning (Morris, 2019). It involves students planning, implementing and assessing their learning needs and outcomes, either with or without assistance (Edmondson, Boyer & Artis, 2012). Implementing SDL in education requires careful scaffolding and structuring to develop the necessary soft skills, which differ significantly from traditional lecture-based approaches (Robinson & Persky, 2019). Teachers can overcome challenges in incorporating SDL through proactive course design and appropriate support for learners new to this model (Robinson & Persky, 2019). According to Graesser and McNamara's (2010: 234–244) findings, the concept of SDL and the ability of instructive representatives to promote a deeper comprehension and grasp of complex subjects can be applied to music education.

2.6.1 Advantages of a self-directed learning approach

SDL is an approach in which students take control of their educational journey, offering numerous advantages in education. SDL enhances students' ability to focus on the useful information they lack, potentially improving their encoding and retention

(Gureckis & Markant, 2012: 468–469). It fosters the development of critical skills such as problem-solving, self-reflection and independent learning (Bester, 2021: 1). SDL empowers students to set their own objectives, choose learning approaches and assess their progress, promoting active engagement in the learning process (Alizadeh & Barat, 2015; Bester, 2021: 3). This approach is particularly valuable in higher education, where students are expected to reach high levels of individual capability and identify their training needs (Alizadeh & Barat, 2015). These benefits make SDL a fundamental aspect of improving education and an important programme in education.

2.6.2 Disadvantages of a self-directed learning approach

SDL offers promising advantages, but it also presents challenges that need to be dealt with if learning outcomes are to be optimal. Students may experience dissatisfaction and disappointment in online SDL environments due to a lack of preparation (Reyes & Caballes, 2021: 51). SDL approaches can positively influence students' flow state and negatively predict internet cognitive fatigue, ultimately affecting learning effectiveness (Shao, Hong & Zhao, 2022: 07). The implementation of SDL requires careful consideration of the teaching environment, learning environment and technology to ensure its effectiveness (Reyes & Caballes, 2021).

2.6.3 Different contexts of self-directed learning

SDL has been around for many academic years in education, emphasising student autonomy and lifelong learning. It involves students taking control of their learning process, including setting goals, choosing approaches and assessing outcomes (Bester, 2021). SDL is particularly relevant in the context of open education and technology-enhanced learning in Africa (Mhlanga, 2022). In online environments, SDL can help with responding to challenges such as student dissatisfaction with the teaching-learning process by allowing students to customise their experiences (Reyes & Caballes, 2021). Teachers play a vital role in fostering SDL, employing various approaches such as language-learning histories, future self-exploration, planning-action-reflection cycles and peer interaction (Ohashi et al, 2021). Whereas SDL shows promise for educational transformation, more targeted research is needed to establish its efficacy in different contexts (Mhlanga, 2022).

2.7 SEAMLESS LEARNING APPROACH

Seamless learning is an innovative teaching approach that emphasises the seamless integration of formal and informal learning experiences. The approach combines traditional classroom-based learning with digital technologies and informal learning settings to create a continuous and personalised learning experience for students (Wong & Looi, 2011: 2364–2381). Seamless learning recognises the evolving nature of education in the 21st century and the necessity for students to use various modes of learning to gain future-ready knowledge and abilities. Without having regard to time, location or circumstance, the objective of seamless learning is to establish an environment in which learning can occur at any moment, in any setting and in any format. This section presents a comprehensive outline of seamless learning, including its characteristics, advantages and disadvantages.

In his 2015 publication titled 'A Brief History of Mobile Seamless Learning', Wong categorises seamless learning into two distinct domains that have developed gradually. The first domain emerged in the early 1990s and was focused on reforming higher education. Scholars and leaders questioned the gap between faculty members and student affairs professionals, which led to a conflict between the perceived domains of student life in and out of the classroom. This dualism was seen as a barrier to holistic visions of the way students learn and develop.

The second phase of seamless learning emerged in the mid-2000s; it was focused on technology-enhanced learning, particularly mobile and ubiquitous learning.[7] This domain is characterised by the development of mobile-assisted seamless learning (MSL) and the use of mobile technology to bridge formal and informal learning contexts. Despite bearing the same name, the two domains of seamless learning have had little interaction with each other until 2011.

The importance lies in having a learning framework that is compatible, widespread and smooth, one which allows for a pervasive learning environment. This design enables the seamless dissemination of educational resources, ensuring effortless availability

[7] Mobile and ubiquitous learning refer to learning environments that enable seamless learning at any time and place, allowing students to engage in educational activities without interruption while moving between physical locations (Chiu et al, 2008).

and intentional incorporation into learning opportunities. Ng and Nicholas (2007: 3–4) conducted a comprehensive analysis of Sharples, Taylor and Vavoula's (2007) 'A Theory of Learning for the Mobile Age', highlighting the crucial interplay between mobile and stable technologies in facilitating uninterrupted learning, particularly in conventional educational environments.

The theory of learning for the mobile age prioritises constant movement, the incorporation of mobile technologies, learning in specific contexts, worldwide connectivity and the expansion of formal education (Wong, Milrad & Specht, 2015). It emphasises the fluidity of knowledge transfer, the use of devices for learning at any time and place, the exploration of immediate surroundings for educational purposes, global communication for collaborative learning and the incorporation of mobile education as an extension of conventional learning. These concepts demonstrate the profound influence that mobile technologies now exert on contemporary education (Sharples, Taylor & Vavoula, 2007).

Ubiquitous learning environments involve seamlessly integrating learning into everyday life through constant access to educational resources using pervasive technologies. Chiu et al (2008: 259) emphasise the significance of ubiquitous learning environments in facilitating continuous learning experiences in different settings. Context-aware, ubiquitous learning environments are important to ensuring that people can keep learning even as they move between set locations, which should ensure that learning opportunities are always available wherever they may be (Hwang, Tsai & Yang, 2008).

Seamless learning is characterised by the incorporation of both formal and informal learning experiences, which ensures that students experience a continuous and customised educational journey. This approach employs digital technologies, including mobile devices, social media and learning management systems, its focus being on putting students at the centre and encouraging their active participation (Sharples, Taylor & Vavoula, 2007: 1–10). For these reasons, personalised instruction and immediate assistance are crucial in contemporary online education, because they ensure that the instructional material is tailored to meet the specific needs of every student (Obisat & Hattab, 2009: 126).

By the same token, the incorporation of mobile technologies in music education seeks to enhance learning experiences by enabling mobility across physical, digital and communicative domains (Rogers & Price, 2009: 4–5). Mobile devices that are everywhere and easily connected to education allow for convenient access to practice tools and resources, promoting continuous skills improvement outside of formal settings (Baloian & Zurita, 2012: 7000).

The accumulation of experiences in various settings also influences episodic learning, which can shape a person's overall learning process (Wong, 2012: E20). Wong (2013: 210) proposes a new understanding of the expression 'seamless learning environment', highlighting the importance of combining the physical and virtual spaces that individuals encounter in their everyday lives. This approach empowers students to create learning environments both in and outside of their homes.

According to Webster (2000), incorporating seamless learning is essential to a comprehensive teaching approach in secondary school music education. Moreover, it has been claimed that music education has the ability to enhance global competencies such as critical thinking and teamwork (Tervaniemi, Tao & Huotilainen, 2018). Moreover, Crawford (2013) introduces an all-encompassing instructional structure for comprehensive music education. These studies emphasise the significance of a unified music education programme that fosters the improvement of skills.

In conclusion, seamless learning entails the integration of various educational environments, combining technology with both formal and informal learning experiences in order to promote continuous and personalised education across physical and digital barriers. This methodology encourages student independence, the cooperative resolution of problems, and a focus on the needs and interests of the students. Seamless learning in music education in particular combines different elements to cultivate essential skills in a comprehensive learning environment. It also teachers and students offers a flexible framework within which to improve educational experiences in various settings and contexts, allowing for exploration in future educational environments.

2.7.1 Advantages of seamless learning

The advantages of seamless learning are widely recognised by students, teachers and educational institutions. Sharples, Taylor and Vavoula (2007) highlight its ability to create a flexible and self-directed learning environment tailored to each student's needs. In a rapidly changing modern society, the emphasis on continuous learning throughout one's life becomes particularly important, as emphasised by Wong and Looi (2011: 2364–2381). In addition, teachers gain advantages from the wide range of resources offered by seamless learning, which enables them to create captivating learning experiences and provide personalised feedback.

The incorporation of emerging technologies into seamless learning, with a focus on continuous learning experiences across various settings and time frames, is gaining traction. Demirer, Aydın and Betül Çelik (2017) and Wong and Looi (2011) highlight the potential of the internet and mobile devices to facilitate seamless learning. Durak and Çankaya (2018) present an exhaustive examination of the subject, highlighting its growing prevalence, specifically in research pertaining to students in grades K–12. In their study, De Waard, Özdamar Keskin and Koutropoulos (2014) proposed that the implementation of seamless learning designs in massive open online courses (MOOCs) should effectively tackle problems such as high dropout rates and challenges such as varied learning environments. These studies collectively underscore the significance and advantages of seamless learning in enhancing educational experiences.

Empowering students to navigate their learning journey across various contexts independently is a key aspect of seamless learning. Setyosari, Kuswandi and Ulfa (2020) demonstrate how this approach provides students with the freedom to decide when and where they participate in educational tasks. According to Sharples (2015), it is critical to cultivate both independent and collaborative learning abilities, which would apply particularly to music students. Scholars such as Li et al (2022), Loureiro, Messias and Barbas (2012), and Milrad (2016) concur with this viewpoint, placing particular emphasis on the promotion of self-directed learning that can be adjusted to various circumstances.

The studies conducted by Xin, Zuo and Huang (2018) on open education platforms and Setyosari, Kuswandi and Ulfa (2020) on instructional design in elementary education demonstrate the substantial potential of seamless learning to enhance different educational contexts. Collectively, these studies confirm that the integration of seamless learning significantly improves educational achievements, levels of engagement and accessibility to resources across different educational stages.

The research on effective approaches to enhancing engagement and motivation in educational environments is wide-ranging. Dindar et al (2021) stress the importance of ongoing student engagement in secondary schools, whereas Mykytiuk et al (2022) emphasise the beneficial effects of integrating web-quizzing into higher education. Bahji, Lefdaoui and El Alami (2013), and Staikopoulos et al (2015), put forward frameworks with the objective of improving engagement through the use of technology and innovative design. These studies demonstrate the ability of seamless learning to integrate approaches and technologies as a way of sustaining engagement and motivation.

Seamless learning is essential to fostering contextual learning and real-world relevance (Glahn & Gruber, 2020); it enables a continuous flow of meaning-making despite changes in the physical and social contexts (Sharples, 2015). This is particularly relevant in the English second-language (ESL) context, where seamless learning can revolutionise teaching and learning by enriching the opportunity for continuous learning (Abdullah & Hashim, 2021). In the context of open and distance learning, the design of seamless learning environments is crucial, with specific criteria identified for this purpose (Yetik, Ozdamar, & Bozkurt, 2020).

The integration of formal and informal learning experiences through seamless learning has the potential to enhance personalised and adaptive learning experiences (Kinshuk, 2014). Moreover, the creation of pedagogy-driven personalisation frameworks that consider the unique needs of each student and the diversity of learning resources available further supports this (Arapi et al, 2007). By offering customised content and presentation techniques, the use of emerging learning platforms, such as digital and smart learning tools, can also promote personalised and adaptive learning experiences (Kem, 2022).

Furthermore, Kohen-Vacs, Milrad and Jansen (2019) stress the importance of seamless learning in the digital age, where students can switch effortlessly between formal and informal learning. They discuss the challenges and opportunities of designing and implementing cross-context educational activities using web and mobile technologies to support innovative educational interactions. By providing authentic learning experiences whenever students want them, this approach promotes seamless learning. Sharples (2015) emphasises the need for continuous meaning-making despite changes in context, which is achievable through mobile educational games and learning integration across different settings. Müller-Werder and Erlemann (2020) underscore the importance of connecting abstract concepts with practical experiences, highlighting the role of technology in facilitating this process. These findings demonstrate how seamless learning can reduce learning gaps and render transitions easier.

Education becomes more inclusive and accessible through the implementation of seamless learning, which allows for flexible learning (Pearson & Koppi, 2002). Yetik, Ozdamar and Bozkurt (2020) underscore the importance of establishing cohesive learning environments that are well suited to distance and open learning. Similarly, Andrade and Alden-Rivers (2019) stress the necessity of having in place a framework that guarantees the sustained expansion of flexible learning opportunities. Seamless learning therefore has the potential to enhance accessibility; however, these studies suggest that adopting an inclusive approach is important.

Real-time feedback, facilitated by seamless learning, is an advantageous feature that provides continuous comprehension assessment in the classroom. In this regard, Al-Shahrani, Mann and Joy (2017) highlight the creation of a technology-based real-time feedback system for teachers and students, one that enhances the pedagogical value of the learning environment. Importantly, seamless learning also enables immediate feedback, which is a valuable attribute for the continuous assessment of understanding in the classroom. This pragmatic solution necessitates no specialised apparatus or spatial arrangements while providing valuable insights into student comprehension through instructional methodologies. Integrating technology into the feedback process aligns with the evolving educational landscape, contributing to effective teaching practices and enhanced student engagement.

In conclusion, seamless learning offers a flexible, self-directed environment that is tailored to individual needs in contemporary education. The integration of new technologies, student empowerment in diverse learning contexts and personalised experiences demonstrate its adaptability and effectiveness. Engagement, motivation, contextual learning and real-world relevance studies point to its positive effects on education. Seamless learning is inclusive and accessible, meeting changing educational needs. Real-time feedback improves both teaching and student comprehension. Seamless learning highlights the need for continuous improvement. With its focus on continuous learning, adaptability and enhanced educational experiences, seamless learning is a dynamic, transformative approach to education.

2.7.2 Disadvantages of seamless learning

This section examines the disadvantages of seamless learning, focusing on challenges such as the transition to online platforms, technical difficulties, potential data-security vulnerabilities and the financial limitations. The analysis focuses on the intricacies of monitoring student achievement, controlling digital diversions and dealing with adverse behaviours. Furthermore, it emphasises the difficulties that teachers face in adjusting to advancing technology and the limited integration of mobile technology in primary schools. To develop seamless learning environments effectively, it is necessary to implement strategic interventions, be flexible and conduct ongoing research to respond to these issues.

To adopt a holistic approach, one must comprehend the complexities of seamless learning. The shift from conventional classrooms to online platforms for more effective learning raises new challenges while pursuing personalised solutions (Martinez, 2013). According to Pillay, Clarke and Hearn (2005), understanding individual learning behaviours in seamless learning requires navigating complex contexts and student variables. However, as pointed out by Kohen-Vacs, Milrad and Jansen (2019), there are still technical challenges with the software architecture for these tools.

The integration of learning approaches and motivation presents challenges to seamless learning (Chai, Wong & King, 2016). The lack of extensive research in primary schools with limited access to mobile technology further confounds its ability to enhance student learning (Setyosari, Kuswandi & Ulfa, 2020). The necessity for

well-planned in-class learning designs is highlighted by the practical implementation challenges highlighted by Hwang, Lai and Wang (2015), which highlight the critical importance of supporting students' learning across home and school environments. Knowledge transfer between contexts requires meticulous orchestration, as pointed out by Sharples (2015).

Data security is vital in seamless learning, with risks associated with the collection and utilisation of personal data (Robertson & Muirhead, 2019). The need to maintain privacy while enjoying the convenience of online services creates risks, requiring increased awareness and strong protective measures (Robertson & Muirhead, 2019). The presence of technological limitations can hinder the smooth progress of learning, particularly in underprivileged regions that have restricted access to technology and the internet (Dan-Zhu, 2005).

Internet quota funding is crucial so that students can get over the financial hurdles of obtaining data for online learning. During the COVID-19 pandemic, this need became even more apparent due to the significant difficulty caused by insufficient funding for internet data (Mansyur, Akidah & Sulaiman, 2022). Ensuring equitable access to online education and facilitating effective remote learning requires allocating resources to internet quota funding. To close the achievement gap and increase participation in online learning, this funding is crucial.

In online and seamless learning environments, tracking student performance and delivering feedback remains a challenge. Automating performance monitoring is essential to keep struggling students from falling behind in the absence of constant supervision (Raza, Sharma, & Chaudhary, 2021). To effectively track students' academic performance in distant settings, automated systems must be put into place. This approach considers the importance of prompt intervention, making sure that students, even in online classrooms, get help and direction.

Enhancing academic achievement by effectively managing digital distractions and fostering self-discipline is a challenging endeavour, as noted by Pérez-Juárez, González-Ortega and Aguiar-Pérez (2023). Focused learning approaches are critically necessary to tackle this challenge, according to Dilger, Gommers and Rapp (2019). By using these approaches, students can tap into a broader array of experiences to

develop a more comprehensive understanding of the subject-matter. In essence, managing distractions and promoting self-discipline become pivotal elements in the quest to enhance the overall academic experience and performance of students.

Preparing for online collaboration initiatives is becoming increasingly difficult for teachers due to the increasing demands of technology. The ever-changing world of educational technology presents these obstacles, which make it difficult for learning to adapt seamlessly. Reinhardt and Elwood (2019) shed light on the significant influence that technological demands have on teachers, especially when it comes to incorporating online collaboration. As teachers face these difficulties, the complex link between technological advancement and the efficacy of seamless learning becomes clear.

A major cause for concern is the fact that students' negative learning behaviours persist even in classrooms where there are ample opportunities for instruction and extra help. The possibility that students may display behaviours such as boredom, disengagement and failure despite the availability of instructional materials and support is a significant challenge in educational settings, as pointed out by Ali et al (2022). To create more engaging and productive learning environments, Ali et al suggest taking proactive steps to address and mitigate these negative learning tendencies. To create a welcoming and supportive environment where students can learn, it is necessary to address the persistent problem of negative behaviours.

Convincing teachers to adopt essential curriculum modifications for effective learning initiatives is difficult when they exhibit resistance. Zhidong (2012) asserts that to achieve successful implementation and adoption of novel approaches in educational environments, it is critical to surmount this resistance. The acknowledgement of resistance as an obstacle highlights the criticality of confronting and alleviating opposition to guarantee the successful implementation and assimilation of novel educational approaches. The significance of surmounting opposition in cultivating a more flexible and dynamic academic milieu.

The primary cause for concern regarding the limited implementation of mobile technology in elementary schools is the dearth of research in this domain. Setyosari, Kuswandi and Ulfa (2020) argue that further investigation is urgently required to

establish matrices for instructional design and learning planning. The implementation of these matrices would facilitate uninterrupted learning in elementary schools, where limited access to mobile technology presents an obstacle. The imperative for additional investigation emphasises the criticality of rectifying knowledge deficiencies and formulating pragmatic resolutions to improve the incorporation of technology in primary education.

In conclusion, as discussed, seamless learning has some disadvantages that should be addressed. The shift to digital platforms brings about complexities that necessitate customised resolutions, and comprehending unique learning patterns necessitates skilful navigation across various contexts. Difficulties with data security, financial constraints and technical integration all contribute to the complex tapestry that is seamless learning. Internet quota funding plays a crucial and indispensable role in surmounting financial barriers that hinder the achievement of equitable access to online education. The necessity for strategic interventions is underscored by the ongoing difficulties associated with automating performance monitoring, managing digital distractions, and addressing negative behaviours. The fact that teachers do not always want to follow technological demands and changes to the curriculum and that mobile devices are not allowed in elementary schools make seamless learning challenges even more complicated. Finally, dealing with these difficulties needs flexibility, prompt action and a strong dedication to ongoing research for seamless learning environments to develop effectively.

2.7.3 Conclusion of a seamless learning approach

Seamless learning is an innovative educational approach that combines traditional classrooms and digital technologies to bridge formal and informal learning experiences. The classification by Wong and Looi into two phases emphasises the evolution of this approach, focusing on the integration of different contexts and personalised learning facilitated by technological advancements. The advantages of seamless learning are apparent in its capacity to provide adaptable, self-guided learning settings that accommodate individual requirements. Seamless learning has the potential to revolutionise education by improving engagement, motivation, contextual learning, and real-world applicability. Nevertheless, it is crucial to recognise the obstacles it presents, including issues related to data security, financial constraints

and the reluctance of teachers to embrace technological advancements. To tackle these problems, it is necessary to implement strategic interventions, maintain flexibility and conduct continuous research to ensure the successful creation of seamless learning environments.

2.8 SEAMLESS LEARNING EXPERIENCE DESIGN FRAMEWORK

In their article, 'Proposing a Seamless Learning Experience Design (SLED) framework Based on International Perspectives of Teachers from Five Higher Education Institutions', Hambrock and De Villiers (2023) introduce the SLED framework. The framework aims to provide teachers in higher education with a seamless learning experience by drawing on insights from teachers at five international institutions. By proposing a framework based on five key concepts: core, human, positive, practical and design, this study fills a gap in the literature (Hambrock & De Villiers, 2023: 52).

Teachers from five international higher-education institutions participated in the study. According to Hambrock and De Villiers (2023), these teachers engaged in a session using the Disney-method,[8] each assuming distinct roles. Using post-it notes and workshops, they exchanged insights on seamlessly integrating learning experiences. The gathered data underwent analysis employing interpretive inductive reasoning, identifying five key themes and sub-themes (refer to Figure 2-3). Hambrock and De Villiers (2023: 55–56) offer comprehensive details on sampling, demographics, data collection and analytical approaches.

[8] The Disney Method, also known as the Walt Disney Method, is a creativity technique that involves participants taking on the roles of dreamer, realist and critic to generate ideas (Schawel & Billing, 2014).

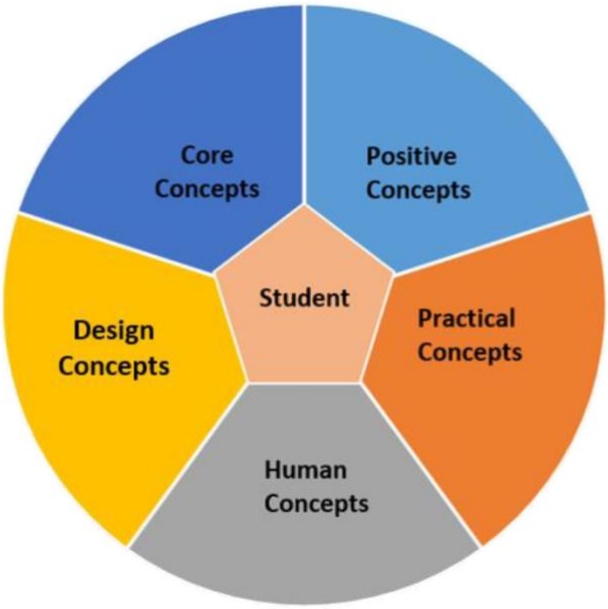

Figure 2-2: The Seamless Learning Experience Design (SLED) framework

2.8.1 Core concepts (pedagogical enhancement)

The core concepts that are necessary to provide an enhanced, seamless learning environment include several related sub-themes that are crucial for both teachers and students. According to Hambrock and De Villiers (2023: 58), these ideas are essential for identifying critical components that are necessary for the achievement, facilitation and enhancement of a holistic approach to learning. They include alternative teaching and learning approaches, acknowledging challenges, promoting expert engagement, emphasising innovation, measuring success, fostering networking among students and advocating scholarship. Together, these concepts form the core concepts of the framework, ensuring a comprehensive, effective and seamless learning experience.

2.8.1.1 Alternative teaching and learning opportunities

The need for a flexible, cross-physically bound learning environment is emphasised in seamless learning. As noted by Hambrock and De Villiers (2023: 58), seamless learning is parallel to ‘a university without walls’, emphasising its lack of location constraints. By incorporating multiple senses into the learning process, seamless learning should extend learning beyond conventional boundaries and expose students to a range of real-world situations. The significance of seamless learning in a variety of cross-cultural settings was emphasised by De Villiers and Hambrock (2023: 58).

2.8.1.2 Challenges'

The challenges of seamless learning are diverse. Technology failures such as the absence of information technology (IT) specialists, concerns about wi-fi accessibility and stability, as well as issues with data management, support and associated costs, were highlighted. Furthermore, issues regarding a lack of digital literacy impeding successful implementation were raised. Concerns about the practicality of seamless learning across diverse content types and challenges related to assessment approaches were also noted. These challenges prompted critical questions about essential infrastructure (Hambrock & De Villiers, 2023: 58).

2.8.1.3 Expert engagement

Expert engagement involves a collaborative approach between teachers, students and industry experts. As described by Hambrock and De Villiers (2023: 58), participants emphasised the necessity for students and teachers to partner with industry professionals. They suggested initiatives such as 'live interviews with experts in their environment' as a means of facilitating this engagement. In addition, participants highlighted the importance of seeking advice from experienced individuals rather than reinventing established practices. The sentiment expressed was to leverage the expertise of those who have prior experience in relevant fields.

2.8.1.4 Innovation

Innovation presents opportunities to stimulate creativity and offer unique learning experiences. Hambrock and De Villiers (2023: 58) noted that the application of seamless learning could foster creativity and innovation and challenge students in their learning journeys. Examples of innovative ideas discussed include the creation of cross-cultural, virtual and holograms in classrooms, along with the integration of augmented- and virtual reality (AR/VR) to enhance learning experiences. These innovative approaches aim to diversify and enrich the learning environment, providing novel avenues for education.

2.8.1.5 Measurement of success

The lack of empirical evidence supporting the effectiveness of seamless learning makes measuring success difficult. Hambrock and De Villiers (2023: 59) highlighted the need for research to monitor and evaluate the efficacy of seamless learning, particularly in terms of student success. They emphasised the importance of gathering student feedback to gain insights into areas that need to be improved. This feedback loop was identified as critical to understanding student perspectives and improving the efficacy of seamless learning approaches.

2.8.1.6 Network with other students

Networking among students in the context of seamless learning contributes to enhancing interpersonal social learning and collaborative learning experiences. According to Hambrock and De Villiers (2023: 59), an example showcasing the significance of a centralised social interactive learning management system (LMS) lies in fostering collaborative and social constructionist learning approaches. They emphasised the potential for group studies and collaborative consultations among students, particularly for group assignments. In addition, participants noted that the accessibility of classes through seamless learning enables inclusivity, allowing individuals to join and participate from any location. This aspect of seamless learning facilitates broader accessibility to educational opportunities, fostering a collaborative and inclusive learning environment.

2.8.1.7 Scholarship

Participants highlighted how seamless learning can cultivate a scholarly atmosphere centred around teaching and learning, as observed by Hambrock and De Villiers (2023: 59). They emphasised that this is achieved through nurturing interdisciplinary connections, integrating real world contexts into educational experiences, and creating innovative applications that blend theoretical principles with practical applications. Despite some participants expressing hesitancy about mandating seamless learning across all modules due to practicality concerns, they underscored the importance of departmental panels deliberating to determine the most effective approach for integrating seamless learning into diverse modules. This collaborative decision-making process was emphasised as vital in establishing optimal practices for incorporating

seamless learning across various academic environments (Hambrock & De Villiers, 2023: 59).

2.8.2 Positive concepts (holistic learning)

The SLED framework incorporates positive concepts outlined by Hambrock and De Villiers (2023: 59). Their study emphasises a student-centred approach, acknowledges the influence of globalisation, underscores the significance of practical experience, prepares individuals for future pursuits, promotes real-time interaction, facilitates remote access and underscores the abundance of research opportunities.

2.8.2.1 Student-centred approach

Prioritising a student-centred approach and accommodating diverse student learning preferences and abilities are crucial in educational design. Hambrock and De Villiers (2023: 59) emphasise how seamless learning fosters inclusivity by addressing the needs of individuals with disabilities and various student learning preferences. This accommodation supports personalised learning and enhances critical-thinking skills, benefiting students' cognitive development. It aligns with evolving educational practices, highlighting the pivotal role of seamless learning in creating an adaptable and engaging educational experience.

2.8.2.2 Globalisation

The process of globalising education entails developing a common platform that combines various international approaches and resources. Hambrock and De Villiers (2023: 59) highlight the online environment's role in fostering a diverse global perspective and enabling the creation of a ‘virtual international classroom’ inclusive of participants from varied cultures. Participants perceive technology as a facilitator, referring to it as a gateway to a ‘global community in your hands’ (Hambrock & De Villiers, 2023: 59). Studies emphasise the accessibility of learning from any location, underscoring the expansive educational opportunities that globalisation presents.

2.8.2.3 Practical experience

Participants emphasised the pivotal role of experiential learning in skill development and its practical application, highlighting its advantages. This emphasis was

underscored by Hambrock and De Villiers (2023: 60), who emphasised its importance in connecting learned techniques and abilities to real-world encounters. In addition, participants stressed the significance of practical experience in broadening one's network and enhancing employability, influencing both skill sets and career prospects.

2.8.2.4 Preparation for the future

The idea that seamless learning significantly improves students' readiness for future roles persists. Emphasising the advantage of seamless learning in equipping students for life after graduation, the incorporation of real-world experiences and interactions with experts was seen as an approach to enhance students' readiness for future employment, acknowledging the pivotal role of professional development (Hambrock & De Villiers, 2023: 60).

2.8.2.5 Real-time interaction

Real-time interaction in education fosters immediate feedback and robust connections among participants, including teachers and students. This approach enables multiple students to engage simultaneously, fostering connectivity beyond traditional class hours and creating an immersive learning environment (Hambrock & De Villiers, 2023: 60). Direct communication between students involved in practical or clinical work and their instructors streamlines the learning process, contributing to a more efficient educational experience. In addition, cloud-based written reports for assessments grant teachers' immediate access, showcasing the effectiveness of real-time connectivity. These capabilities enable diverse and interactive teaching approaches, enriching the educational landscape.

2.8.2.6 Remote access

Remote learning has become a viable option, thanks to advances in technology and the adaptable approaches of seamless learning. students can engage in their unique situations, using their personal resources and abilities, and therefore access information at any time. This inclusive approach fosters connectivity among students living in different cities, effectively eradicating geographical barriers and allowing education to reach a broader audience in line with the globalised landscape (Hambrock & De Villiers, 2023: 60).

2.8.2.7 Research opportunities

Prospects for research advancement are promising in the emerging field of seamless learning, which may lead to ‘increased research output and publications’ and broaden the scope of research opportunities. These findings, according to Hambrock and De Villiers (2023: 60), provide opportunities for results sharing at conferences and building databases for upcoming research projects. Publications that come from this research can also strengthen the institution's ability to innovate and improve its marketing prospects.

2.8.3 Practical concepts (implementation of framework)

The practical concepts within the SLED framework encompass the tangible aspects of seamless learning, which are crucial for its successful implementation. These elements include technical, financial and legal considerations, encompassing various components required for success, such as access and support factors such as data and wi-fi connectivity, necessary devices and hardware, funding considerations, critical infrastructure development, policy establishment, software selection and comprehensive technology resources. These foundational pillars are integral to the seamless integration of this innovative educational approach (Hambrock & De Villiers, 2023: 61).

2.8.3.1 Data and wi-fi

Data and wi-fi connectivity present significant challenges, indicating issues with unstable networks and limited accessibility in the learning environment. As highlighted by Hambrock and De Villiers (2023: 61), these connectivity concerns underscore the challenges posed by unstable networks and restricted access. Their insights emphasise the critical necessity of access to resources, technology and information to facilitate an effective learning environment conducive to seamless learning experiences.

2.8.3.2 Devices and hardware

Devices and hardware pose multifaceted challenges within the learning environment. Despite issues such as stolen devices and insurance concerns, Hambrock and De

Villiers (2023: 61) believe that providing every student with access to a computer, tablet or smartphone is ideal. One way to solve this is for schools to work together with tech companies. They can give devices to students by making agreements with these companies. These insights shed light on the complexities surrounding device accessibility and highlight approaches aimed at mitigating these hurdles.

2.8.3.3 Funding and cost

In a seamless learning environment, funding and cost can pose significant concerns. Various financial issues arise, emphasising the perceived high cost of software and technology. Insights shed light on the financial challenges faced and underline the crucial requisites for facilitating an optimal learning environment. Additionally, sustained support and funding, access to high-speed wi-fi, and subsidised or free data are identified as necessary components to enable seamless learning experiences (Hambrock & De Villiers, 2023: 61).

2.8.3.4 Infrastructure

Infrastructure is important for diverse learning approaches like seamless learning, requiring strong support structures. According to Hambrock and De Villiers (2023: 61), successful implementation needs commitment from top leadership to grassroots levels, fostering cooperation among faculty. Moreover, campus-wide wi-fi speed is critical for supporting seamless learning experiences, highlighting the need for comprehensive infrastructure in implementing innovative learning approaches.

2.8.3.5 Policies

Refinement of policies regarding technology use and online learning approaches is foundational within the tertiary education sphere with specific emphasis on refining assessment policies, as noted in various sources. Highlighting the critical nature of a guiding document or framework, Hambrock and De Villiers (2023: 61) note its essential role. Furthermore, ensuring teachers have an in-depth understanding of seamless learning practices is crucial for successful implementation and pedagogical advancement.

2.8.3.6 Software

The potential of software is highlighted by its inventive ideas and applications, which emphasise its role in seamless learning. Promising ideas include applications that keep track of practical hours worked, gauge development, and assign tasks at random. Furthermore, there's a recognised importance to supporting app development and aligning to establish a uniform learning platform to enhance overall educational experiences (Hambrock & De Villiers, 2023: 61).

2.8.3.7 Support

Strong institutional support is crucial for a seamless learning environment, including essential elements such as call centres and specialised services (Hambrock & De Villiers, 2023: 61). Establishing a comprehensive support system and offering resources such as IT specialists, artificial intelligence (AI) tutors, staff training and implementation assistance is vital for successful seamless learning initiatives. Providing adequate training and support remains crucial for seamless learning success.

2.8.3.8 Technology

Technology stands as a cornerstone for seamless learning, as evident in numerous discussions addressing its pivotal role. The concept of technology accessibility emerges, with recommendations favouring the provision of free technology. The successful integration of technology within seamless learning hinges on motivating both staff and students to use technological tools. Furthermore, technology's positive facets are evident, facilitating connections among distanced students and fostering a sense of global community. Nonetheless, challenges surface, such as potential platform complexities leading to chaos and issues concerning unequal access to technology among students and staff (Hambrock & De Villiers, 2023: 61).

2.8.4 Human concepts (implementation readiness)

The SLED framework's Human Concepts section covers a wide range of topics about teachers' and students' preparedness and desire to adopt the seamless learning methodology. Hambrock and De Villiers (2023: 62) note that these include sub-themes

such as skillset, time management, training, variations in norms and convictions, pursuit of equality, cultivation of mindset and fostering a positive attitude towards learning experiences.

2.8.4.1 Skillset

The skillset sub-theme in the seamless learning framework covers crucial aspects related to students' foundational knowledge and computer proficiency. Potential challenges arise when students with varying knowledge and computer skills encounter difficulties, potentially leading to comprehension gaps. Essential skills such as practical application, digital literacy and technical proficiency are vital. Implementing seamless learning not only fosters student skill development but also enhances their job prospects. Addressing teachers' diverse computer literacy levels presents an opportunity for further support and improvement. Providing additional training and resources can empower all teachers to confidently and effectively use technology for instructional purposes (Hambrock & De Villiers, 2023: 62).

2.8.4.2 Time management

Implementing seamless learning poses time management challenges for both students and teachers (Hambrock & De Villiers, 2023: 62). Integrating these approaches demands considerable time investment and amplifies workloads. Concerns are expressed about time availability and experience for developing digital activities, as well as adapting assignments to suit new learning modes, imposing significant time and resource demands. These observations highlight the substantial time and effort required for effective, seamless learning integration.

2.8.4.3 Training

The training subtheme emphasises the importance of comprehensive workshops and training programmes. Students are recognised as needing instructions and training, while teachers require specialised guidance in effectively using the required technology and implementing seamless learning approaches. Extensive provision of workshops and training sessions for both students and teachers is deemed necessary, highlighting the significance of teachers understanding ‘best practices’ (Hambrock & De Villiers, 2023: 62).

2.8.4.4 Differences in norms and convictions

The sub-theme illustrates varying perspectives regarding the effects of cultural, moral and political differences in seamless learning implementation. Hambrock and De Villiers (2023: 62) view these differences as potential barriers, citing disparities in cultural convictions, moral norms, political affiliations and concerns about political, racial and gender equality. Conversely, others perceive these differences as advantageous, emphasising participation in a global classroom and engagement among geographically dispersed individuals.

2.8.4.5 Equality

The equality sub-theme emphasises parity in ‘interactions and learning’, advocating fairness, ‘equity of access’ and comprehensive inclusion of all disabilities to enhance diversity. This aspect highlights the importance of ensuring equal opportunities for all students to succeed and participate fully. In addition, it recommends prioritising open-source resources to enhance accessibility and inclusion (Hambrock & De Villiers, 2023: 62).

2.8.4.6 Mindset

The mindset component of the seamless learning framework prioritises cultivating a constructive perspective, free from criticism, to motivate and involve all participants. Hambrock and De Villiers (2023: 62) underscore its pivotal role in fostering student and faculty engagement with technology, emphasising awareness, responsibility, integrity and a positive attitude. They recommend teachers maintain an open mindset, refrain from offence and recognise the effect of imperfect implementation on student engagement. Encouraging participation involves motivating initially disengaged students through support and appropriate challenges.

2.8.4.7 Positive outlook

Creating a seamless learning environment necessitates a positive outlook from both teachers and students. Their optimism and proactive attitude play a pivotal role in fostering an atmosphere conducive to seamless learning. This optimistic approach involves a determined mindset focused on problem-solving, planning and embracing

the excitement of the learning journey. Such positivity among teachers and students is integral to the successful implementation of seamless learning practices (Hambrock & De Villiers, 2023: 62).

2.8.5 Design concepts (instructional design)

The design concepts cover the basic components needed to create an effective, seamless learning environment. Hambrock and De Villiers (2023: 62) discuss these concepts as they cover topics such as knowledge application, assessment approaches, curriculum and design, feasibility considerations, implementation approaches and various learning approaches. Each of these elements plays a crucial role in shaping the foundation and structure of the seamless learning experience, ensuring its effectiveness in modern educational settings.

2.8.5.1 Application of knowledge

Students are expected to demonstrate practical application of acquired knowledge in the Application of Knowledge component. For example, they could play various roles, such as lawyer, prosecutor or judge, or they could create a comprehensive marketing plan. Such integration of real-world experiences and work placements within classroom settings has the potential to improve practical learning experiences (Hambrock & De Villiers, 2023: 63).

2.8.5.2 Assessment

The assessment aspect of the seamless learning framework incorporates a range of assessment approaches. Hambrock and De Villiers (2023: 63) emphasise the importance of employing diverse assessment approaches that complement various teaching approaches. They highlight proactive technology use and advocate for progress-tracking applications. Opinions on assessment frequency differ; some favour continuous assessments and feedback, while others support recurring assessments for performance comparison. These varying views underscore the need for flexible assessment techniques that consider students' diverse needs and preferences, catering comprehensively to a wide spectrum of students.

2.8.5.3 Curriculum and design

In the curriculum and design sub-theme, concerns arose about additional curriculum changes and challenges in achieving seamless learning across diverse modules. Hambrock and De Villiers (2023: 63) highlighted the need for diverse instructional designers and discussed obstacles to integrating seamless learning. Recommendations included emphasising instructional design, effective design approaches, a question–answer model, an initial steps-design phase and involving educational experts. In addition, suggestions were made to integrate AI into the curriculum and design processes.

2.8.5.4 Feasibility

In evaluating feasibility, questions were raised about the viability of the initiative, weighing the opportunities against the barriers. Hambrock and De Villiers (2023: 63) noted the importance of diverse instructional designers and discussed challenges in seamlessly integrating learning across various modules. Considerations also extended to the university's servers, assessing their capacity to handle potential strain and the potential impact on the educational experience itself. The suggested approach involves implementing a pilot programme to identify and address any errors, thereby confirming the overall feasibility of the project.

2.8.5.5 Implementation

Implementation covered a wide range of topics, including class sizes, implementation challenges, the importance of coordination and a plan of action, and the need for strong technical support. According to Hambrock and De Villiers (2023: 63), diverse instructional designers are critical for overcoming challenges in integrating learning across modules. Furthermore, considerations for communicating decisions to staff and students were raised, emphasising the importance of strategic timing for implementation.

2.8.5.6 Learning approaches

In learning approaches, positive feedback highlighted the potential for enhanced connectivity, creative learning opportunities, and a shift to multi-dimensional

experiences. According to Hambrock and De Villiers (2023: 63), diverse instructional designers are crucial for overcoming challenges in integrating learning across modules. Online learning, fostering a philosophy of open education and advanced engagement, was also seen to facilitate an accelerated curriculum. Recommendations stressed the importance of clear instructions, ensuring academic value in new modalities, and effective perception management during conceptualisation.

2.8.6 Conclusion of the Seamless Learning Design (SLED) framework

The SLED framework, as introduced by Hambrock and De Villiers (2023), stands as a comprehensive and innovative approach to revolutionising education. This framework offers a paradigm shift intended to provide a comprehensive, efficient and flexible learning environment. It was developed through a thorough study involving teachers from five international institutions. By delving into core, positive, practical, human and design concepts, this framework includes crucial elements that are pivotal to effective seamless learning experiences.

The framework creates a solid basis for a comprehensive educational journey by emphasising key ideas such as pedagogical enhancement, alternative teaching approaches, expert engagement, innovation, measuring success, student networking and promoting scholarship. This foundation tackles issues with technology, digital literacy, assessment and infrastructure in addition to encouraging a variety of learning opportunities.

Furthermore, the inclusion of beneficial ideas such as a student-centred approach, globalisation, real-world experience, preparation for the future, instantaneous interaction, remote access and research opportunities highlights flexibility, inclusivity and exposure to a range of viewpoints. This focus fosters an environment conducive to critical thinking, skill development and readiness for the evolving professional landscape.

The practical concepts within the SLED framework underscore the tangible necessities for successful implementation. Addressing aspects such as data and wi-fi accessibility, devices and hardware, funding considerations, critical infrastructure, policies, software selection and comprehensive support mechanisms are crucial steps towards achieving

a seamless learning environment. Attention to these practicalities ensures a robust foundation for the integration of seamless learning approaches.

The human concepts presented in the framework stress the importance of preparedness, skills, time management, training, varied norms and convictions, pursuit of equality, mindset cultivation and a positive outlook. These elements highlight the significance of both teachers' and learners' readiness, adaptability and receptiveness towards adopting seamless learning approaches.

Furthermore, the design concepts encompassing knowledge application, assessment approaches, curriculum and design, feasibility considerations, implementation approaches and diverse learning approaches elucidate the structural and foundational elements needed for an effective, seamless learning experience. These aspects emphasise not only the practical application of acquired knowledge but also the necessity of flexible assessment techniques and adaptable curriculum design aligned with the evolving educational landscape.

In essence, the SLED framework offers a comprehensive, adaptable, and transformative approach to higher education. Its emphasis on multiple facets – ranging from core pedagogical elements to practical implementation approaches – provides a holistic roadmap for institutions seeking to embrace a seamless learning environment. By addressing challenges, promoting inclusivity, fostering innovative approaches, and emphasising adaptability, the SLED framework stands as a cornerstone for shaping the future of education, catering to the diverse needs of learners in a rapidly evolving global landscape.

2.9 CONCLUSION

Chapter 2 summarises the differences between traditional and alternative approaches of teaching and learning. Although they help with structured learning, traditional techniques typically overlook the variety of demands that today's students have. On the other hand, several approaches such as the flipped-classroom model, personalised instruction, individualised learning and multimodal teaching offer creative ways to empower students' individual choices and encourage critical thinking. Even though its

successful implementation requires careful planning, finance and support, the incorporation of ICT has further enhanced the educational experience.

Effective pedagogy is shaped in large part by student factors including environment learning needs and generational differences. In order to create supportive learning environments, the chapter emphasises the importance of inclusive and flexible teaching approaches. Finally, the seamless learning approach facilitated by the SLED framework, offers a transformative framework for integrating technology-based formal and informal learning experiences, guaranteeing that education is flexible and pertinent in a global context setting.

CHAPTER 3

Research methodology

Every experience is a moving force. Its value can be judged only on the ground of what it moves toward and into - John Dewey[9]

3.1 INTRODUCTION

The focus of this chapter is to describe the methods that were used in my research project. It aims to reveal intricate details of music education and understand student engagement and learning experiences using a range of data-collection methods, including classroom observation, end-of-lesson and unit reflection questionnaires and semi-structured interviews. The first section that follows lays a foundation for thoroughly examining how to incorporate seamless learning into the music curriculum for Year 9 students while highlighting the ethical considerations and the matter of data reliability and validity.

3.2 QUALITATIVE RESEARCH METHODOLOGY

This study adopted a qualitative research approach. Creswell and Creswell (2023) assert that qualitative research is an effective method for eliciting the emotional responses of individuals or groups to social or human issues from their own perspective. It entails participants being interviewed and data being collected in a variety of settings. Silva et al. (2022) noted that qualitative approaches provide fresh perspectives and new means of deducing causal relationships which help us to understand complex phenomena. As part of the process, research questions are formulated, the literature is reviewed, and the most effective design, data collection, and analysis techniques are selected (Hathaway & Norton, 2018: 73; Al-Sherbiny & Reda, 2022; Creswell & Creswell, 2023). Qualitative methods excel in helping researchers to investigate local perceptions, subjective reasoning, exploratory

[9] Dewey, 2008: 21.

research, meaning-oriented matters, and offering adaptability and internal reliability (Wolff et al., 2019).

Groenland and Dana (2019: 32–33) also note that qualitative methods can provide a holistic understanding in diverse contexts. It has also shown beneficial effects in distance learning, personalised education, technology integration (Lebid et al., 2021), technology impact assessment on music theory education, and curriculum development based on music education values. These methods help researchers to understand the subject and study the dynamics of phenomena, which advances theory (Bonell, Warren, & Melendez-Torres, 2022: 19).

3.3 RESEARCH PARADIGM

This section briefly discusses several paradigms before identifying the most appropriate choice for this study. Positivism promotes objective reality through empirical observation and science. The approach seeks truth through systematic observation, measurement and experimentation (Lincoln et al., 2011; Braun & Clarke, 2013; Babbie, 2017; Sławecki, 2017; Erciyes, 2020). Post-positivism, or critical realism, acknowledges the influence of perception. Quantitative and qualitative methods are used to assess biases (Lincoln, Lynham, & Guba, 2011; Sławecki, 2017; Creswell & Creswell, 2023). The transformative paradigm deals best with inequalities and prioritises marginalised groups' experiences through research and political change; participatory and culturally respectful methods are used (Creswell & Creswell, 2023).

In interpretivism, qualitative methods reveal social patterns and meanings, arguing that reality is subjective and socially constructed (Merriam & Tisdell, 2016; Sławecki, 2017; Pulla & Carter, 2018). Critical theory uses both qualitative and quantitative research methodologies to challenge dominant ideologies and promote social change on the basis of power and inequality (Lincoln, Lynham, & Guba, 2011; Sławecki, 2017; Erciyes, 2020). Constructivism advocates trustworthiness, participatory enquiry and local realities shaped by shared meanings using hermeneutical and dialectical methods (Braun & Clarke, 2013; Creswell & Creswell, 2023). A multi-paradigmatic approach integrates diverse perspectives and methodologies in order to obtain a complete understanding of the matter being researched (Denzin & Lincoln, 2005;

Lincoln & Lynham-Guba, 2011). Participatory research emphasises practical, empathic, and imaginal dimensions, along with knowledge co-creation and stakeholder perspectives (Sławecki, 2017; Erciyes, 2020).

This study followed the action-oriented approach of pragmatism. The pragmatic paradigm, influenced by Peirce, James, Mead and Dewey, prioritises actions, situations and consequences over antecedent conditions and emphasises practical solutions and what works over rigid methods (Creswell & Creswell, 2023: 40). According to Simpson (2018) and Kelly & Cordeiro (2020), knowledge is dynamic and shaped by experience and enquiry, and beliefs affect actions and outcomes. Pragmatism promotes methods that combine qualitative and quantitative approaches to solve real-world problems (Onwuegbuzie & Leech, 2005; Gilad, 2019). Understanding researchers' choices and their effects on outcomes across contexts is also stressed. This paradigm fits this research's goals because it offers flexible methodologies and practical solutions for real-world problems in an academic setting.

3.4 RESEARCH FRAMEWORK

This section describes and analyses various research frameworks and subsequently identifies the most optimal one for the present study. A systematic framework uses methodical data collection and analysis to uncover insights. The process begins with developing research questions and employing systematic sampling methods, with interviews and observations as key research methodologies (Lu et al., 2012; Hackett & Strickland 2019). An emerging framework adjusts to changing environments by incorporating methods and viewpoints while emphasising adaptability, creativity and teamwork to deal with issues and modern-day challenges.

A critical framework analyses power dynamics and social hierarchies to question existing structures and promote social justice. It uses self-reflection and techniques such as discourse analysis to support marginalised groups (Patton, 2015; Merriam & Tisdell, 2016; Cohen, Manion, & Morrison, 2018; Babbie, 2021; Nastar, 2023). A framework for existentialism focuses on experiences: it aims to enhance our grasp of human existence by exploring authenticity, freedom and accountability using interviews and phenomenological studies (Patton, 2015). The hermeneutic framework is used to interpret texts, symbols or experiences in cultural contexts. It focuses on

subjective understanding through the analysis of texts and interviews to uncover meanings and reconstruct intentions (Patton, 2015; Cohen, Manion, & Morrison, 2018).

This study used a descriptive explanatory framework to comprehend phenomena by delineating the connections between variables, as elucidated by Yin (2018). By employing both qualitative and quantitative methods, this process entails the systematic gathering and examination of data (Babbie, 2017). The descriptive explanatory framework reveals phenomena by analysing factual data to uncover causation or underlying mechanisms. Furthermore, Doyle (2020) underscores the importance of meticulous observation, analysis and interpretation in distinct contexts. Damonte (2021) and Deffner, Rohrer and McElreath (2022) emphasise the framework's ability to be applied and to interpret a variety of situations. Descriptive frameworks use a variety of methods such as conducting research surveys and case studies and performing factor analysis (Seixas, Smith, & Mitton, 2017; Al-Sinani, 2018) to gather and analyse data. These frameworks have different uses and can be used for cross-validation while also providing additional assistance. In this regard, Lesko, Keil, and Edwards (2020) stress the need to mitigate biases in descriptive research.

In my study of the Year 9 LGR-22 music curriculum I found that the descriptive explanatory framework helped me to grasp the dynamics of aspects that interacted with each other. This approach enabled me to pinpoint the correlations and pivotal elements influencing the application of seamless learning in the curriculum, which in turn laid the groundwork for suggesting recommendations and enhancements.

3.5 RESEARCH DESIGN

The research design essential to structured problem-solving (Creswell & Creswell, 2023) includes many types that identify relationships, assess interventions and document educational phenomena. Moreover, a research design should include sampling, data collection, analysis and reporting (Indu & Vidhukumar, 2020).

Numerous fields use an experimental design, including discrete choice experiments (Mariel et al., 2020: 37–49), as it encourages a programmatic research design, theory development as well as the sharing of findings (Bang & Eriksen, 2019: 1–8). Keskin and Yilmaz (2020) suggest that educational experimental research should assess

intervention effects using rigorous and innovative methods. It is a complete design methodology that can be used from the start (Hall, 2011). Experimental research design uses music as an educational tool, as Riddle (2017) shows; and Johnston and Ferguson (2016) suggest adopting expressive approaches, interdisciplinary connections and collaborative compositional practices to improve music education.

Causal comparative research, also known as ex post facto research, seeks to reveal relationships between cause and effect in situations where direct experimental manipulation is not feasible (Baumgartner & Falk, 2021; Smela, 2021). This kind of study involves analysing events and outcomes in defined contexts. It uses qualitative data to explore complex causal connections in the field of education (Bingham et al., 2019). Scholars such as Anderson (2021) have used this approach to explore and contrast curriculum design and collaborative music composition practices in the field of music education.

In descriptive research, surveys or questionnaires are used to portray a phenomenon or a population. According to Charbonneau (2007) and Roopa and Rani (2012), survey designs that work well involves different types of questions, forms, scales and language. Descriptive research can help music teachers to comprehend the experiences of both students and teachers by highlighting the trends and obstacles they encounter. Neboga (2023) emphasises the increasing use of digital technologies in music education, indicating a departure from traditional models.

This research employs an approach which is valuable for delving into the intricacies of this particular educational phenomenon: the effect of seamless learning on Year 9 music students.

3.6 RESEARCH APPROACH

I briefly discuss narrative enquiry, phenomenology, grounded theory, ethnography, and case studies in this section. My research was based on the last of these. Participants share life stories with researchers in narrative research (Merriam & Tisdell, 2016). It interprets texts through biographical, psychological and linguistic analyses to create cohesive narratives that help us to understand human experiences (Creswell & Creswell, 2023: 44), despite validity and reliability debates (Patton, 2015).

Phenomenological research uses interviews to describe intense human experiences without preconceptions (Merriam & Tisdell, 2016: 25–28; Babbie, 2017: 306).

Grounded theory employs a sampling method and continuous comparative analysis to discover categories and hypotheses based on the perspectives of participants (Merriam & Tisdell, 2016; Babbie, 2017: 308; Creswell & Creswell, 2023: 44). Ethnography explores not just the language used by groups but also their behaviours and actions through detailed observations and interviews (Merriam & Tisdell, 2016: 28–30; Babbie, 2017: 305), focusing on detail rather than explanation.

Case studies help us understand a certain social phenomenon by looking at programmes, events, processes or individuals (Babbie, 2017: 310). Researchers employ approaches to gather data in order to respond to enquiries about the “how" and "why" aspects of a situation (Yin, 2018), using real-life situations to improve problem-solving. They focus on building connections between researchers and individual cases, which is crucial in settings and particularly helpful in training prospective teachers (Hyett, Kenny, & Dickson-Swift, 2014; Arseven, 2018). Studying a case involves examining it in its real world setting from various perspectives to gather comprehensive information regarding the time period and location plus the actions taken (Creswell, 2023: 717).

Yin (2018) states that different case study types serve different research purposes. The first goal of descriptive case studies is to describe a phenomenon in its real-world context (Yin, 2018: 350). Unlike explanatory case studies, which delve into causality,[10] descriptive case studies focus solely on presenting a case without attempting to elucidate the reasons behind events (Yin, 2018: 351). Case studies that are explanatory delve into the reasons or processes behind a situation or a series of events with the objective of responding to enquiries about the reasons for and the methods behind occurrences. Finally, exploratory case studies are carried out to pinpoint areas of research interest or methods for further investigation (Yin, 2018: 351). These studies serve as an investigation to guide researchers in shaping their research endeavours.

[10] In quantitative research, causality refers to a relationship where one variable, X, causes another variable, Y. This is typically demonstrated when X precedes Y in temporal order (Creswell & Creswell, 2023: 356).

The case study method works well for my research because it aims to give a portrayal of the ways in which seamless learning is used in the music curriculum in a real-life scenario without getting into causation details. The case study revolves around a school in Stockholm where I oversee the implementation of the music curriculum as the Head of the Department for Aesthetics, guided by the guidelines of the LGR-22 curriculum.

Creswell and Creswell (2023: 98–99) define case studies as, first, identifying a case and stating the study intentions, then choosing data-analysis methods, describing the case and revealing themes or issues before finally reaching a conclusion. Following Creswell and Creswell (2023: 98–99), this research can be summarised in Table 3-1:

Table 3-1: Parameters of this case study based on Cresswell and Cresswell (2023)

Case study literature	This research
Programme, event, process or individuals	Läroplan för grundskolan (LGR-22) Music Programme in Stockholm, Sweden
Identification of a specific case	Learning experiences of Year 9 students in the music classroom
The intention of conducting the study	A single instrumental case study used to illustrate a specific issue
Bounded by time	2023–2024
Bounded by action	Seamless learning in Year-9 music class
Bounded by place	Stockholm, Sweden
Detailed, in-depth data collection	End-of-lesson reflection and end-of-unit reflection questionnaires, and interviews
Lesson reflections and in-depth data collection	Filled in after each lesson to gain insights into the students' learning experience
Unit reflection questionnaires and in-depth data collection	Filled in after each completed unit to gain insights into the students' learning experience
Interviews, in-depth data collection	Voluntary interviews at the end of the course to triangulate the information received in the lesson and unit reflections
Selection of approach to data analysis	Inductive approach

Finding of themes, codes, and categories	The findings of themes, codes and categories were identified through the analysis of the student responses from each data source
Conclusion	Overall meaning will be derived from the case

3.7 SAMPLING

Qualitative research typically employs two types of sampling: random (quantitative) and purposeful (qualitative). When drawing conclusions, it is important to select samples that help to ensure that the entire population is represented (Tillé & Wilhelm, 2017; Franco & Di Napoli, 2019). This methodology includes stratified, random, snowball, homogeneous and convenience sampling (Babbie, 2017; Merriam & Tisdell, 2016; Creswell, 2023) but in this study the convenience sampling method was employed to select the participants based on their accessibility rather than random selection, which may lead to biases and restrict the generalisability of the findings (Pruchno et al., 2008; Farrokhi & Mahmoudi-Hamidabad, 2012; Merriam & Tisdell, 2016; Emerson, 2021).

This research project focused on selected Year 9 Music students at a stage before transitioning to Gymnasieskola.[11] This approach aligns with qualitative principles, where cases are selected based on their richness and relevance (Yin, 2018). Moreover, the research questions, data and resources to hand serve as a guide when determining the sample size in qualitative research (Patton, 2015). This study sought to approach the phenomenon by emphasising instances of information-rich cases rather than gathering large sets of quantitative data (Patton 2015: 314).

Convenience sampling entails selecting participants based on their availability and proximity rather than through random selection (Farrokhi & Mahmoudi-Hamidabad, 2012; Merriam & Tisdell, 2016). This approach could result in a sample that may not accurately represent the population or context due to biases that can emerge when specific individuals or groups are readily available or willing to take part in the study's

[11] Gymnasieskola is the upper secondary school level in Sweden, attended by students aged 16 to 19 after completing Year 9 of grundskola. It offers academic and vocational programmes, preparing students for higher education or the workforce.

activities. Furthermore, the outcomes derived from convenience samples may lack relevance beyond the individuals included in the research study; this suggests that the findings of the study might not be applicable in particular situations or with certain groups of people.

The selection of the participants for this study was conducted to ensure a substantial sample size in accordance with the recommendations of Creswell and Creswell (2023) and Yin (2018). Vasileiou et al. (2018) emphasise the importance of having an adequate sample size to respond effectively to the research problem. The current research adhered to the suggested sample size recommendations provided by Creswell and Creswell (2023), Merriam and Tisdell (2016) and Yin (2018). Casteel and Bridier (2021: 335) proposed in their study that using multiple data-collection sources can aid in achieving dataset saturation and accessing different perspectives.

In accordance with Merriam and Tisdell's (2016) recommendations, I used the convenience sampling method to invite students in my music classes who were both available and willing to participate in the study. The sample size and response rate[12] of this research can be summarised as follows in Table 3-2:

Table 3-2: Sample size of participants in this study

Sample size of participants actively participating			
	Questionnaire 1: End-of-lesson reflections	**Questionnaire 2: End-of-units reflections**	**Interviews**
How many students are there in each class?	140	140	140
How many were willing to participate?	50	50	13
How many girls participated?	32	32	9

[12] The response rate is the number of people participating in a survey divided by the number selected in the sample, expressed in the form of a percentage. This is also called the 'completion rate' or, in self-administered surveys, the 'return rate' – the percentage of questionnaires sent out that are returned (Babbie, 2021: 537).

How many boys participated?	18	18	4
What is the age group for each class?	15–16 years of age	15–16 years of age	15–16 years of age

All the students from five classes were invited to participate in the research to ensure that I obtained a variety of perspectives from those who completed the coursework collectively. It should be noted that the coursework was consistent across all of the classes. The objective was to gather viewpoints from students without emphasising their individual class distinctions. Although efforts were made to include everyone, some students opted out for personal reasons.

3.8 METHODS OF DATA COLLECTION

Various methods are used to gather data such, as utilising platforms or conducting interviews either through phone calls or face to face meetings. Surveys and diaries are also tools along, with using secondary literature sources and group discussions (Braun & Clarke, 2013; Merriam & Tisdell, 2016; Cohen, Manion, & Morrison, 2018; Babbie, 2021; Creswell & Cresswell, 2023). In this research various methods were used to gather data: observing the classrooms, completing two sets of questionnaires and carrying out semi-structured interviews.

The combination of classroom observations, questionnaires, and semi-structured interviews was selected to provide a comprehensive understanding of students' learning experiences with the seamless learning approach. Classroom observations offered direct insight into student engagement, interactions, and learning behaviours in real time, ensuring that findings were grounded in actual classroom dynamics. The two questionnaires—end-of-lesson reflections and end-of-unit reflections—allowed students to articulate their learning experiences, providing both immediate feedback and broader reflections on the effectiveness of the approach over time. Finally, semi-structured interviews enabled deeper exploration of students' perspectives, allowing for nuanced responses that might not emerge in written reflections, thus enriching the overall analysis of the research findings.

3.8.1 Classroom observations

Classroom observation is essential in qualitative research, offering a firsthand perspective with which to complement interviews and reveal nuances beyond interviews, particularly with a view to understanding complex or sensitive human behaviours and learning (Merriam & Tisdell, 2016; Harvey, 2018). Researchers such as Hollingsworth and Wong (2022) and Filmer et al. (2020) analyse real-world data to evaluate the effectiveness of teaching and how it influences students' learning outcomes. This involves systematically gathering data on teaching practices and student engagement, emphasising the importance of creating a positive environment (Al-Balushi & Saad, 2022). For my research study, I observed my Year 9 music students, with their permission, in order to witness and grasp their learning experience and understand how they perceived the lessons taught to them through the seamless learning approach.

3.8.2 Questionnaire 1: End-of-lesson reflection

Constructing questionnaires is essential in social research. Babbie (2021: 256–268) emphasises the importance of clear and concise wording for respondents to understand what they are being asked and how to respond. With these structured documents a researcher can gather standardised data for analysis and they are used in surveys, experiments, field research and other methods (Babbie, 2021: 536). They include various question types, from closed-ended to open-ended, tailored to research objectives.

To gather information about the participants' learning experiences as reported by Otienoh (2009) and Ortlipp (2008), for the purposes of reflection, I used two guiding questionnaires in this study. Following each lesson, the students completed lesson reflection journals which were filled out by responding to a series of questions that serve as a guide for the students' reflective journalling (Addendum G). The purpose of these questions was to help me investigate the students' use of seamless learning, to record the educational experiences of the students and to provide suggestions for improving the quality of instruction in the music classroom. This study's questionnaires were not meant to be used for statistical analysis; instead, they were meant only to gather data in the form of brief responses. This contrasts with the questionnaires used

in quantitative research. This customisation ensures the data's relevance to the qualitative research goals and their reliability.

Reflective journalling is a qualitative way to gather data and gain insights into the ways in which participants experience and learn from their journeys in education settings. Studies have demonstrated the benefits of using reflective journals to document students' learning experiences. For example, Silvia, Valerio and Lorenza (2012) discovered that keeping journals helped students to improve their ability to reflect and learn from their experiences. Similarly, research by May Melendez et al. (2019) have shown that students generally found journals helpful for their learning but not necessarily so for every course they took. Lew and Schmidt (2011) suggested that keeping a journal for self-reflection can boost achievement. According to Wallin and Adawi (2017), using prompts in journals can help to deepen the process of reflection and support self-directed learning while enhancing self-regulation abilities.

3.8.3 Questionnaire 2: End-of-units reflection13

The questions for the end-of-units reflection were created using the SLED framework's five concepts as a guideline, as seen below in Figure 3-1:

[13] It is worth noting that the data from the end-of-unit questionnaires will not undergo statistical analysis. Instead, it will complement the richness of data where data from the lesson reflection journal and semi-structured interviews fell short.

Figure 3-1: Author's visualisation of the SLED framework by Hambrock & De Villiers, (2023)

Questionnaire 2 was designed as a Likert-scale survey and was handed out to the students at the end of each unit to measure the extent to which seamless learning had influenced the students' learning experiences. Using closed-ended multiple-choice questions, in surveys has its benefits, as it allows for data collection and ensures uniform responses. Cohen, Manion and Morrison (2018: 334–374) suggest that the layout of the questionnaire is also important to prevent confusion and ensure that no questions are missed. The questionnaire used in the present study focused on aspects of seamless learning (see Addendum H). The participants were requested to share their thoughts on how engaged they felt during the sessions and the usefulness of the learning resources used during the lesson unit as a whole to pinpoint any areas that could possibly be enhanced and lead to improved music classes.

3.8.4 Semi-structured interviews

Adopting conversational approach, interviews aim to elicit both spoken and unspoken responses from participants under the direction of the researcher's predetermined plan

(Yin, 2018). According to Braun and Clarke, (2013) Merriam and Tisdell, (2016); Denzin and Lincoln, (2018); Yin, (2018) and Creswell and Creswell, 2023, the process of creating knowledge through human interaction often involves interviews, which can be classified into three categories: structured (commonly used in quantitative research), semi-structured (typically used in qualitative research for greater flexibility) and unstructured (participant-led following researcher-provided themes) Cohen, Manion, and Morrison (2018: 510) describe five categories, each of which directs data collection in a different way: structured, semi-structured, unstructured, non-directive, and focused.

In this research, semi-structured interviews were used because of their flexibility and capacity to gather detailed information through questions that are open-ended and not suggestive (Addendum I). This approach boosts the data richness by encouraging discussion and the thorough exploration of experiences. Cohen et al. (2018: 508) states that even though semi-structured interviews provide depth and engagement in communication, they can also bring out subjectivity. But they also emphasise the element of gathering information which allows participants to shape their understanding of situations. This method strikes a balance between adaptability and structure by offering perspectives from individuals involved in case studies (Yin, 2018: 161–164) who grasp the nuances and depth necessary for a comprehensive analysis.

Semi-structured interviews provide a combination of flexibility and structure, enabling a thorough examination of participants' viewpoints (Merriam & Tisdell, 2016: 108–110; Cohen, Manion & Morrison, 2018: 510). The interviews follow a versatile protocol that includes follow-up questions, probes and comments to stimulate dialogue and investigate unexpected themes, which can result in the emergence of valuable insights (Adams, 2015; De Jonckheere, 2019).

Before each interview, the participants in the present study were informed of the interview's purpose and assured of confidentiality. They were provided with a participation information document (see Addendum A) and were required to sign a written informed consent form (see Addendum B). The parents also had to sign a written consent form (see Addendum C). To reduce the influence of personal opinions,

the interviews were carried out by a colleague[14] who is both an academic principal and a member of the student care team. The interviews took place from 13 May to 13 June 2024 in a calm office environment that was suitable for concentrated discussions. Each interview, conducted in English, lasted between 15 and 25 minutes, was audio-recorded, and was backed up to the researcher's Google Drive.

According to Patton (2015), interview questions can be classified into six categories based on the content they cover: experience- and behaviour-related queries; opinion- and values-oriented enquiries; questions about feelings; enquiries regarding knowledge; related prompts, and background or demographic queries. These diverse question types are regarded as essential to extracting answers, thoroughly exploring the perspectives and experiences of interviewees as they do. The open-ended enquiries were tailored to explore the ways in which the students experienced aspects of seamless learning by prompting them to share specific examples and reflections on how it influenced their learning journey. The participants were also asked about the effectiveness of the assessment approaches and any training or support they required for using technology. The aim of this method was to gather in-depth insights into the ways the students perceived and engaged with the seamless learning. The objective was for me to understand their individual learning experiences and the various factors that shaped them.

3.9 DATA ANALYSIS

Thematic analysis is a form of content analysis that involves organising data into categories (Kuckartz, 2019). According to Clarke and Braun (2017), content analysis involves recognising and interpreting patterns in data across various theoretical frameworks and research paradigms in a flexible manner. Lochmiller (2021) demonstrates how this method is applied systematically to data by focusing on identifying the themes generated by the researchers themselves. Kiger and Varpio (2020) present a comprehensive six-step thematic analysis framework that serves to ensure objectivity and evidence-grounded analysis.

[14] The colleague who conducted the interviews signed a confidentiality agreement to ensure the protection of the participants' information. Refer to Addendum F for details.

There are several approaches to theme identification, including both inductive and deductive approaches (Braun & Clarke, 2006; 2012; 2021). The inductive method involves identifying themes from the data gathered by the researcher (Varpio et al., 2017). These themes might not always match the questions posed to the participants. They are also not influenced by the researcher's personal beliefs or interests (Braun & Clarke, 2006, 2012, 2021). Deductive approaches, in contrast, rely on established theories or frameworks to analyse and interpret the collected data (Braun & Clarke, 2006, 2012, 2021; Varpio et al., 2017). This approach is helpful to concentrating on elements of the data or results that can be more comprehensible within the framework of existing theories or frameworks (Braun & Clarke, 2006; 2012; 2021).

Qualitative research employs both deductive and inductive data-analysis approaches to understand participant meanings and interpretations (Ravindran 2019: 41) (see Figure 3-2). Deductive reasoning uses existing facts, information or knowledge to derive a valid conclusion suitable for establishing causal relationships in specific contexts. In contrast, inductive reasoning entails drawing conclusions from particular details and observations to construct interpretive frameworks, which helps with gaining a thorough grasp of vast amounts of data.

In this research project, I followed an inductive approach as described by Ravindran (2019: 41), using the vast amount of data from multiple sources, employing conceptual analysis by coding, categorising and theming to arrive at overarching themes. It allowed for the participants' perceptions and experiences to be explored comprehensively, with the aim of uncovering new insights and understandings in the context of seamless learning.

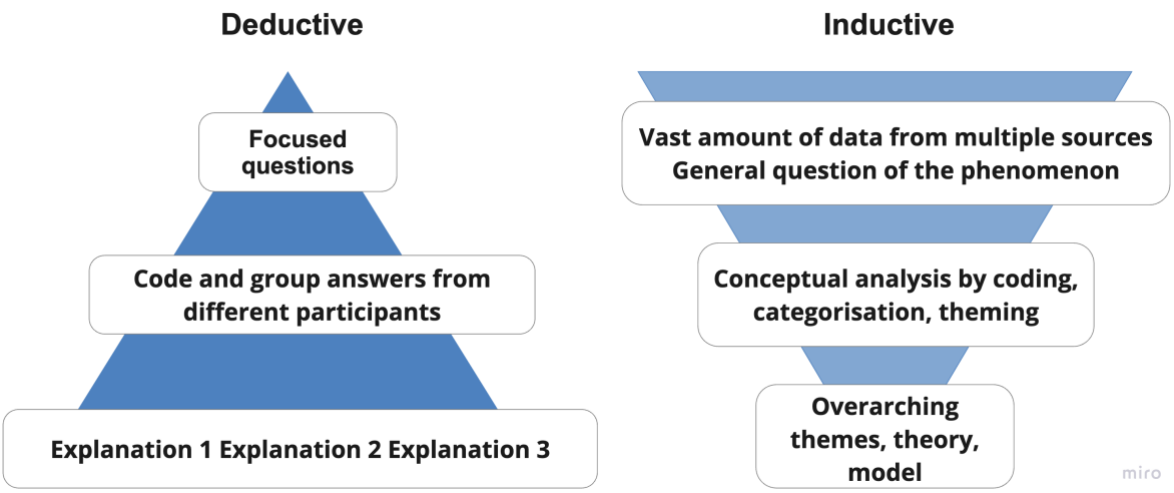

Figure 3-2: Approaches to qualitative data analysis (Ravindran, 2019: 41)

Ravindran (2019: 41) discusses various different methods for analysing qualitative data, including thematic analysis which identifies trends in people's experiences; narrative analysis that shapes identities through personal tales; discourse analysis that reveals social norms and power dynamics through language examination, and semiotic analysis which interprets signs and symbols in written texts and images.

Content analysis is recognised as a qualitative research approach (Vespestad & Clancy, 2021) which can be adapted for manual or automated implementation methods. Ravindran (2019: 41–44) outlines a process for analysing information that starts with preparing the data through tasks such as transcription and organisation. When researchers read and think about data collected from interviews or observations, they become deeply involved in the stories shared and use them to shape their narrative while being mindful of any biases that may arise. The next step is coding: here, data are first organised into categories using *in vivo* or interpretive codes and then the analysis is further refined to provide a deeper understanding at interpretive levels. Finally, themes or theories are derived from the coded data to gain an understanding of the phenomena being studied.

This research study used thematic data analysis across various data sources by following the guidelines of Creswell and Creswell (2023). The goal was to reveal similarities and differences and create themes that align with the research questions

and the theoretical framework in place. In line with Ravindran's (2019: 41–44) four-step qualitative data-analysis process, all the qualitative data – including the interview transcripts – were carefully transcribed to establish a defined and easily accessible data repository. Engaging in reading these transcriptions helps with becoming familiar with the material and developing frameworks while also minimising biases. Following this phase, I used manual data-analysis and Google Suite to categorise the information in the form of codes to encapsulate the language of the participants and I used the interpretive codes to generate overarching themes and ideas. Moreover, I documented my reflections and theoretical linkages that were found to underpin each categorised segment, in this way progressing the analysis to the interpretive stages. Finally, by putting together the themes and theoretical frameworks derived from the categorised data which revealed patterns and interconnections, I was able to gain insights on facilitating learning within the educational environment.

In social research studies data coding involves sorting and analysing data in such a way as to reveal key ideas and relationships (Chan et al., 2015). Thematic coding refers to the identification and classification of themes in qualitative data (Williams & Moser 2019). Open coding marks the stage of coding where all the data are examined from various angles, possibly resulting in multiple descriptions that might not necessarily fit with the developing theory (Glaser, 2016). Axial coding involves organising data into categories and identifying connections between these categories. In the phase of data analysis known as selective coding (Saldaña, 2021) researchers focus on fine-tuning and confirming the key themes or categories that have emerged from the data. The coding frame plays a role in qualitative research by facilitating the data organisation and analysis (Williams & Moser, 2019). This process involves making decisions based on the researcher's background and considering the study's design and research enquiries (Elliot, 2018). I used content analysis to analyse the questionnaires and thematic analysis for the interviews.

To summarise, thematic analysis was used in this study to identify patterns in the qualitative data (each question), allowing for an in-depth exploration of students' experiences with seamless learning. An inductive approach was chosen to ensure that themes emerged naturally from the data rather than being predetermined by existing theories. Thematic coding, incorporating both open and selective coding, was applied

to categorise and refine key themes, ensuring a structured yet flexible analysis. This process enabled the development of a coherent narrative that aligned with the research questions while capturing the complexities of students' learning experiences.

3.10 TRUSTWORTHINESS, RELIABILITY AND VALIDITY

Reliability, validity and trustworthiness are important in social research (Rose & Johnson, 2020) – more especially in research settings where the researcher's personal perspective can influence data analysis and understanding. Throughout the research journey of this study, ethical concerns were consistently considered in order to uphold the well-being and rights of those participants who were involved in the study.

3.10.1 Member-checking

Member-checking in research studies is used to ensure that interpretations are accurate and reliable. It is crucial to have member-checking as a step in the process, according to Koelsch (2013). This step enables an external member to give feedback that confirms the authenticity and understanding of the interview data, therefore enhancing the trustworthiness and validity of the research outcomes by including input from other participants, as noted by Birt et al. (2016). In the present study, the interview participants and colleague who conducted the interviews were asked for feedback regarding the authenticity of the transcribed interview data.

3.10.2 Reflexivity

Examining one's biases and assumptions is crucial in research, according to (Day, 2012; Finefter-Rosenbluh, 2017; Reid, 2018). This involves acknowledging various perspectives, including those of external researchers, so as to reveal any ethical issues and dilemmas in the research process. In research, ethical dilemmas call for a stance where the researcher questions their own underlying motivations and assumptions (Reid 2018). Dealing with ethical dilemmas in research requires a reflective stance where the researcher questions their own underlying motives and beliefs (Reid 2018). Looking at things from a certain perspective is key when examining the challenges that relate to power dynamics and the creation of knowledge and subjectivity.

Throughout this research, I took the time to reflect on my biases and views regarding my teaching and learning practices; the SLED framework and the LGR-22 music curriculum, in order to deal with any assumptions that could influence the way the data are interpreted or the study design. I tried constantly to be reflective to prevent any personal perspectives from influencing the outcomes of the study. Ethical matters were thoroughly reviewed regarding the way adjustments to the curriculum could affect the students' learning experiences, with a focus on ensuring transparency surrounding any prejudices or conflicting interests that could affect the reliability and ethical standards of the study and reduce the likelihood of the results being valid.

3.11 ROLE OF THE RESEARCHER

The ethical behaviour of the researcher was critical to the validity and reliability of this research project (Carter et al., 2014; Patton, 2015; Merriam & Tisdell, 2016; Babbie, 2017; Yin, 2018; Creswell & Creswell, 2023). It was essential to maintain impartiality and uphold ethical standards when gathering, analysing and interpreting the data. To this end, I used triangulation and crystallisation to reduce researcher bias as far as possible.

Triangulation, as emphasised by Patton (2015), serves to counter the bias that derives from relying on a single method, source or perspective. It involves multiple approaches or data sources, which leads to the validity and reliability of findings being enhanced by the limitations of any single method being minimised (Heale & Forbes, 2013). Triangulation, as recommended by Carter et al. (2014) and Patton (2015), enhances the credibility and quality of research findings by reducing biases. Data-source triangulation is a method in which data is collected from multiple sources, such as individuals, groups and communities, in order to validate the findings. This approach, as suggested by Santos et al. (2020) and Denzin and Lincoln (2018), helps to ensure the reliability and strength of the results. The present study employed method triangulation by using data obtained from interviews, questionnaires, class observations and a literature review.

The inclusion of Ellingson's (2009) crystallisation process enhances the methodological rigour of a study by encouraging iterative analysis and diverse interpretations, thereby reducing inherent biases in qualitative research, particularly in

educational contexts (Cugno & Thomas, 2009; Vik & Bute, 2009; Shagoury, 2011). In the present study, crystallisation involved a methodical analysis of the data so as to identify emerging patterns and themes with the aim of thoroughly exploring the incorporation of seamless learning principles into the music curriculum. This methodology enabled various viewpoints and subtle observations to be examined, thus helping to mitigate the impact of personal biases on the research results.

3.12 ETHICAL CONSIDERATIONS

The university's General Human Research Ethics Committee (GHREC) granted the research ethical clearance (number UFS-HSD2023/0634 (Addendum E)). Institutional approval where the study took place had been obtained (Addendum D). Throughout the study, ethical issues were carefully managed to balance the research risks and benefits. The study objectives were clearly communicated in a research study information leaflet provided to prospective participants (Addendum A). Participation was voluntary and the participants were required to sign a written informed consent form (Addendum B). The parents of the participants were also required to sign a written consent form due to the participants' being younger than 18 (Addendum C). The use of pseudonyms ensured anonymity and the participants were assured that their personal information would be securely stored and accessed only by authorised individuals in accordance with the EU's General Data Protection Regulation (GDPR), which was applicable as the study was conducted within the European Union.

3.13 CONCLUSION

In summary, this chapter elaborated on the research methods and structure employed in this study by exploring the foundations of the research and offering explanations of the different methodological elements selected for the study. It also described these elements in detail so that it could serve as the groundwork for forthcoming research by detailing the methodology used together with the design principles and the ethical considerations, the sampling and the data-collection methods. The chapter highlighted the importance of reflexivity in dealing with relational prejudices in order to maintain honesty and credibility during the research journey. Overall, this chapter sets the stage for an insightful investigation into the application of seamless learning in the Year 9 LGR-22 music curriculum using the SLED framework.

CHAPTER 4

Data analysis

A dot is a line that went for walk – Paul Klee[15]

4.1 INTRODUCTION

This chapter provides an analysis of the data collected from the student cohort through various reflective methods, focusing on three main areas: interview questions, end-of-lesson reflections and end-of-unit reflections. The first section, Analysis of Interview Questions, explores the responses obtained from semi-structured interviews conducted at the end of the course. The second section, Analysis of End-of-lesson Reflections, examines the immediate reactions and learning experiences recorded by the students at the end of each lesson. This analysis highlights recurring themes and insights into the students' perceptions of the lessons. The final section, Analysis of End-of-unit Reflections, reviews the broader reflections provided by the students at the conclusion of each unit in response to a set of multiple-choice answers. This section aims to saturate the overarching themes and patterns that confirm or deny the impact and outcomes of the units. Each section combines thematic descriptions with raw data extracts, the analytic narratives providing a comprehensive presentation of the students' learning experiences during the course.

4.2 INTERVIEW QUESTIONS[16]

The interviews were conducted with 13 students at the end of the semester. All of the students belong to the Gen-Z Generation (they turn 16 in 2024). Therefore, I gave them pseudonyms that reflect their generation: Vibe, Remix, Lit, Hype, Flex, Slay, Chill, Bop, Drop, Glow, Wave, Fire and Snap.

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15 Denzin and Lincoln, 2018: 420.
16 See Addendum I.

4.2.1 Question 1: Could you explain your process of planning, carrying out and reflecting on the music project in general to guide yourself through its completion?

I did not receive extensive information on their question, as the students answered cryptically. However, the following themes emerged: content difficulty, group work and time management.

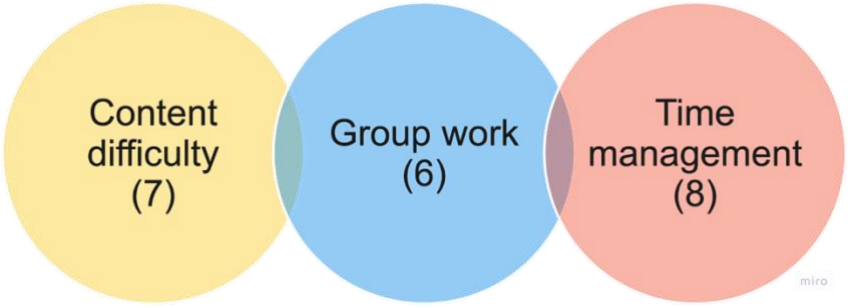


Figure 4-1: Themes that emerged from interview question 1

4.2.1.1 Content difficulty

Seven students shared the sentiment that the music project presented significant challenges due to unfamiliar content. One student, Remix, stated,

> It was a bit complicated at the beginning because we didn't study any of this stuff last year because last year, we only did stuff like playing on piano, doing some online quizzes, but we never, like, wrote lyrics or did some composition for our music.

Other students (6) agree with this, highlighting that the new material required them to learn and apply skills they had not previously practised. This added to the complexity and required additional effort to understand and complete the tasks.

4.2.1.2 Group work

Six students found working in groups to be a valuable aspect of each music project. It was explained that most of the planning happened in a group context (‘We start like

planning in the group' (Bop)). Some of them, such as Hype, did not like groupwork and would have preferred individual tasks. Some students (5) noted that group work enabled them to share responsibilities, gain diverse perspectives and support one another in areas where they might individually have struggled.

4.2.1.3 Time management

Eight students emphasised the importance of planning and structuring their work to manage the demands of the music project effectively. One student, Lit, shared this view:

> Well, so what we did in the beginning was that we would plan what we were gonna do for the following weeks.

Other students (7) agree with this, explaining that having a clear plan allowed them to allocate their time efficiently, meet deadlines and stay organised throughout the various phases of each music project.

4.2.2 Question 2: In what way could you do your music projects anytime and anywhere in each unit?

From the responses to question 2, three prominent themes emerged: flexibility in working on music projects, the integration of technology in the learning process and the challenges associated with using physical instruments.

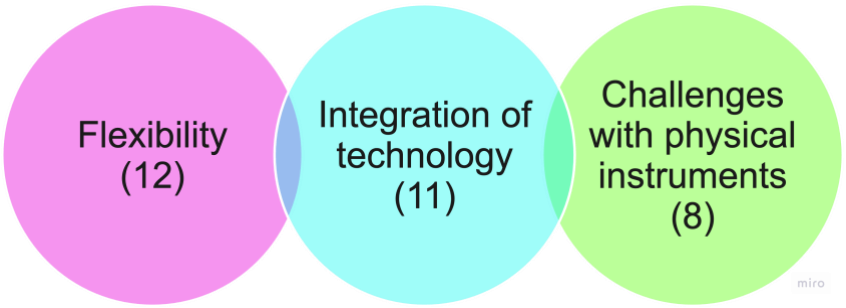


Figure 4-2: Themes that emerged from interview question 2

4.2.2.1 Flexibility

Flexibility in music projects was highly valued by the students, as it allowed them to work on their assignments in various locations and at their convenience. Snap

mentioned: “We had time to work at home, in class, in surgery[17] and everywhere.” Other students (12) shared Snap's view, highlighting the way they could use online resources (10), digital tools (8) and the ability to work in different settings, such as home (9), school (7) or even outdoors (1). They appreciated having opportunities to manage their time effectively and fit their music projects into their personal schedules.

4.2.2.2 Integration of technology

Bop stated:

> For each unit, we have worked very much on the computer and, like, on the Internet. So, it was very easy to, like, just bring home the computer or, like, do it on your phone to look up, like, information for some units.

Other students (11) agree with Bop's perspective, noting that they could use digital instruments (4), online platforms for quizzes and research (7) and various applications for music composition (5) and presentations (6).

4.2.2.3 Challenges with physical instruments

Despite the benefits of digital tools, some students faced challenges when using music instruments for their music projects. Fire pointed out:

> And then the performance, we couldn't really do at home except for learning lyrics because we didn't have those type of instruments at home.

Other students (8) agree with Fire's sentiment, explaining that practising with instruments such as pianos and guitars was difficult without having the instruments available at home (8). They noted that while some aspects of music education, such as theory (4) and history (3), could easily be managed online, the lack of access to instruments created a significant barrier to their performance practice.

[17] The term ‘surgery’ is employed at the school to denote an opportunity for students to pursue additional assistance and concentrate on their academic responsibilities during supplementary study time. This also implies that they have the chance to meet with the teacher of the same subject who may teach a different year group.

4.2.3 Question 3: In what ways did it benefit you to be able to do your work on a handheld device (laptop, cellphone, tablet) in each unit?

Accessibility and self-directed learning emerged as two themes from question 3.

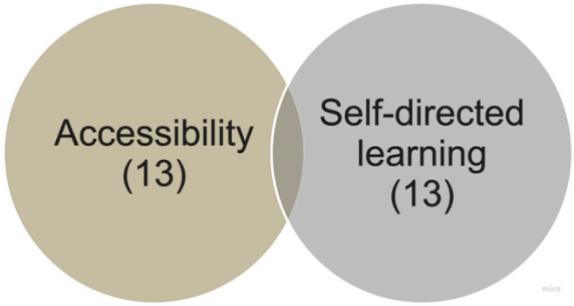


Figure 4-3: Themes that emerged from interview question 3

4.2.3.1 Accessibility

All 13 students highlighted the significant benefits of using handheld devices (laptops, cellphones and tablets) for enhancing accessibility in their work for each unit. Glow explained that 'Google Classroom made it easier to follow unit instructions', demonstrating how digital tools streamlined the learning process by providing immediate access to the necessary materials and resources, both in and out of the classroom. Other students (12) found there to be practical benefits: using their computers during breaks, finding information and writing documents, and mentioning the efficiency and portability of working from a laptop.

4.2.3.2 Self-directed learning

Thirteen students noted how handheld devices facilitated self-directed learning in each unit. Hype illustrated this by using technology for music composition, stating:

> In music composition, especially, it was a really helpful tool because it made … easier to get a hang on … how the notes sound together.

Other students (12) also used technology to learn independently: using AI for lyric ideas, working on songs at home and appreciating the ability to practise at their own pace.

4.2.4 Question 4: Please elaborate on the use of the different apps and programs you used for completing each unit.

The three main themes that emerged from question 4 are practical application, enhanced learning, and creativity.

Figure 4-4: Themes that emerged from interview question 4

The different apps and websites that students used throughout the four music units are presented in Table 4-1.

Table 4-1: Author's list of different apps and websites

App/Website	Purpose	Units/Activities	Mentioned by
Google Classroom	Submitting work and accessing information	General use across units	'Like in Google classroom, we usually hand in our work there, and that's where, like, most of the information is' – (Vibe)
Flat.io	Creating music and lyrics	Music composition	"For music composition, I used the flat.io. It's where you can make sheet music, basically" – (Flex)
YouTube	Tutorials for playing instruments, finding lyrics	Music performance, music history	'For the performance, it was obviously a lot easier because you can find videos on how to do, like, piano online' – (Lit)
Musictheory.net	Identifying notes, taking music theory quizzes	Music theory	'On music theory, we used only one site. We did musictheory.net where we would identify notes' – (Hype)
Google Slides	Creating presentations	Music history, general use	'And we used Google Slides for the presentation' – (Snap)
Kahoot	Creating quizzes	Music history	'And, in unit 3, music history, I used Kahoot because, this is where we wanted, with my friend, to make a presentation with questions' – (Glow)

AI Voice Generation	Creating podcast voices, reading scripts	Music history, music composition	'On music history, I, for example, used AI voice generation to do my presentation' – (Hype)
Spotify	Finding lyrics	Music performance	'I use the, Spotify to both learn the lyrics, and to listen to the beats and learn the song to play' – (Drop)
Rhyming Apps	Finding rhymes for songwriting	Music composition	'I used, like, an app that could, like, if you'd put in the word, it would put out words that rhyme with the word' – (Lit)
PowToon	Creating animated presentations	Music history	'Some did presentations with PowToon, podcasts, Google Slideshow, and all of those' – (Hype)
Genius	Finding lyrics	Music performance	'Music performance, I use Genius, I think it's called. It's, like, a lyrics app or a lyrics website, and that's where I could find the lyrics to my song' – (Flex)
ChordChord.com	Creating and finding chords	Music composition	'And in music composition, we all used flat.io and chordcord.com' – (Hype)
Deep.ai	Various AI functionalities	Music history	'Some of us used AI sites (like DeepAI)' – (Hype)

4.2.4.1 Practical application

Nine students demonstrated practical application in their use of various apps and programs for hands-on learning experiences. Vibe illustrated this:

> Or for example, flat IO, which was, like, a really big part we used where we made our own, like, music and our own lyrics and everything.

In addition, eight students made practical use of technology by searching YouTube for piano lessons, practising music theory on musictheory.net, composing music on Flat.io and making presentations on Google Slides and Kahoot.

4.2.4.2 Enhanced learning

Eight students highlighted how these tools made learning more effective. Hype illustrated this: "On music theory, we used only one site. We did musictheory.net, where we would identify notes," showing how specific tools made learning more structured (3). In addition, students made practical use of technology for various tasks:

Lit emphasised the convenience and depth of online resources for music history, which were beneficial for research (2). Chill mentioned using various apps and websites to find lyrics and sheet music for their performances in the music performance unit (3).

4.2.4.3 Creativity

A total of six students contributed to the theme of creativity in their use of various apps and programs to enhance their learning experiences. Lit demonstrated this by using a rhyming app to help with songwriting, stating: ‘I used an app that could, if you'd put in the word, it would put out words that rhyme with the word.’ Similarly, Hype leveraged AI voice generation for presentations. In addition, other students (4) used AI voice generation for various reasons: creating a podcast voice, reading a script due to a lost voice and enhancing music composition projects.

4.2.5 Question 5: What stood out in terms of networking and collaborating with other students?

The themes that emerged from question five include optionality and emotional and social dynamics.

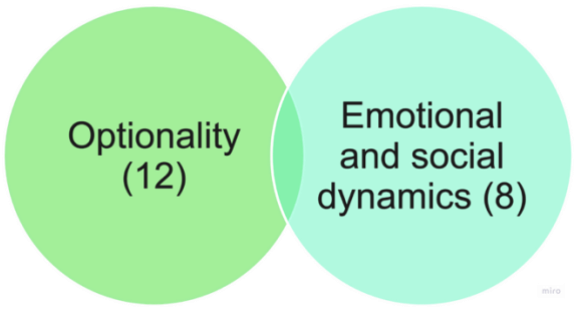


Figure 4-5: Themes that emerged from interview question 5

4.2.5.1 Optionality

Twelve students expressed their preference for having the option to choose between working alone or in groups, describing how this choice had an impact on their learning experiences. Hype emphasised this by stating:

> Because for me, I don't really like relying on other people so I feel like the option to work alone was really good for my personal learning experience.

Snap echoed this sentiment, appreciating the ability to work with close friends or independently when needed, saying:

> So, the option to choose who you wanted to work with was very good for me because I'm very close to a small number of people.

Noting the collaborative nature of performances, other students (10) also appreciated this aspect, finding group presentations helpful, enjoying both independent and paired work, assisting classmates in music theory, dividing work with a partner, finding group work encouraging, consistently working with peers, enjoying collaborative learning in performances, and balancing independent and supported learning.

4.2.5.2 Emotional and social dynamics

When asked how their learning experiences were affected by working alone or in groups, eight students said the latter was very influential: group work helped to alleviate anxiety, especially during performances. Hype noted:

> So, for some of us, we have stage fright. Instead of needing to go up there and play piano and sing at the same time, we can be multiple people to hold our rhythm and divide the attention because that makes some people more comfortable.

Choosing work partners fostered a supportive environment, making learning more enjoyable (4). However, differing opinions and conflicts could hinder progress. Lit mentioned that

> it was kind of harder because, as we don't share the same opinions, sometimes it clashes, and then you get stuck, and then you don't know what to do.

Enforced peer interaction, while beneficial for some, could be disruptive for others who prefer to work independently, and aligning schedules and ideas was sometimes challenging (4).

4.2.6 Question 6: Have you had the opportunity to engage with music experts?

Two themes emerged from the responses to question 6. Enhancement of learning through expert interaction and inconsistent opportunities to engage with such professionals were among the most frequently mentioned aspects.

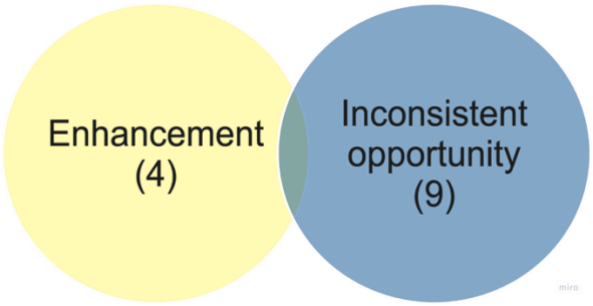


Figure 4-6: Themes that emerged from interview question 6

4.2.6.1 Enhancement

The idea that students' interactions with music professionals improved them was a driving theme. Flex shared this thought:

> During the music club on Wednesdays, I got to … him every once in a while … it's beneficial for an expert because they can, like, spot all the little details that you're doing wrong, that you're not noticing yourself.

Others mentioned the benefits of expert engagement, including those who visited surgery and benefited from it (3). They mentioned receiving personalised help with musical techniques, being inspired for projects and learning about future musical paths.

4.2.6.2 Inconsistent opportunities

Unfortunately, the experts that the researcher had invited to participate in this study withdrew for personal reasons, therefore the researcher asked the students to go to surgery, where they could meet two other music experts to engage with and ask questions. Surgery times were outside of school time and this did not suit many students. In essence, the absence of expert interaction in class time resulted in a missed opportunity for these students. From the interview data it was clear that most of the students (9) did not meet any experts, either inside or outside of class.

4.2.7 Question 7: Describe the technological skills that you have learned in each music project

Three main themes emerged from question 7: online research and presentation skills, online composition skills, and online performance and practice skills.

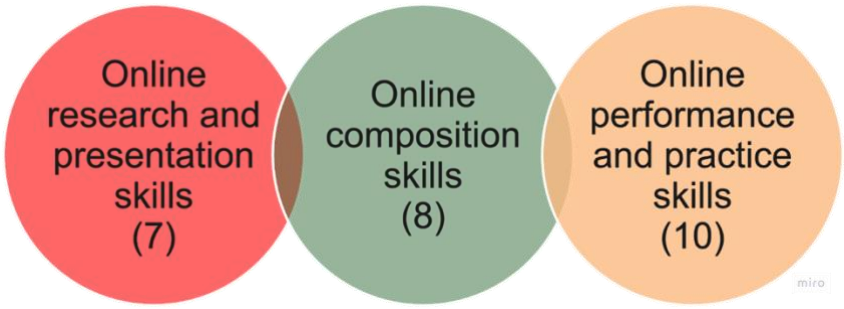


Figure 4-7: Themes that emerged from interview question 7

4.2.7.1 Online research and presentation skills

Seven students demonstrated significant progress in their online research and presentation skills. Slay illustrated this by using Kahoot and Google Slides to create interactive quizzes and presentations. Using podcasts to deliver information, online quizzes to improve note-reading, and Google, the other six students also honed their research and presentation abilities.

4.2.7.2 Online composition skills

Through their online compositions, eight students demonstrated their growing skill. Hype demonstrated this by creating music with Flat.io and saying, ‘we had this flat.io. We had chord-chord[.com].’ In addition, seven additional students enhanced their abilities by employing artificial intelligence (AI) to assist in the composition of lyrics, practising music theory with musictheory.net and composing songs using syllables.

4.2.7.3 Online performance and practice skills

Competence in online performance and practice abilities was shown by nine students. ‘We also use our computer and our laptop to be able to search for songs,’ Vibe said, demonstrating how they use online resources to find music. Piano tutorials on

YouTube, apps for reading music while playing instruments, Flat.io for music composition and musictheory.net helped eight other students to improve.

4.2.8 Question 8: Can you describe your experience with using digital tools, apps and programs in your work? How do you feel about the training you received to use these tools?

Two main themes emerged from question 8 regarding the use and training of digital tools, apps and programs: the effectiveness of introductory sessions and the enjoyment and effectiveness of using these tools.

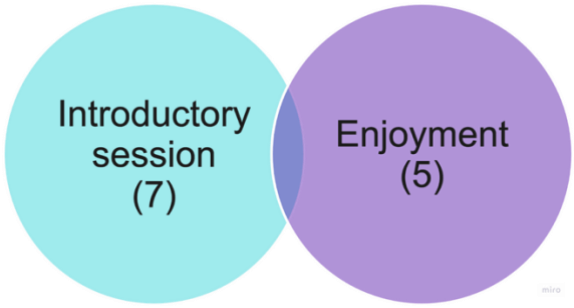


Figure 4-8: Themes that emerged from interview question 8

4.2.8.1 Introductory sessions

Hype highlighted the lack of structured initial training by noting:

> we didn't have a whole introduction where everyone sits down, looks at the board where he introduces the program.

It would have been helpful to have an introduction to the apps at the beginning, according to three other students. They stressed that a brief overview would have helped them to understand the tools better. In addition, they brought up the point that a thorough introduction would have saved time and made sure everyone was on the same page, preventing the inefficiency of repeating instructions.

In contrast, Wave emphasised a positive aspect of the introduction process, stating, ‘because Mister Coetzer went through them before we started, it was kind of fun.’ Two more students shared this positive experience and praised the individualised and concurrent instruction that helped them grasp the materials at their own speed. They

agreed that the approach made learning interesting and accessible, even with small challenges such as infrequent internet connectivity issues.

4.2.8.2 Enjoyment

Fire described some frustrations with the digital tools, stating:

> It was a bit annoying sometimes because … some of the apps, … where you had to click on the note, … sometimes you would press the wrong thing and then you had to start over.

This was a shared concern among another student, who also reported that the app's features were tricky and error-prone, which hampered their productivity and made things worse. Conversely, Chill shared a more positive experience, stating:

> I really enjoyed using the different digital tools that we were given, and I feel like I was very quickly able to understand how to use them.

They were joined in this sentiment by two other students, who also thought the digital tools were easy to use and beneficial to their education. They appreciated the ease of use and the quick learning curve, which allowed them to focus on their tasks without significant delays.

4.2.9 Question 9: Did you feel more or less motivated to learn about music after the curriculum changed? Why do you think so?

The responses were divided between engagement and indifference. Some students felt more inspired and involved because of the new curriculum, while others did not experience any significant change in their motivation.

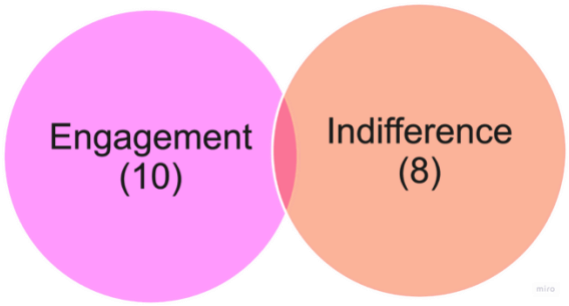


Figure 4-9: Themes that emerged from interview question 9

4.2.9.1 Engagement

The changes in the music curriculum have significantly increased students' motivation to learn. Snap expressed this view:

> so, I'm very motivated to learn more about music, and thank you to Mister Coetzer for the change in the curriculum. I think everyone feels that way.

Several other students also felt this way and they provided different explanations for the increase in their involvement. One found the new approach more serious and interesting, as it allowed them to delve deeper into the subject. Two others appreciated the online format, which made lessons more fun and exciting. The inclusion of practical activities, such as playing instruments and reflecting on daily lessons, also contributed to their motivation (3). In addition, some students felt that the increased rigour and structure of the lessons made them take the subject more seriously and view it as equally important as other core subjects (3).

4.2.9.2 Indifference

Despite the curriculum changes, some students remained indifferent to the new music lessons. Hype stated it in this way:

> The thing is very few of us were even aware that the curriculum changed. We didn't go through it. We didn't learn about it. We didn't know what has changed.

Seven additional students gave similar explanations for their disinterest. One student felt that the curriculum change had not affected their motivation as their interest in music remained the same. There were also students who experienced frequent teacher absences in previous years, which contributed to their continued lack of interest or disinterest. In addition, four students found the increased focus on reflection and digital work less engaging, preferring more hands-on, practical music activities.

4.2.10 Question 10: Do you feel like you have more ownership over your learning? If so, in what ways?

Two themes emerged from the responses to question 10, highlighting the students' experiences with ownership of their learning. The sense of autonomy and the responsibility they felt towards their education were among the most frequently mentioned aspects.

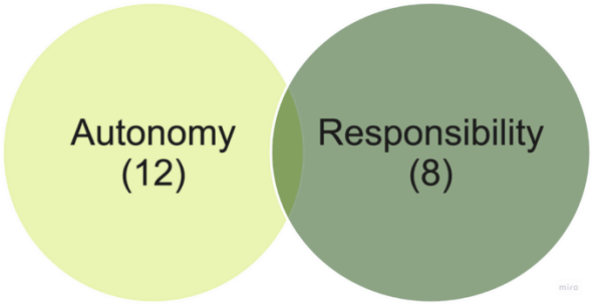


Figure 4-10: Themes that emerged from interview question 10

4.2.10.1 Autonomy

In the context of personalised learning, many students felt a heightened sense of autonomy over their education. Hype underscored this point:

> I believe that having a personalised experience enhances our sense of ownership and makes us feel more connected to our work, which I thoroughly enjoy.

This sentiment was echoed by several other students (11) who appreciated having the ability to choose their own projects (5), manage their learning pace (4) and explore topics of personal interest (2).

4.2.10.2 Responsibility and accountability

A common thread was the importance of taking responsibility for one's own education, or taking responsibility in learning. On this point and summarising the data, Glow said:

> Of course, you can get help, but you need to do it yourself. You need to learn by yourself.

This perspective was shared by seven other students, who acknowledged that while support was available, the onus was on them to ensure their own understanding (3) and progress (4).

4.2.11 Question 11: Do you think that if you chose to go and study music at a music gymnasium, you would be well prepared by taking this course? If so, please give an example from each unit completed.

The answers to question 11 revealed two main points of view: strong foundation in theoretical knowledge and a lack of practical performance experience.

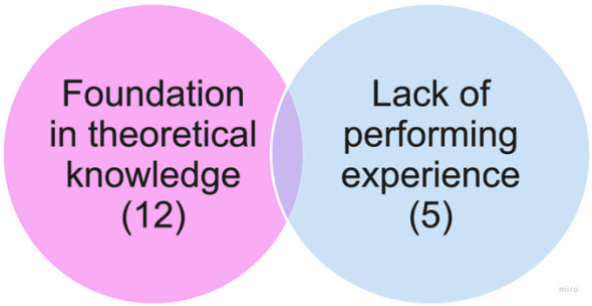


Figure 4-11: Themes that emerged from question 11

4.2.11.1 Foundation in theoretical knowledge

Students felt their music theory knowledge had improved. Chill described this as follows:

> In the music theory unit, we worked on a lot of different topics, and I feel that I have really understood them very well, especially how to read, like, the note, the sheet music, and that kind of thing.

The comprehensive music theory coverage was appreciated by many students (11). This theoretical foundation helped them to understand different music genres and supported their learning (6).

4.2.11.2 Lack of performance experience

The lack of practical performing experience is a significant concern for many students. This was voiced by Flex:

> For the music performance, I got a lot of constructive criticism on how I should play the guitar, so that would help I'm definitely not prepared to play it at an actual (music) school, though.

Four other students shared this view; they also believed that they were unprepared for real performance situations due to the lack of opportunities for hands-on instrument practise in their music classes.

4.2.12 Question 12: Were there any aspects of the application of Seamless Learning in the curriculum that you particularly enjoyed or found helpful? Can you describe those aspects of each unit?

From the responses to question 12, two prominent themes emerged regarding the application of Seamless Learning in the curriculum: the flexibility of anytime, anywhere learning and the importance of networking and collaboration.

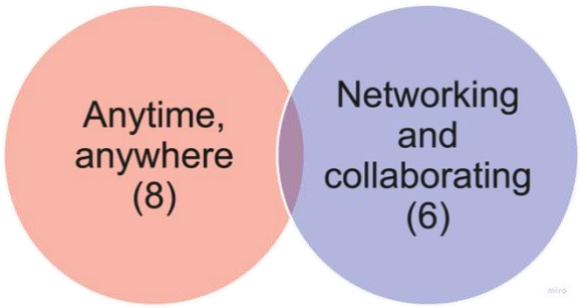


Figure 4-12: Themes that emerged from question 12

4.2.12.1 Anytime, anywhere

Students could study in different settings following seamless learning curriculum. Remix found this approach particularly beneficial, stating:

> The anytime, anywhere one was helpful for me … because … all of the things we're doing are on computers. So, we can do it at any time – at home, outside, in a cafe, at school, whether we have spare time, or anywhere.

The ability to work outside of the typical classroom environment helped to reduce stress and improve time management, according to seven other students who shared this sentiment.

4.2.12.2 Networking and collaborating

Cooperative learning was fostered by networking and collaboration in the seamless learning curriculum. Vibe highlighted the importance of this aspect by saying:

> Like networking with others, … was used a lot during this curriculum… A lot of people are working together with their performances and their presentations.

Another five students agreed that working together on projects and assignments improved their learning and made the classroom more engaging.

4.2.13 Overarching themes emerged from interview questions

When looking at the different themes of each question, five overarching themes emerged. They are: Learning Environment & Accessibility, Collaboration & Group Dynamics, Technological Integration & Tools, Time & Self-Management and Learning Preferences & Engagement.

4.2.13.1 Theme 1: Learning environment & accessibility

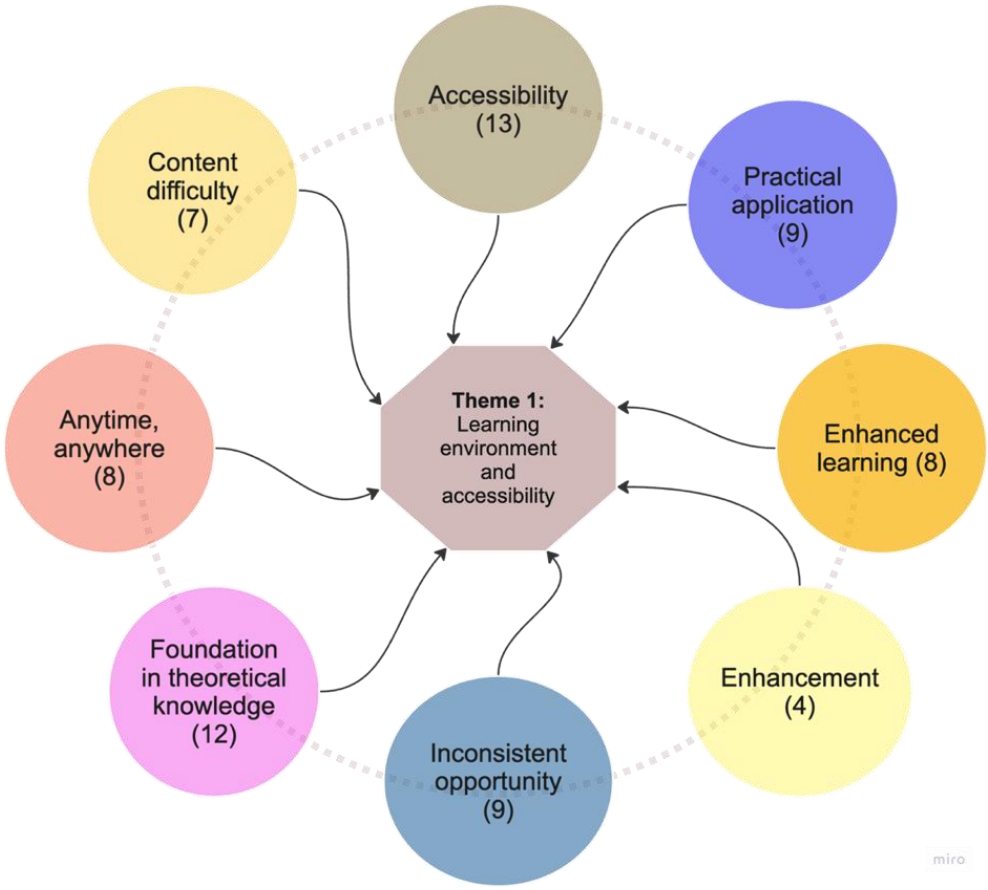


Figure 4-13: Themes from interviews crystallising into the overarching theme 1

The overarching theme of ‘Learning Environment & Accessibility’ encompasses various aspects that contribute to an effective and inclusive learning experience. These include making learning materials easily accessible, ensuring the practical application of knowledge, enhancing the learning process through innovative approaches, responding to disparities in learning opportunities, building a strong theoretical foundation, providing flexible learning environments and managing the difficulty level of content. Together, these sub-themes highlight the multifaceted approach required to create a conducive learning environment that caters to the diverse needs of all students.

4.2.13.2 Theme 2: Collaboration & group dynamics

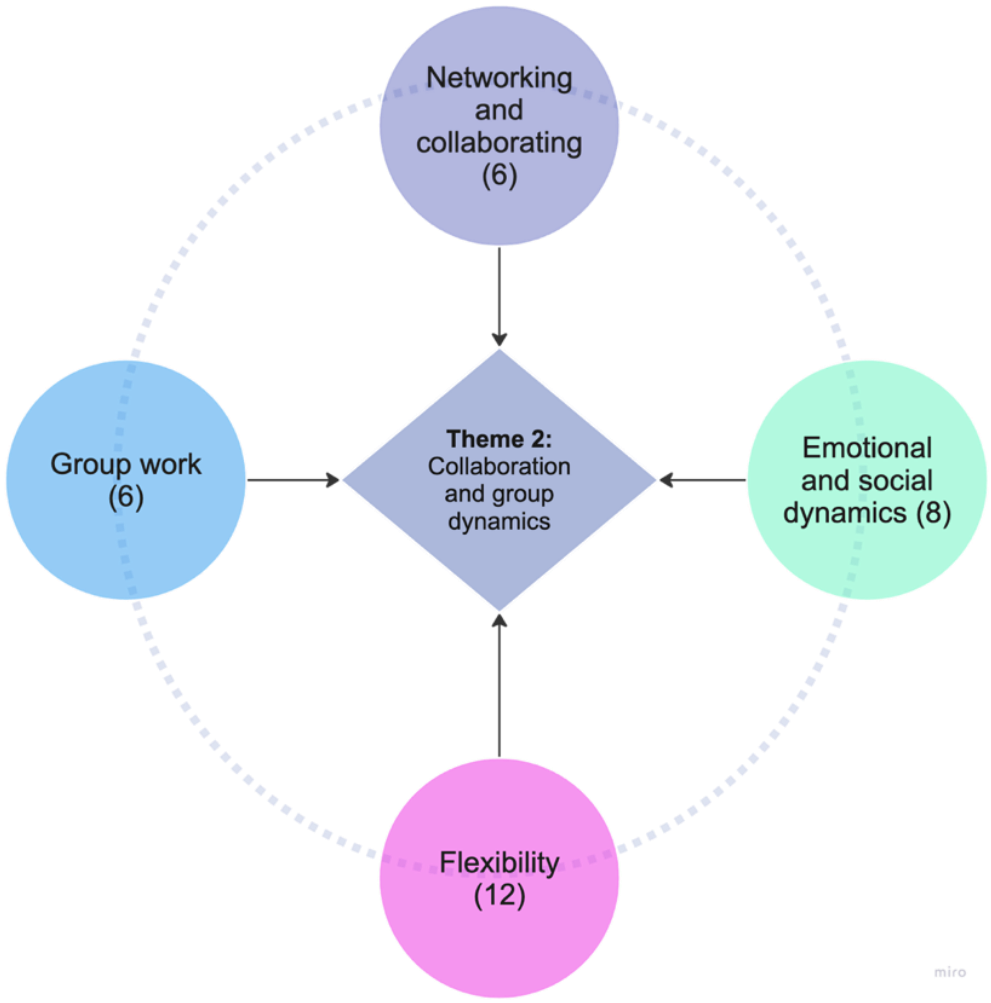


Figure 4-14: Themes from interviews crystallising into the overarching theme 2

The theme of ‘Collaboration & group dynamics’ covers several key factors that improve group learning and collaboration. These include networking and collaborating, the role of group work in academic success, the effects of emotional and social dynamics on group interactions and the need for flexibility in collaborative efforts. These sub-themes demonstrate the complexity of collaboration and the factors that affect educational group dynamics.

4.2.13.3 Theme 3: Technological integration & tools

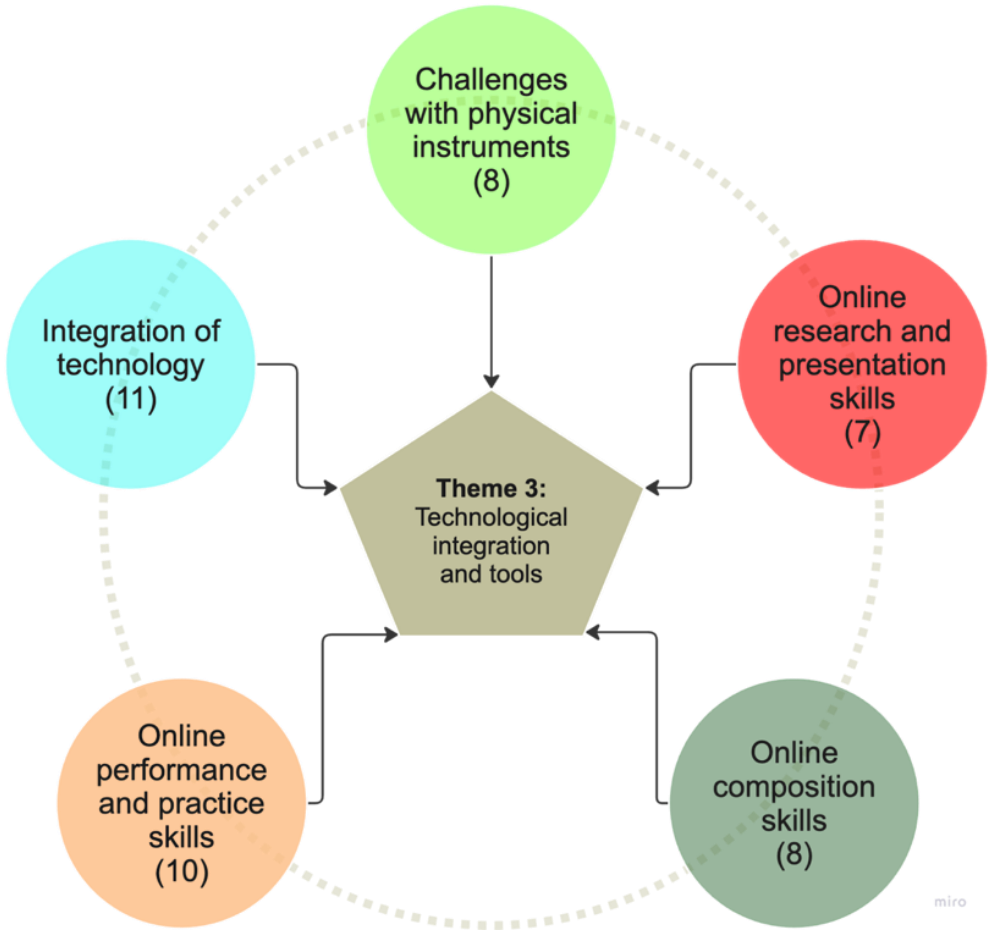


Figure 4-15: Themes from interviews crystallising into the overarching theme 3

As a whole, ‘Technological integration & tools’ covers wide ground regarding making good use of tech in music classes. Enhancing online research and presentation skills, developing online composition skills, integrating digital tools and resources, overcoming challenges with physical instruments, and so on, are all part of this. The

varied factors and abilities required for effective technology integration in today's classrooms are reflected in these sub-themes when taken as a whole.

4.2.13.4 Theme 4: Time & self-management

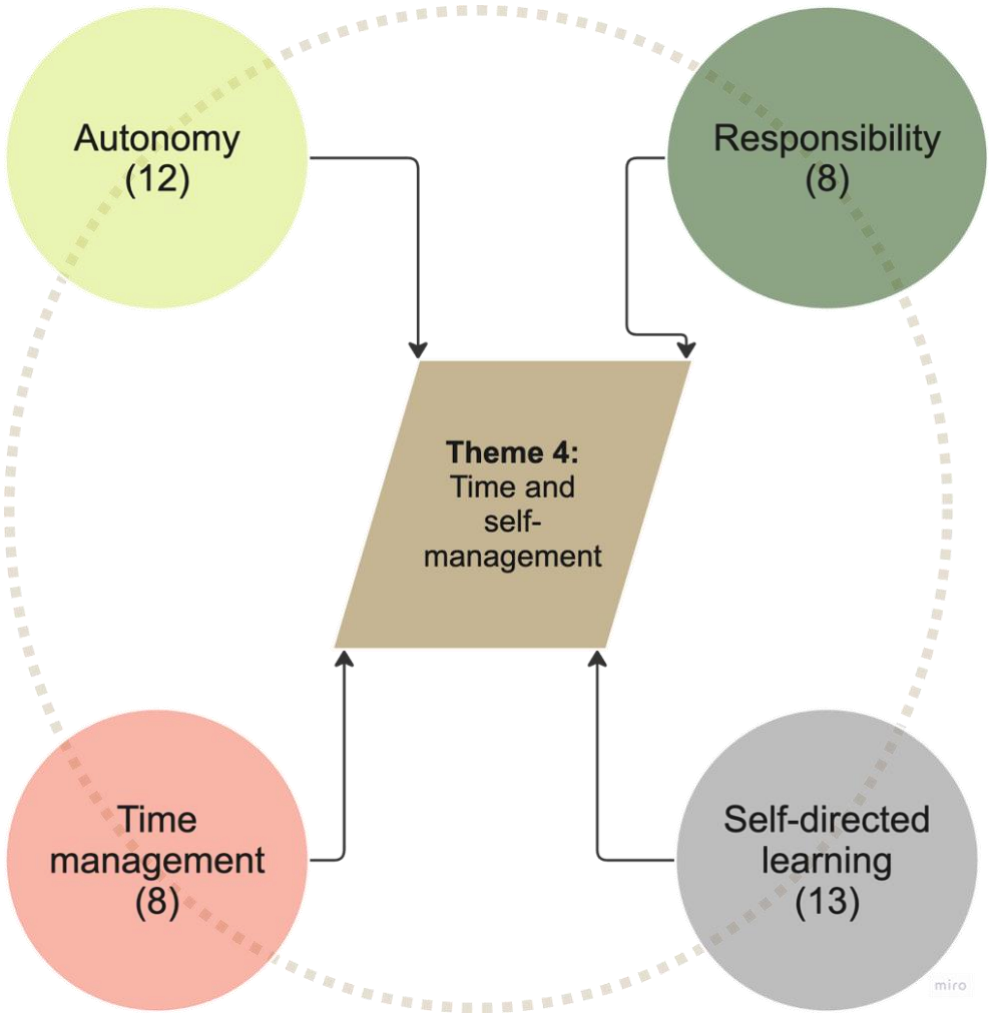


Figure 4-16: Themes from interviews crystallising into the overarching theme 4

Several sub-themes under the umbrella theme ‘Time & self-management’ pertain to the management of one's own learning. Some of these skills include autonomy, which stresses the significance of learning on one's own; responsibility, which stresses the necessity of taking responsibility for one's own learning; time management, which stresses the significance of appropriately dividing up one's time between different learning activities; and self-directed learning, which stresses the importance of being able to self-regulate and direct one's own educational path. The interconnectedness of

these sub-themes reflects the variety of factors and abilities essential to effective self- and time management in today's classrooms.

4.2.13.5 Theme 5: Learning preference & engagement

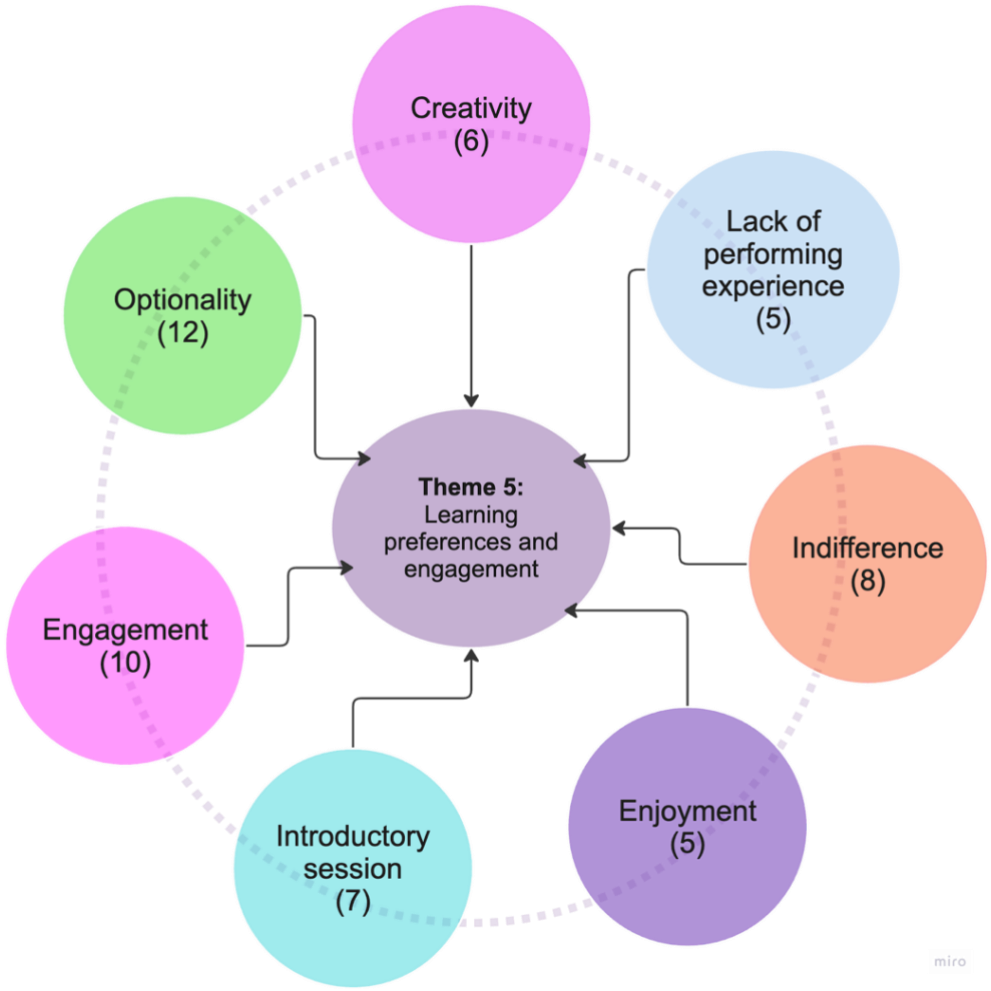


Figure 4-17: Themes from interviews crystallising into the overarching theme 5

Several aspects of student learning are covered under the theme ‘Learning preference & engagement’. These include creativity, which emphasises innovative and artistic expression in learning; a lack of performing experience, which emphasises the need for practical performing experience; indifference, which deals with student apathy; and enjoyment, which emphasises pleasure and satisfaction in learning. The introductory session emphasised initial orientation and familiarisation, helping students feel prepared and confident. Engagement focused on active participation, ensuring students took part in their learning journey. Lastly, Optionality provided students with meaningful choices in learning activities, allowing them to personalise their experience.

These sub-themes express the many factors that affect student preference and engagement in education.

4.2.14 Conclusion of overarching themes for interviews

The visualisation below shows the five main themes of the analysis and how they relate to one another and to the sub-themes.

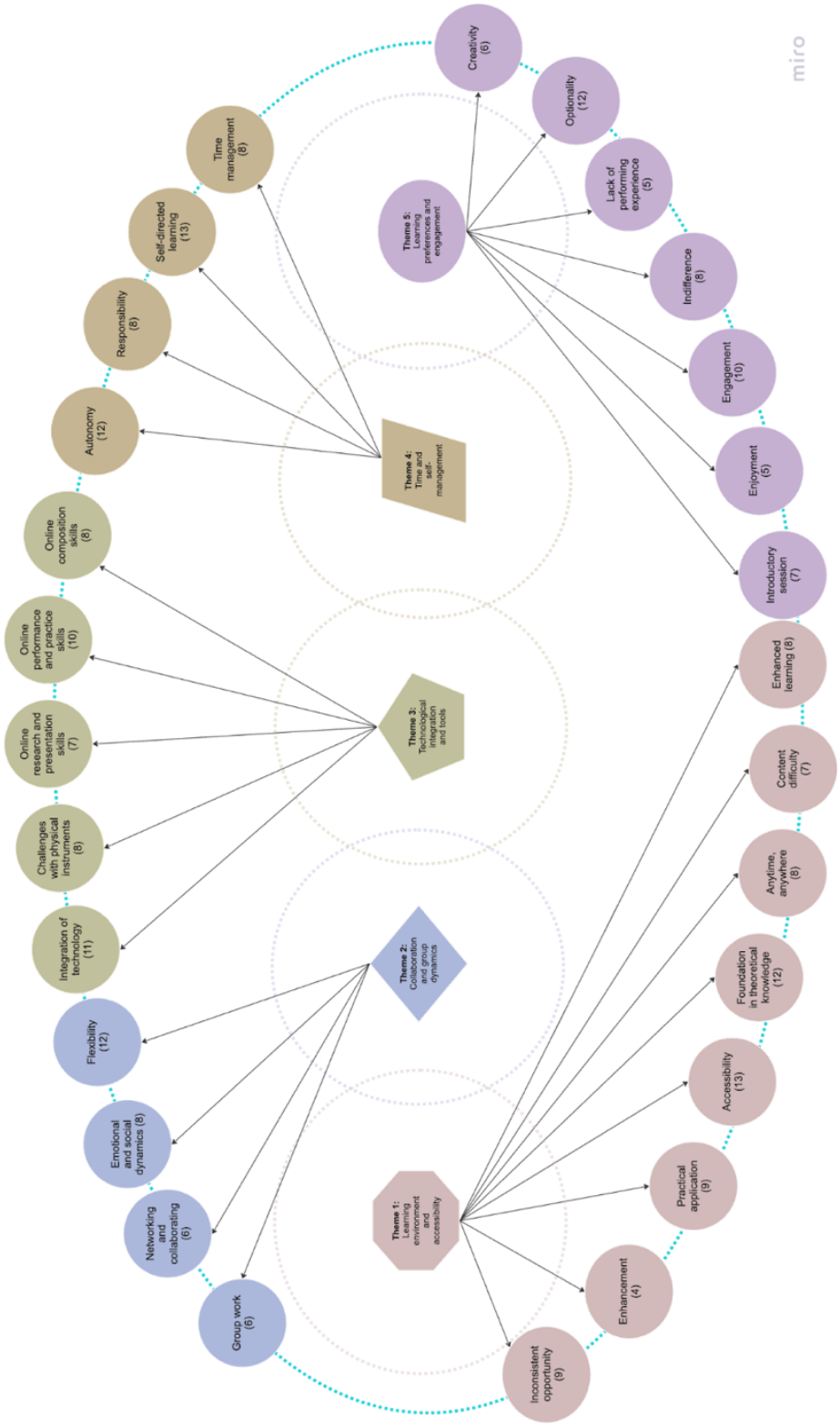


Figure 4-18: Analysis of visualisation of overarching themes

The overarching themes depicted in the diagram highlight critical aspects of the learning experience, including accessibility, collaboration, technological integration, time management and engagement. Each theme is connected to specific factors such as flexibility, autonomy, emotional dynamics, practical application and creativity,

underscoring the multifaceted nature of educational environments and the diverse needs of learners. These themes set the stage for a deeper exploration of students' experiences through their end-of-lesson reflections.

4.3 QUESTIONNAIRE 1: END-OF-LESSON REFLECTION[18]

Over the course of each semester, the student cohort were tasked to write a 10–15-minute lesson reflection (Addendum G) at the end of every music lesson. There were a total of 612 entries[19] across four units from a total of 50 students.

4.3.1 Question 1: Describe how and if you were able to do your work in different places and at different times, using both formal and informal learning.

Several responses confirmed the accessibility and flexibility of the adapted curriculum. Although some challenges, such as limited access to resources and time management challenges, were raised, most students reacted positively to this question. The following themes emerged (Figure 4-19):

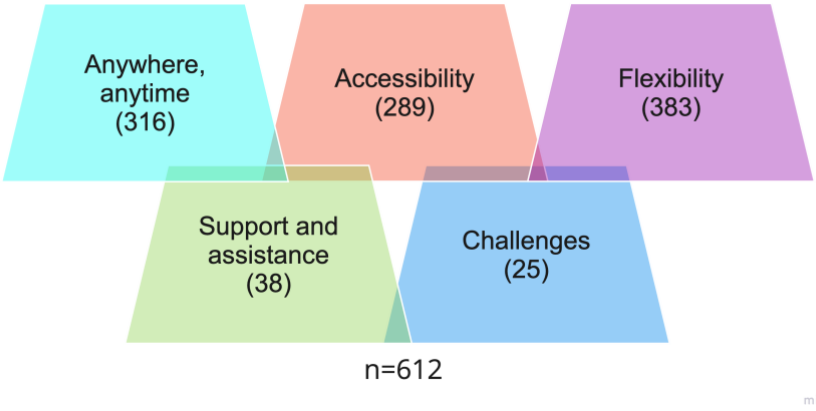


Figure 4-19: Themes that emerged from end-of-lesson reflection question 1

[18] See Addendum H.
[19] A mixture of programs was used to analyse and visually represent the data, including Google Suite and Miro.

4.3.1.1 Anywhere, anytime

The ‘Anywhere, anytime’ theme that emerged provides valuable insights into the students' learning experiences. The students (316) appreciated having the option to study outside the classroom settings, with one noting,

> I could do music history at home by using my computer to access resources and complete assignments on my own schedule.

However, those students without access to digital tools at home faced challenges, as was noted by a number of the students (50).

4.3.1.2 Accessibility

The students (289) expressed their gratitude for the availability of workbooks, with one stating, ‘I can take the music theory booklet home and work on it at home or any other location.’ A number of the students (52) frequently used educational materials outside the classroom, with one student saying: ‘Yes, I can work with this outside of school because you have access to a website that you can practise and learn on.’ This suggested a preference for flexibility in their learning environments. The availability of digital tools and internet access at home facilitated task completion and informal learning, as one student mentioned: ‘having internet access at home made it easier to finish my work.’

4.3.1.3 Flexibility

Many students (383) valued having the flexibility to study in different environments and at different times. One student specifically mentioned:

> I was able to study music history from home by accessing Canva on my computer and working on my video. I could use the internet to search up information at home.

4.3.1.4 Support and assistance

Of the 38 students who contributed to this theme, one said, ‘if I need help, I can email my teacher or Google it.’ This approach allowed students to obtain real-time feedback when they needed it. Through teacher communication or online resources, students are able to overcome challenges and continue their studies outside the classroom.

Another student shared that '… if we have any questions, we can google or use the link that's in the booklet'. Keep in mind that the teacher's links to online lessons were effective.

4.3.1.5 Challenges

Challenges represent the difficulties and obstacles students encounter while learning. Time management challenges affected 25 students, with one saying, 'I had trouble finishing my work on time.' Technical difficulties were also common, as highlighted by a student who said, 'sometimes it's difficult to access the internet.' Concentration outside of the classroom can be problematic, with one student sharing that 'it was hard to concentrate outside of the classroom.'

4.3.2 Question 2: How did today's class allow you to personalise your music learning journey?

A few responses attested to the customised nature of the modified course. Although some challenges such as difficulties in personalisation were raised, many students reacted positively to this question. The following themes emerged: autonomy, developing music skills, and challenges in personalisation (Figure 4-20).

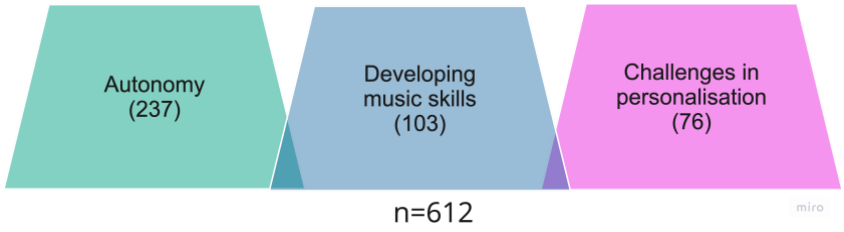


Figure 4-20: Themes that emerged from end-of-lesson reflection question 2

4.3.2.1 Autonomy

Autonomy in learning, highlighted through aspects mentioned at least 237 times, was a critical theme that indicated a significant impact on student engagement and motivation. This recurrent emphasis reflects the importance of allowing students to choose their learning paths, personalise their educational experiences and exercise independence in their studies. As one student pertinently expressed it:

> I could choose my own song, which makes my music learning journey easier and more fun as I can do what fits best for me.

This quotation encapsulates the essence of autonomy, underscoring the empowering effect of giving learners control over their learning journey choices.

4.3.2.2 Developing music skills

The development of music skills, which was emphasised through the mention of at least 103 aspects, is a central theme that emphasises the growth and proficiency of Musical Education. This emphasis underscores the significance of ongoing practice and the exploration and refinement of musical abilities. According to one student,

> Today's class enabled me to refine my musical abilities and experiment with various notes in order to become proficient and able to perform them independently.

4.3.2.3 Challenges in personalisation

A major theme that addresses the challenges faced in tailoring educational experiences to individual needs is the difficulty of personalisation, which is demonstrated through aspects that are mentioned at least 76 times. This focus reveals the complexities and difficulties inherent in creating a truly personalised learning environment. Someone in the class said:

> Today's lesson did not allow me to personalise my music learning journey because we only went through the units, what we are going to be doing and the basics of music theory.

Another student shared a comparable viewpoint, remarking, ‘today, we did not truly individualise the music theory lesson as everyone did the same thing.’

4.3.3 Question 3: Describe your experience with the different technologies that you have used during the lesson.[20]

The wide variety of technology tools used in the class was brought to light by multiple replies. Although technology challenges were noted, the students' feedback was positive. The following themes emerged (Figure 4-21):

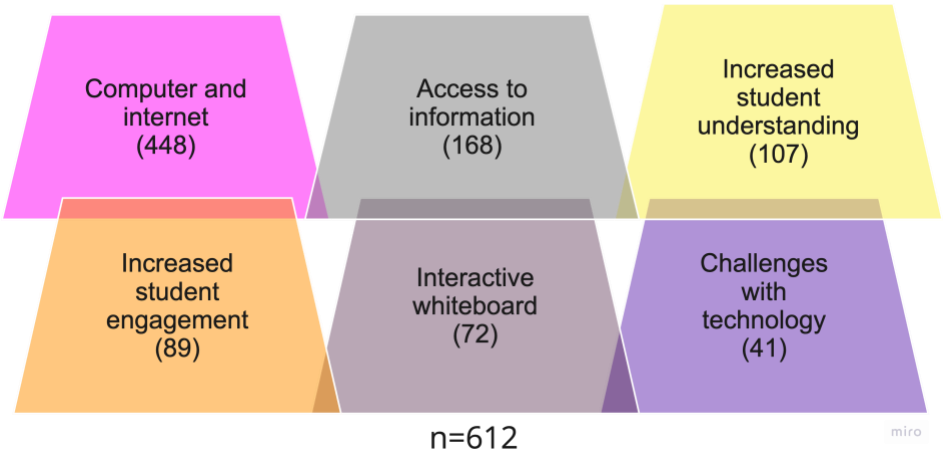


Figure 4-21: Themes that emerged from end-of-lesson reflection questions 3.1 and 3.2

4.3.3.1 Computer and internet

At least 448 student responses mentioned the use of their computers and the internet for various tasks. They completed quizzes about music theory, researched and presented music history projects and wrote reflection journals. 'I worked on a music history presentation using my computer and the internet,' one student said. They accessed online music theory resources to gain a deeper understanding and practical application. Students also created and edited music compositions, found sheet music and lyrics, and practised on their instruments using digital tools. Collaborative projects were managed through shared documents and AI tools helped to generate music ideas. In addition, they learned from music tutorials on platforms such as YouTube, further enriching their educational experience.

[20] The data from questionnaires 3.1 and 3.2 was merged as they produced the same themes.

4.3.3.2 Access to information

Access to information played a significant role in the students' learning experiences, with at least 168 student responses mentioning it. The availability of digital tools such as computers and internet access facilitated completing tasks and informal learning. One student noted: ‘the internet and the computer helped me to work on music history because I had access to the internet and could search up the information that I needed.’ Another added: ‘it helped me because I could research music history ….’ These resources made performing tasks quicker and easier compared to traditional approaches.

4.3.3.3 Increased student understanding

Increased student understanding was a significant benefit mentioned by at least 107 student responses. The use of digital tools such as interactive whiteboards and online resources enhanced comprehension. One student explained: ‘the names of the notes in the staff were explained and illustrated clearly with the help of the whiteboard.’ Another stated: ‘it helped me, I could understand the work easier by looking at the whiteboard.’ These tools made complex concepts more accessible and easier to grasp, contributing to a deeper understanding of the material.

4.3.3.4 Increased student engagement

Increased student engagement was a significant benefit mentioned by at least 89 student responses. The use of digital tools and internet access made learning more interactive and enjoyable. One student noted: ‘the technology that I used in the lesson helped me learn, since it makes it way easier to set up for the podcast for the music history unit.’ Another added: ‘it made my learning quicker, which gives me more time for more work.’ These resources made lessons more engaging and dynamic, fostering more active participation in the learning process.

4.3.3.5 Interactive whiteboard

The interactive whiteboard was mentioned at least 72 times, underscoring its vital role in the lessons. Teachers used the interactive whiteboard to explain music theory, demonstrate note identification and present slides and videos. ‘The teacher was able

to explain the name of the notes well with the interactive whiteboard,' noted one student. This tool helped the students to visualise complex concepts, making them easier to understand. Another student shared: 'I used the interactive whiteboard to write the letter names for F clef; it was very smooth and it also helped me learn.' In addition, students used the whiteboard for class activities, practising writing musical notes and collaborating on group projects.

4.3.3.6 Challenges with technology

Challenges with technology was highlighted by at least 42 student responses that some of the difficulties students faced during the lessons. One student expressed frustration, stating: 'the internet that I used today was a bit slow but it started working seamlessly again during the end of the lesson.' Another student found it challenging, saying: 'I have found it difficult on the computer.' Despite these challenges, many students still managed to complete their tasks, albeit with varying levels of difficulty. For instance, one student noted: 'this lesson the internet worked very slow, which made it difficult to make it through this reflection document.' These comments indicate that whereas technology is crucial to learning, technical issues such as slow internet and difficulties using computers posed some challenges for some students.

4.3.4 Question 4: Can you share how something you learned today might be helpful in a real-life situation? In other words, how could you use it in the real world?

Several responses highlighted the ways in which the knowledge and skills acquired during the lesson could be applied in real-life situations. Many students identified various practical applications, indicating the relevance of their learning. The following themes emerged (Figure 4-22):

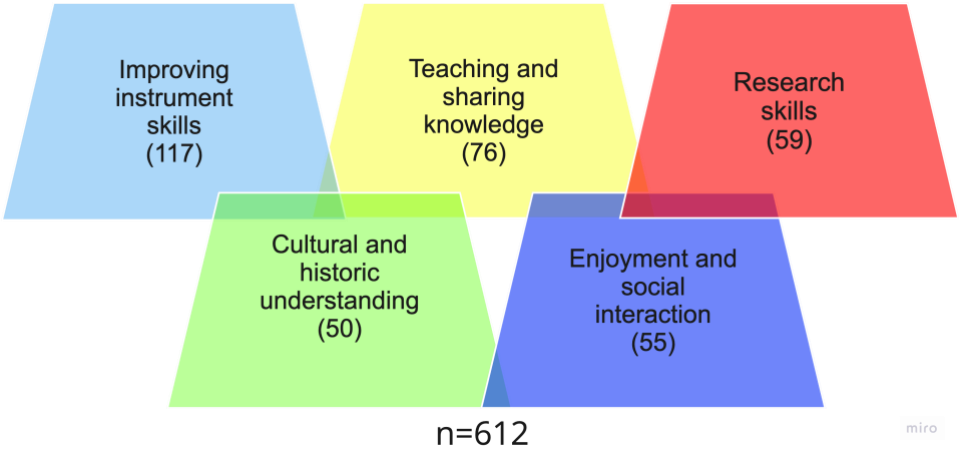


Figure 4-22: Themes that emerged from end-of-lesson reflection question 4

4.3.4.1 Improving instrument skills

Improving instrumental skills was mentioned by at least 117 student responses. Students highlighted how the lessons enhanced their ability to play various instruments, such as the piano and the ukulele. They appreciated learning music theory and note recognition, which aided them in composing and playing music ('Music theory is helpful when learning an instrument'; 'I could use my music theory knowledge to compose music or to play an instrument'). Practical applications were also noted, including the ability to play specific songs and understand musical elements ('I can use my piano skills to make my own songs'; 'Learning the notes will make it possible for me to play piano in the future without searching for notes'). In addition, students recognised the long-term benefits of their improved skills for personal enjoyment and social settings ('I learned how to play the piano a bit better now than I did 2 weeks ago, I can use this when I want to impress someone').

4.3.4.2 Teaching and sharing knowledge

Aspects regarding teaching and sharing knowledge were highlighted by at least 76 student responses. Students expressed the value of learning music theory and skills to help others ('I could teach other people the things I've learned that can help them in the future'; 'Yes, I can teach others where which note is supposed to be on the lines'). This aspect was seen as beneficial not only for reinforcing their own understanding, but also for aiding peers and family members ('Teach my mother how to read music';

‘I could use what I have learned today to maybe show it to my younger sibling’). The ability to share knowledge was also linked to potential future careers in music education (‘The music theory I learned today can help me teach others and understand music’).

4.3.4.3 Research skills

Research skills were mentioned by at least 59 student responses. Students frequently stated how learning music improved their research abilities (‘I learned how to search up a question that I was stuck on’; ‘During today's lesson I got more efficient on researching using the computer’). They appreciated the development of skills in finding and evaluating information (‘When researching different types of music, it's good if I want to become a musician, the more music information I have, the better music I can make’). This enhancement of research skills was seen as beneficial for both academic purposes and to future career opportunities.

4.3.4.4 Cultural and historical understanding

Cultural and historical understanding were highlighted by at least 50 student responses. Students valued learning about different music genres and their historical contexts. This knowledge was seen as enriching and useful for understanding cultural backgrounds and musical evolution (‘I learned a lot about Hip Hop and about what themes are often present in Hip Hop’). The historical insights gained were considered beneficial to engaging in informed discussions about music (‘It's helpful because I learned about rock, which could be helpful when I'm having a conversation with a music-interested person’; ‘One example where it pays off to know music history in the real world is if you want to work in music marketing’).

4.3.4.5 Enjoyment and social interaction

Enjoyment and social interaction were mentioned by at least 55 student responses. Students highlighted how learning music contributed to personal enjoyment and enhanced social interactions (‘Listening to music and playing it could help me enjoy music’; ‘Karaoke is often done in social situations in real life, so being good at it could be fun with other people’). Many students noted that playing instruments and singing could be enjoyable activities that also brought people together (‘If I want to impress

someone, I can now play half of “Fly me to the moon”’; ‘Being able to play the keyboard can be used in social situations and be vital if you want to work in the music industry’). These activities were seen as ways of building connections and improving social skills.

4.3.5 Question 5: Describe in what way today's lesson combined personal (doing research on your own) and social learning (such as discussing ideas with peers) to collaborate and connect with other students.

The following themes emerged (Figure 4-23):

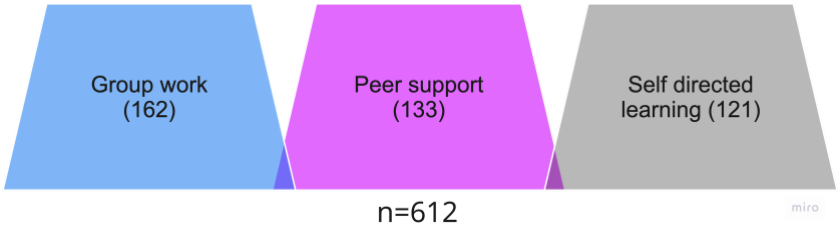


Figure 4-23: Themes that emerged from end-of-lesson reflection question 5

4.3.5.1 Group work

Group work was mentioned by at least 162 student responses, reflecting its importance in their learning process. They emphasised how collaborating with peers enhanced their understanding and ability to tackle tasks together (‘In music history, we worked in pairs’). Students appreciated the opportunity to divide tasks and share responsibilities (‘We decided to work inside of a group of three’).

4.3.5.2 Peer support

Students frequently emphasised the importance of peer support in their learning journey, being mentioned by at least 133 student responses. They frequently mentioned how assistance from classmates facilitated their understanding and progress (‘I got help from my friend’). This support was crucial when students faced difficulties, allowing them to acquire knowledge from one another and establish a sense of community (‘I got help from a friend and we talked about the different clefs and other music history stuff’).

4.3.5.3 Self-directed learning

Self-directed learning was a prominent aspect of students' educational experiences, with at least 121 student responses highlighting its importance. Their capacity to self-manage their learning was bolstered by their frequent mention of working independently on assignments and projects ('I worked in my booklet by myself'). This approach allowed students to take control of their learning process, enhancing their skills in self-management and discipline ('I mostly worked by myself and was very focused').

4.3.6 Question 6: How did the activities from today's lesson help you explore various types of music knowledge during your learning?

Students noted significant improvements in their understanding and skills across various aspects of music. The following themes emerged (Figure 4-24):

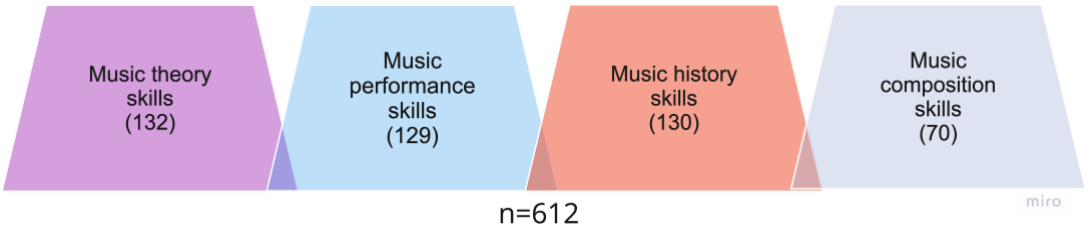


Figure 4-24: Themes that emerged from end-of-lesson reflection question 6

4.3.6.1 Music theory skills

At least 132 student responses emphasised their grasp of abstract ideas in music theory, including rhythms, clefs and notes. Students appreciated reviewing and reinforcing previously covered material, which helped solidify their knowledge. Among other things, 'the music theory book helped me understand the grand staff and clefs,' one student pointed out. Clear and straightforward tasks made the lessons more accessible, with another student mentioning 'it helped me learn easily because the tasks were straightforward and fun.' The ability to write different notes, their correct position and names was also emphasised: 'It helped me to know how to write different notes, their correct position and names.'

4.3.6.2 Music performance skills

The lessons relied on hands-on experience with instruments, as noted by no fewer than 129 student responses. Students developed practical skills, such as reading music and playing instruments, which they found engaging and enjoyable. ‘I simply practised naming the music notes; that will help me understand various notes and play some instruments,’ one student said. ‘The activities were fun and made the time fly by; it made it easier to learn,’ said another.

4.3.6.3 Music history skills

As many as 130 student responses thought that the class's exploration of various musical styles and artists was its most valuable component. The students thought that learning about the background of music helped them better understand how it developed over time. ‘I know how those genres sound now that I learnt about them in music history,’ one student said, referring to Bruno Mars's musical background. Someone else stated:

> today's lesson helped me explore various types of music. Because we needed to learn about a variety of musical styles before deciding on one to study in our music history class.

Researching and using online tools were also considered to be beneficial: ‘I read about rock on the internet which increased my knowledge.’

4.3.6.4 Music composition skills

Seventy or more student responses stood out for actively participating in songwriting and composition activities, which gave them the opportunity to investigate their own musical interests and share what they had learnt with their classmates. The focus was on acquiring knowledge of musical notation and rhythmic patterns. ‘In music composition, I learnt about how many sentences a verse needs, this made it easy for me to write rhyming lyrics,’ one student commented. The exploration of personal music interests was highlighted:

> Because we have such a free way of learning, we can explore and research what interest in music we feel like, while also getting a share of opinions on what our friends and peers think.

The use of digital tools, like flat.io, facilitated music creation and arrangement: ‘Using flat.io helped me understand how to put notes into my lyrics.’

4.3.7 Overarching themes of this section

When looking at the different themes of each question, the same five overarching themes emerged. They are Learning Environment & Accessibility, Collaboration & Group Dynamics, Technology Integration & Tools, Time & Self-Management, and Learning Preferences & Engagement.

4.3.7.1 Theme 1: Learning environment & accessibility

Figure 4-25: Themes from end-of-lesson reflections crystallising into the overarching theme 1

‘Learning environment & accessibility’ as a theme covers a range of elements that go into creating a productive and welcoming learning environment. These include facilitating easy access to educational resources, guaranteeing that knowledge is applied practically through adaptability, and offering opportunities for learning that are always available and their locations. It also discusses the need for help and support, the difficulties presented by technology and the challenges involved in customising learning experiences. Collectively, these sub-themes draw attention to the complex approach needed to establish a welcoming learning environment that meets the various needs of every student.

4.3.7.2 Theme 2: Collaboration & group dynamics

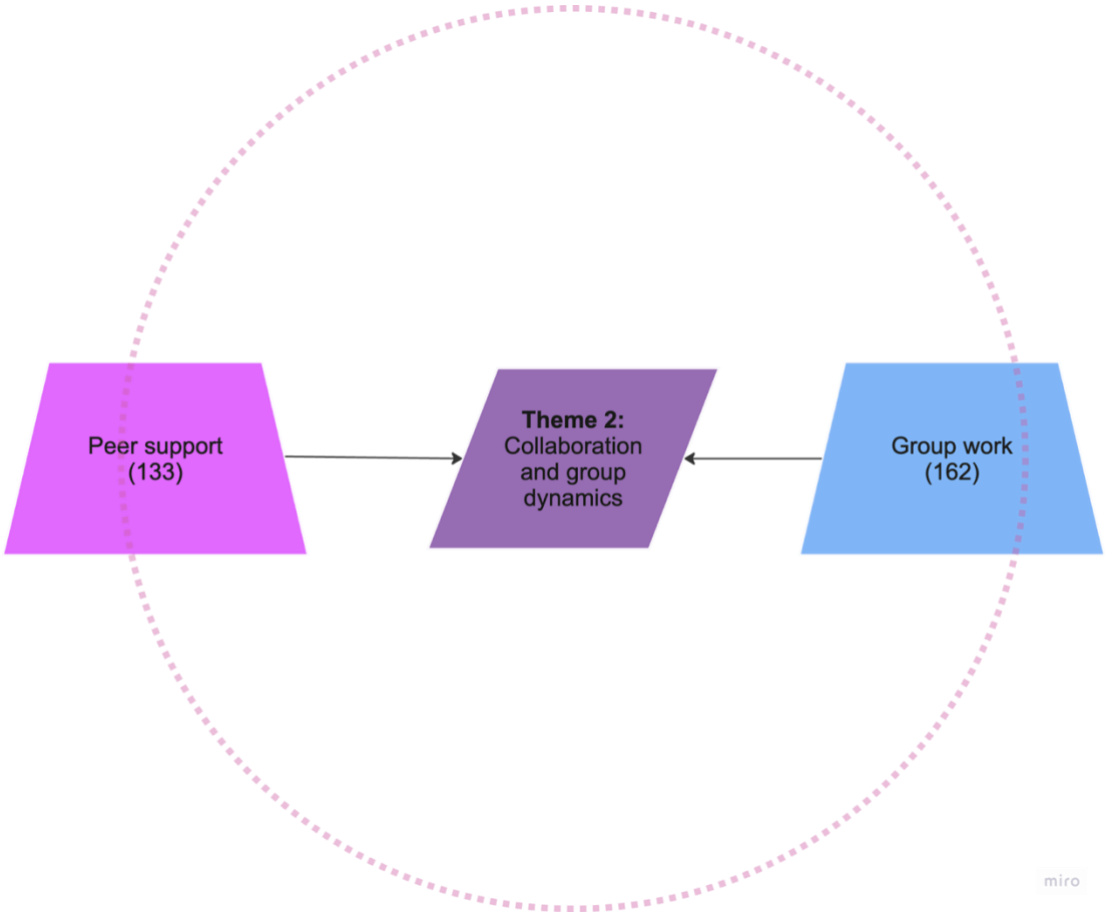


Figure 4-26: Themes from end-of-lesson reflections crystallising into the overarching theme 2

A variety of factors that support productive group collaboration and student interaction are included under the broad theme of ‘Collaboration & group dynamics’. Peer support underscores the value of students helping and supporting one another, while group

work emphasises the importance of cooperating on tasks to accomplish shared objectives. All these sub-themes highlight just how crucial cooperative efforts and constructive group dynamics are to establishing a vibrant and encouraging learning environment.

4.3.7.3 Theme 3: Technology integration & tools

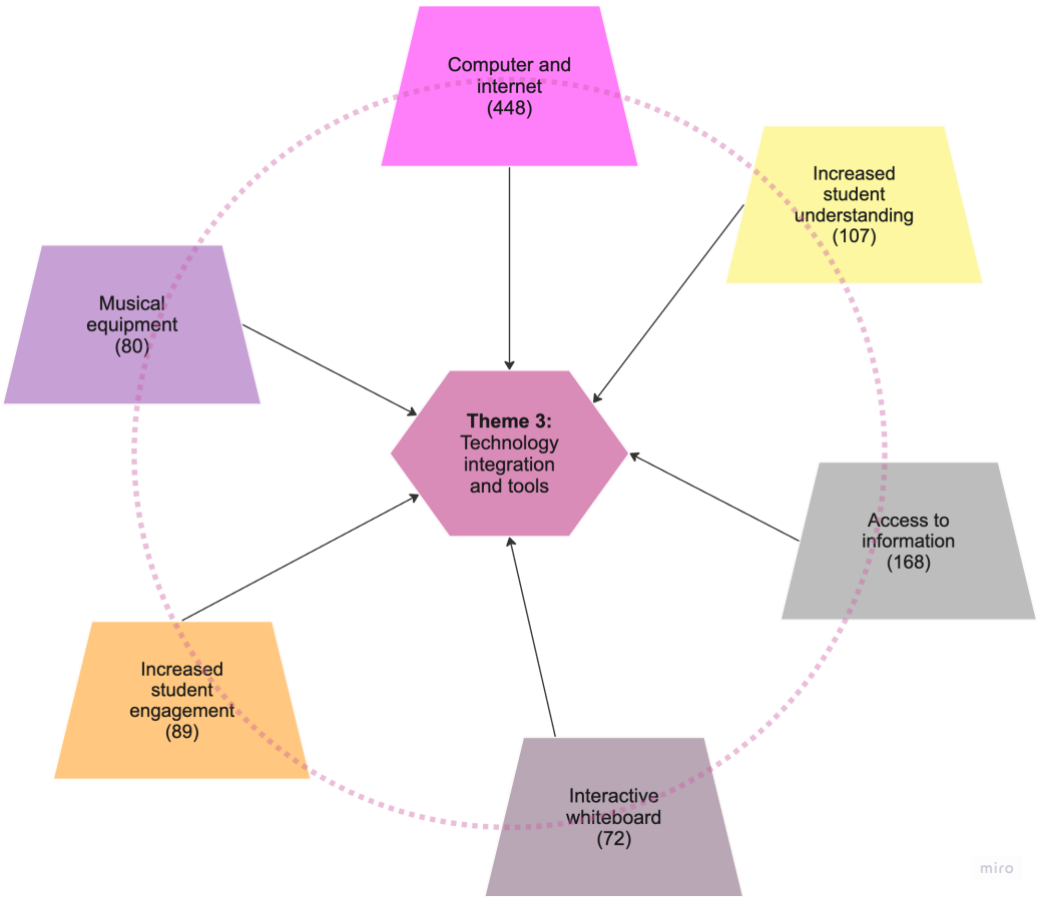


Figure 4-27: Themes from end-of-lesson reflections crystallising into the overarching theme 3

The overarching theme of ‘Technology integration & tools’ encompasses various aspects that contribute to the effective use of technology in education. Among these are the use of computers and the internet, which make it easier to access a variety of data and resources; the contribution of interactive whiteboards to raising student participation, and the availability of musical instruments – which promotes a variety of educational opportunities. The positive effects of technology on learning outcomes are

highlighted further by emphasising the increased understanding and engagement of students. Together, these sub-themes underscore the critical importance of integrating technology tools to create a dynamic and supportive learning environment.

4.3.7.4 Theme 4: Time and self-management

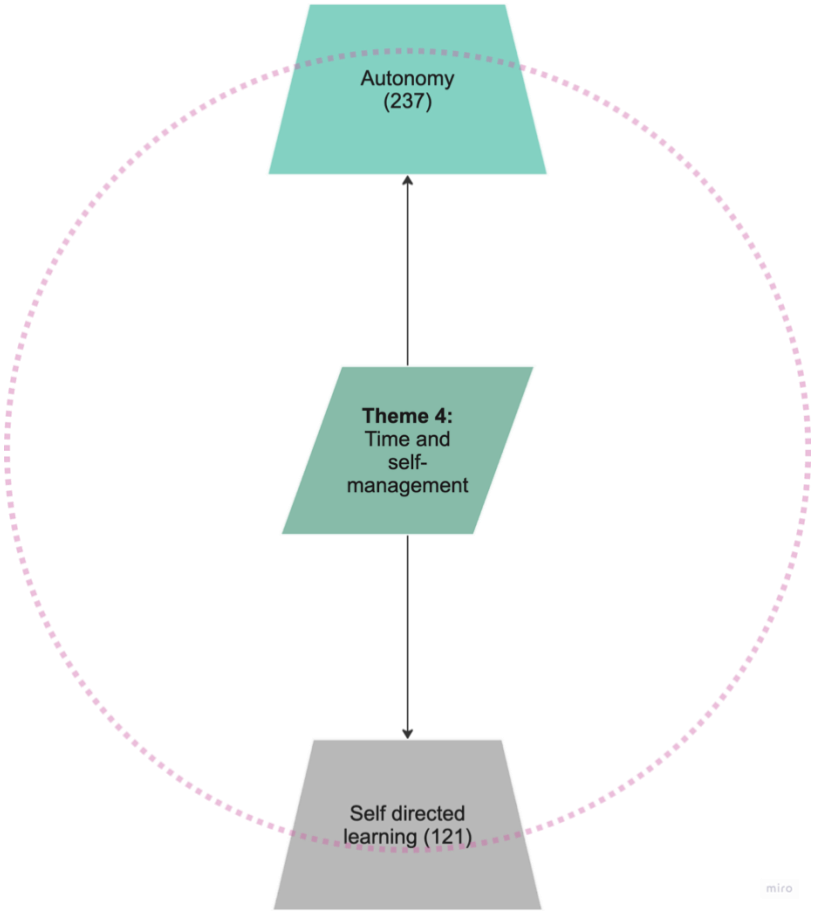


Figure 4-28: Themes from end-of-lesson reflections crystallising into the overarching theme 4

There are numerous components that contribute to the effective personal and academic productivity encompassed by the overarching theme of 'Time & self-management'. These include autonomy, which underscores the significance of students' autonomy in their learning processes, and self-directed learning, which stresses the importance of students' taking the initiative and being responsible for their own education. These sub-themes collectively emphasise the importance of self-regulation and time-management skills in cultivating an independent and productive learning environment.

4.3.7.5 Theme 5: Learning preference & engagement

Figure 4-29: Themes from end-of-lesson reflections crystallising into the overarching theme 5

Various components that contribute to a personalised and engaging learning experience are encompassed in the overarching theme of 'Learning preference & engagement'. To achieve a comprehensive musical education, it is necessary to develop music skills, teach and share knowledge, and comprehend music history. The relevance of learning to real-world contexts is underscored by its practical application in music careers and daily life. To develop well-rounded musicians, the theme emphasises improving instrument, music theory and performance skills. Enjoyment and social interaction, music composition, cultural and historical understanding, and research skills enhance learning by catering to diverse interests and deepening engagement. To create an engaging and effective learning environment, these sub-themes emphasise learning preferences.

4.3.8 Conclusion of overarching themes of questionnaire 1

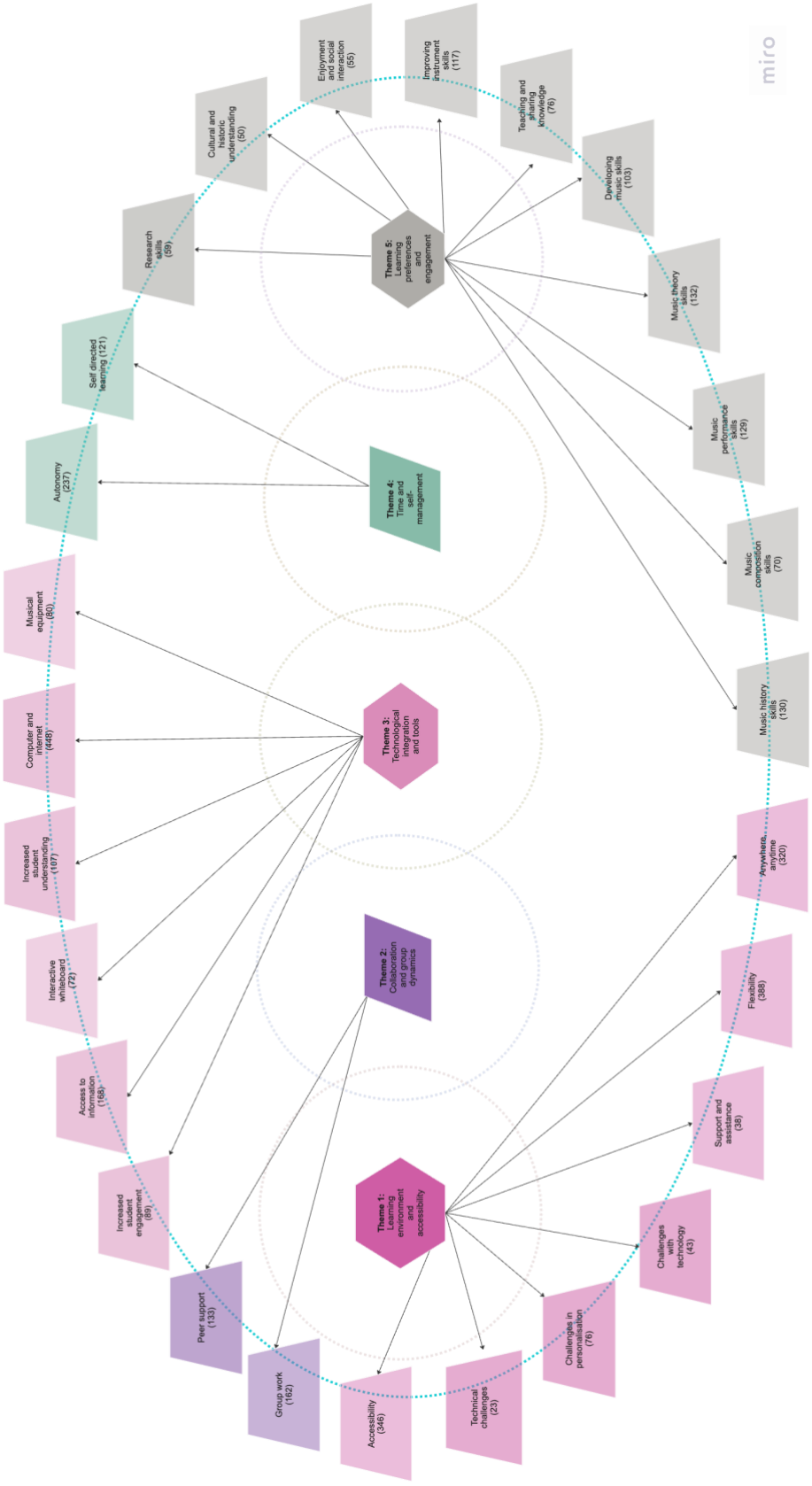


Figure 4-30: Analysis and visualisation of overarching themes of questionnaire 1

Based on the overarching themes presented in questionnaire 1, it is evident that the respondents' feedback is diverse and multifaceted, reflecting a wide range of experiences and perspectives. The themes indicate significant areas of interest and concern, such as peer support, group work, accessibility, increased digital resources, practical application and self-directed learning. These themes highlight the importance of flexibility, autonomy and a supportive learning environment. In addition, the emphasis on research, cultural understanding and economic impact underscores the broader context in which these educational experiences are situated. Overall, the data suggest that enhancing accessibility, fostering collaboration and integrating practical and theoretical knowledge are crucial to improving educational outcomes and student engagement.

4.4 QUESTIONNAIRE 2: END-OF-UNITS REFLECTION

Students were also asked to reflect[21] on the entire unit after completing each of the four music course units. I received 181 reflections. The questionnaire included multiple-choice questions regarding aspects of seamless learning, their level of engagement, various learning tools and the structure of the units.

4.4.1 Core concepts[22]

To assess the core concepts, a set of targeted questions was designed. These questions aimed to evaluate the effectiveness of a student-centred approach, the impact of globalisation on learning and the value of practical experience. They also assessed how well students are prepared for future pursuits, the benefits of real-time interaction and the accessibility provided by remote learning. By covering these areas, the questions helped to identify the key elements essential to achieving a holistic and enriched learning environment.

[21] See Addendum H.
[22] Discussed in 2.8.1 Core concepts in chapter 2.

4.4.1.1 How much did using the interactive whiteboard help you to learn about music in the unit(s)?

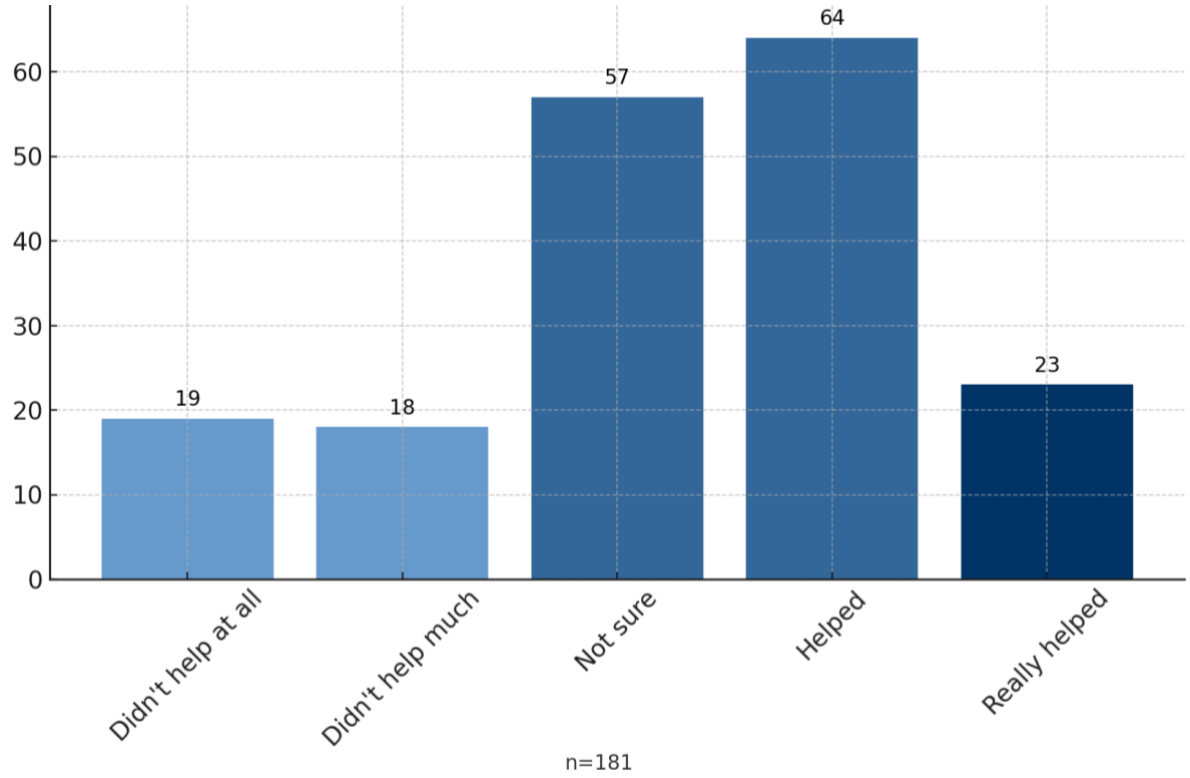


Figure 4-31: Impact of the interactive whiteboard on learning

The interactive whiteboard probably enhanced the students' engagement and understanding in the music unit. It seemed to cater to various student preferences, potentially making the material more accessible and interactive. However, the uncertainty among some students suggests a need for further refinement in its implementation or for additional training to maximise its benefits across the four music units.

4.4.1.2 How often did you use computer programs and apps (like musictheory.net, flat.io, or others) in the unit(s)?

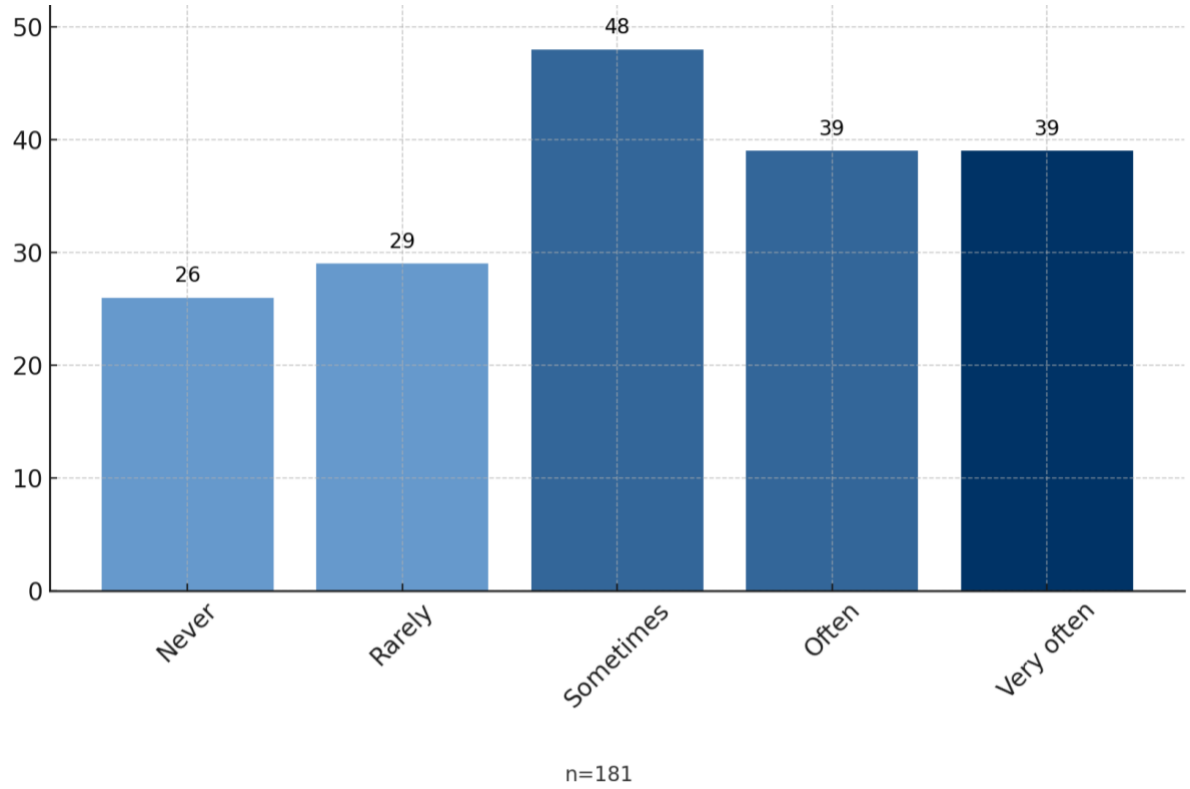


Figure 4-32: Frequency of using computer programs and apps in the music units

The diverse usage patterns of computer programs and apps in the music unit suggest varying levels of technological integration and student engagement. Some students might be more comfortable or familiar with digital tools, whereas others may need additional support or encouragement to use these resources effectively.

4.4.1.3 Did you have any problems with your laptop that made it hard for you to learn in the unit(s)?

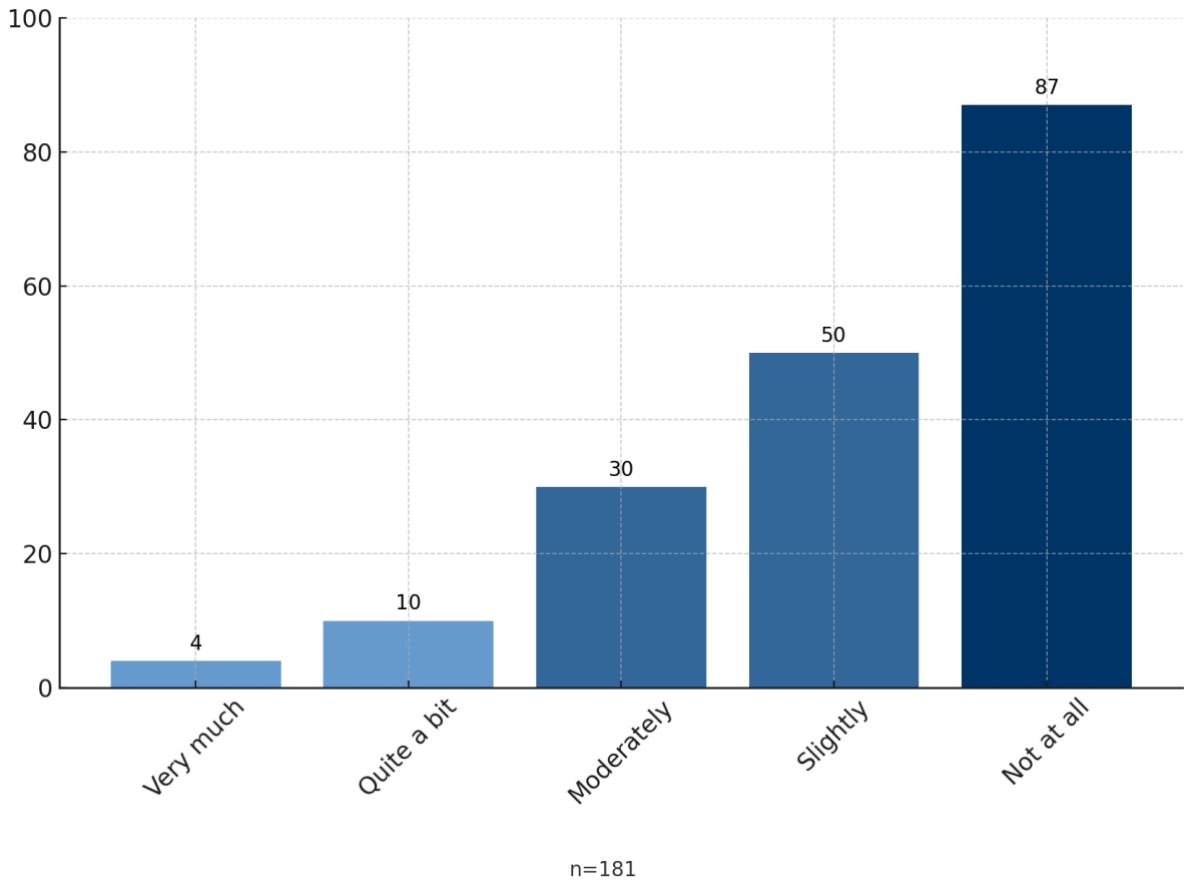


Figure 4-33: Problems with laptop affecting learning

Laptop issues do not appear to hinder learning significantly for most students in the music unit. This indicates that most students have reliable access to functioning technology However, the presence of any technical challenges highlights the need for robust technical support and resources to ensure that all students can maintain their learning activities without disruption.

4.4.1.4 Did talking to other expert music teachers or musicians (for example, during surgery time) help you learn or understand more about music?

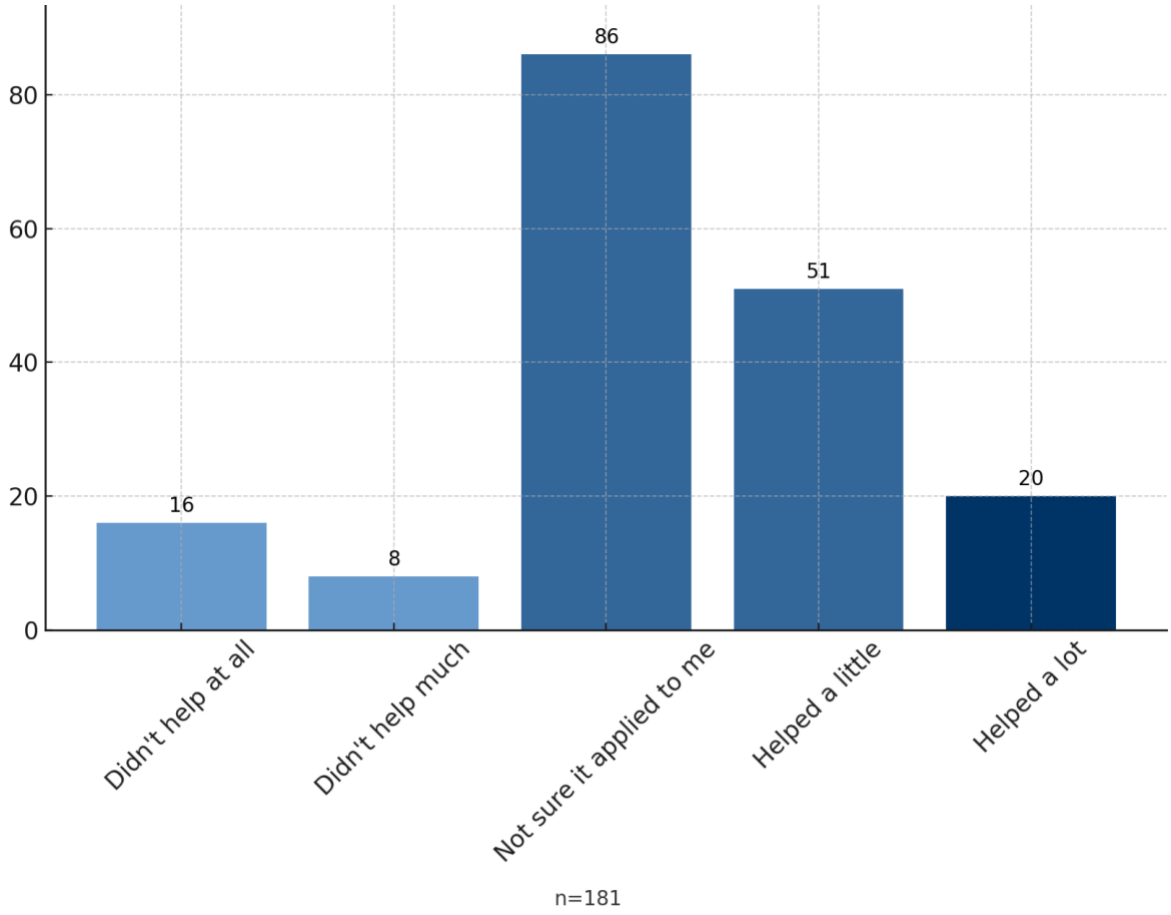


Figure 4-34: Impact of talking to expert music teachers or musicians

Some students benefited from learning from expert music teachers or musicians. The significant number of students who were unsure about its relevance suggests that more 'other expert' interactions could increase the perceived benefit. The varied responses also indicate that personal learning experiences and preferences play a crucial role in the way students perceive the usefulness of such interactions. This feedback highlights the potential for these expert engagements to be more effectively integrated into the learning experience to ensure that all the students can see their relevance and gain from them.

4.4.1.5 How much did the software help you acquire and process knowledge about music during this unit?

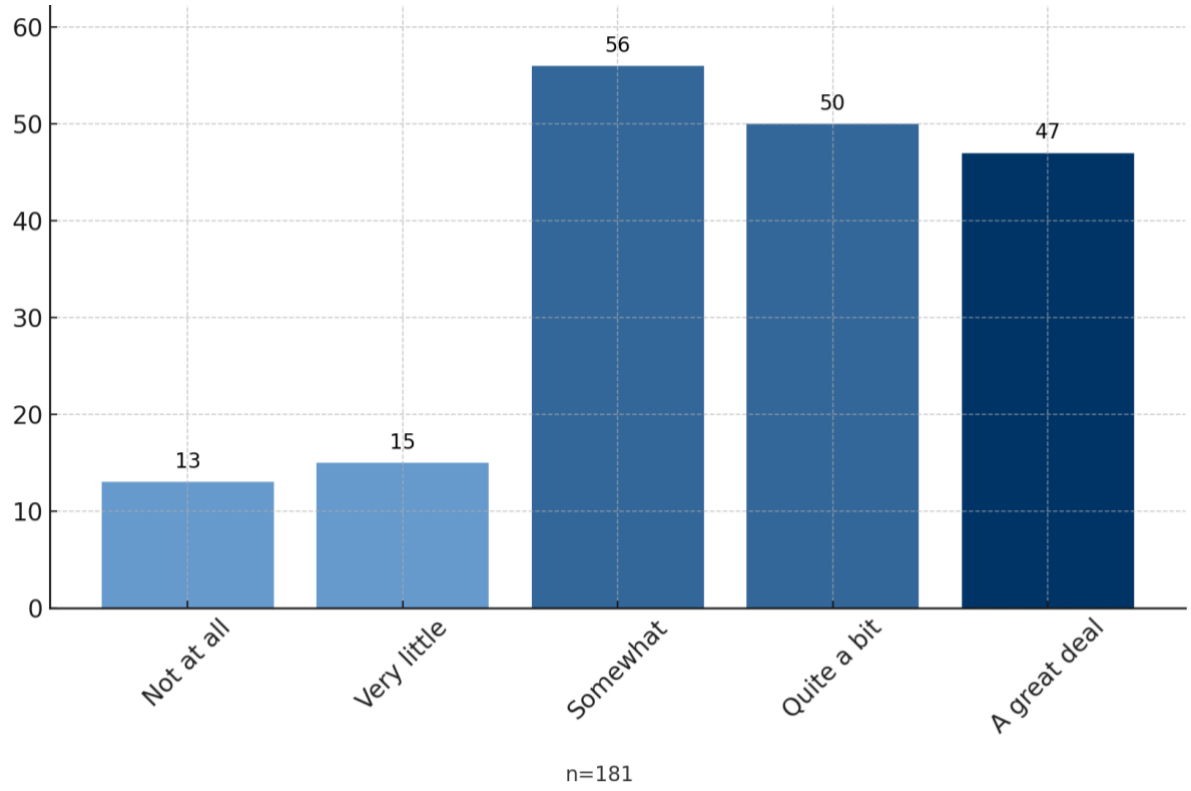


Figure 4-35: Impact of software on acquiring and processing music knowledge

The software used in the music unit appears to have been quite effective in helping the students to acquire and process knowledge. The high levels of positive feedback suggest that these digital tools play a significant role in the learning process. However, there was a small group of students who found the software less beneficial, indicating a possible need for additional support or alternative resources to cater to different learning needs.

4.4.1.6 Did the feedback you got help you understand your final grade for the unit(s)?

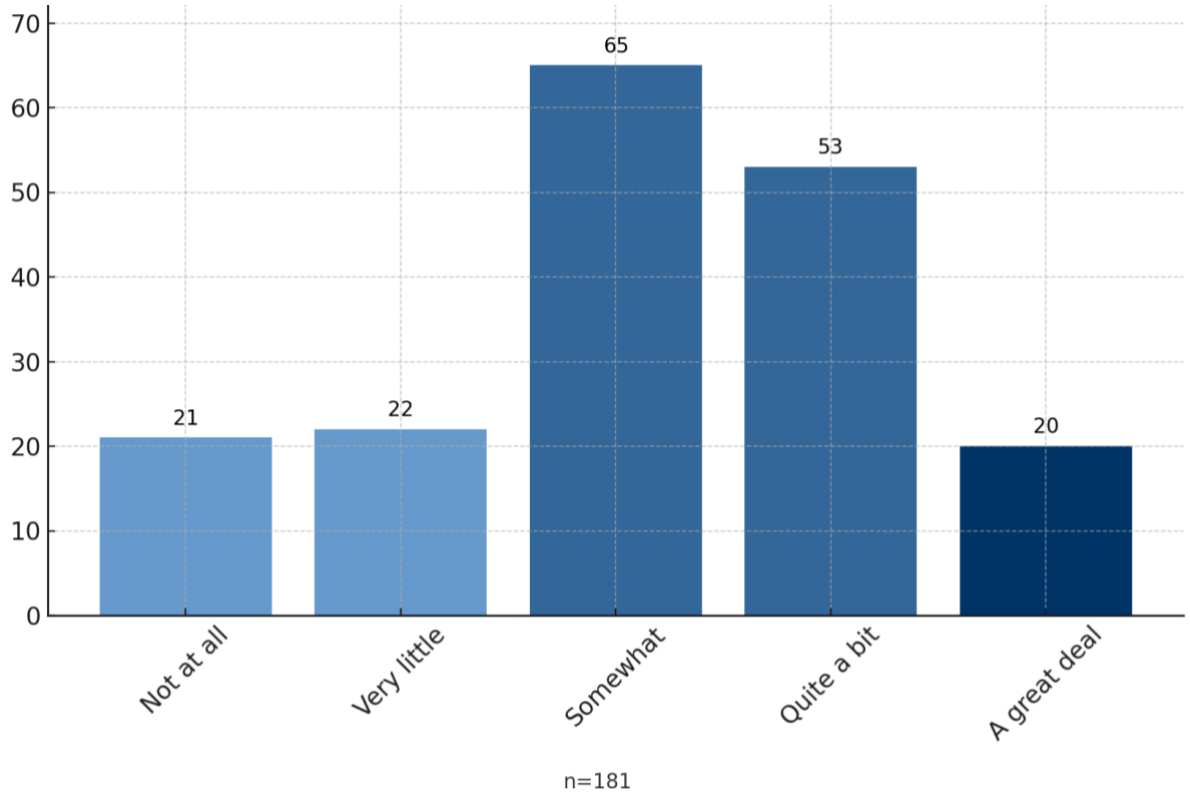


Figure 4-36: Impact of feedback on understanding final grade

Feedback received during the unit seems to have played a crucial role in helping students understand their final grades. Many students found feedback to be somewhat to quite helpful, indicating that clear and detailed feedback can significantly enhance students' comprehension of their performance. However, there is a notable proportion of students who found the feedback to be of little help or not helpful at all, suggesting that the quality or clarity of feedback could have been improved. This highlights the importance of providing constructive, actionable and comprehensible feedback to support all students in understanding their academic progress and areas for improvement.

4.4.1.7 Did you feel encouraged to collaborate with others in this unit?

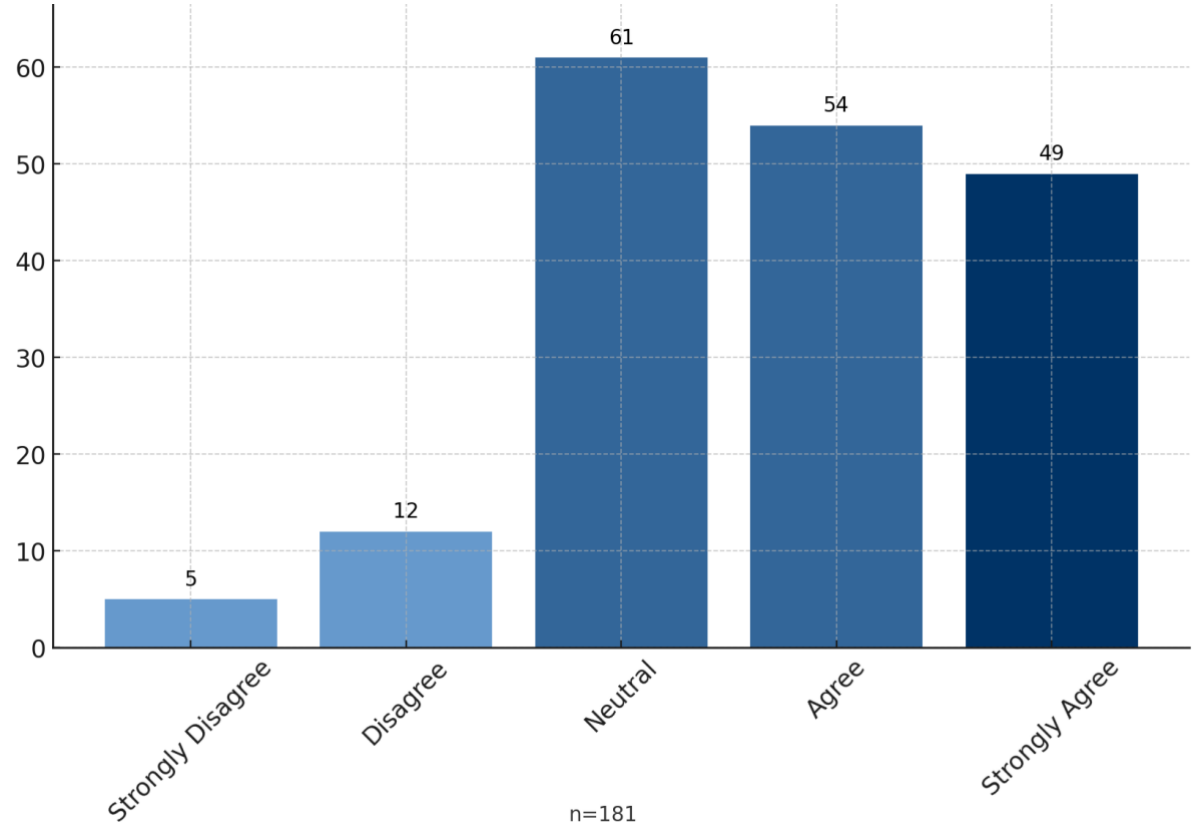


Figure 4-37: Encouragement to collaborate

The encouragement to collaborate with others in the unit seemed to have been well received, with a significant portion of students feeling positively about it. This suggests that collaborative activities and peer interactions are integrated effectively into the unit, promoting a supportive and interactive learning environment. However, a portion of students remained neutral, indicating that there might be room for improvement in fostering a more inclusive or engaging collaborative culture. The small number of students who disagreed or strongly disagreed with feeling encouraged to collaborate suggests that individual preferences or experiences might have affected their perception of collaborative efforts. This feedback highlights the importance of continually assessing and enhancing approaches to encourage collaboration, ensuring that all students feel included and motivated to participate.

4.4.1.8 How well did you collaborate with other students in the class in the unit(s)?

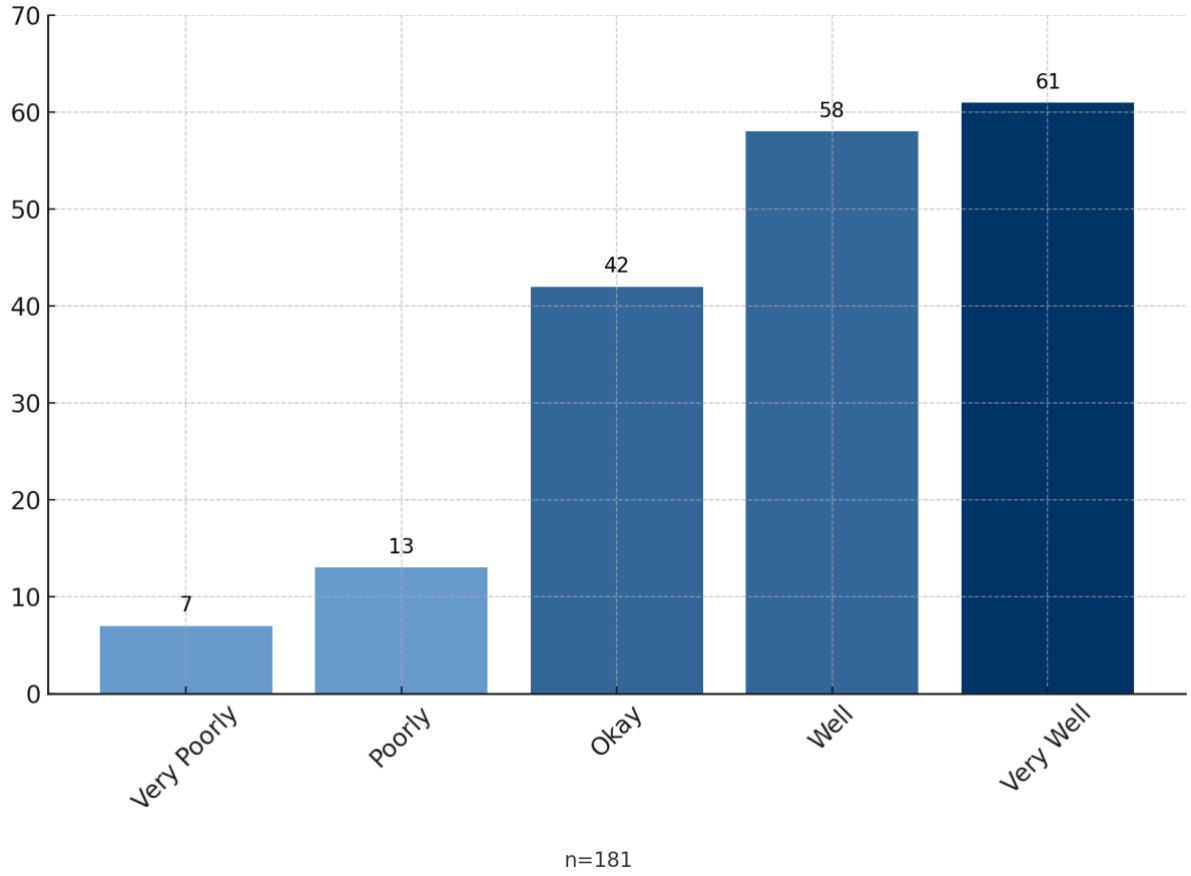


Figure 4-38: Quality of collaboration with other students

Many students reported positive experiences with class collaboration, suggesting that it is generally effective. This suggests a generally supportive and cooperative learning environment where students can work well together. The small number of students who rated their collaboration as poor or very poor could indicate areas where group dynamics or individual participation could be improved.

4.4.1.9 How interested are you in working in groups in future units?

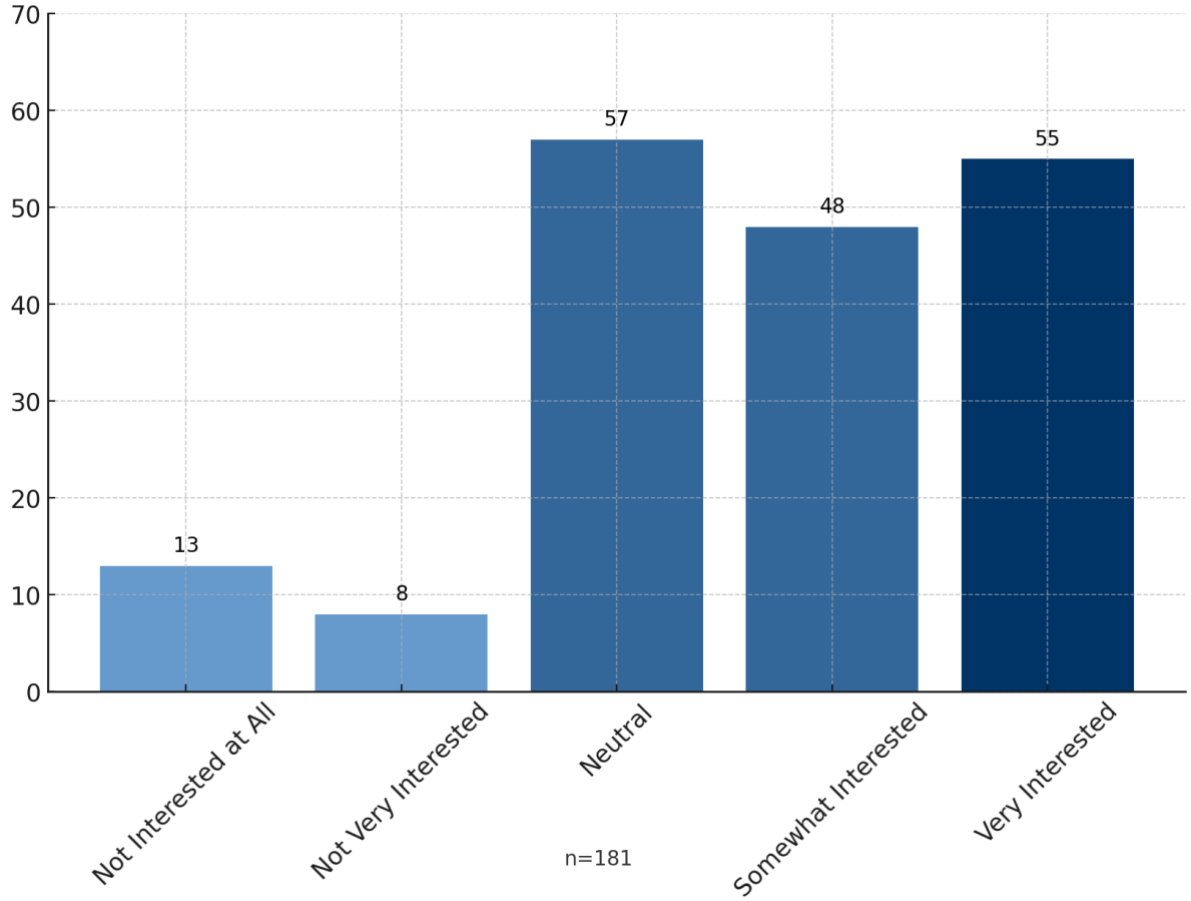


Figure 4-39: Interest in future group work

The students indicated a favourable attitude towards collaborative learning by expressing a strong desire to work in groups for new units. The high levels of interest suggest that students value the benefits of group work, such as shared knowledge and peer support. However, the presence of some students who indicated they are not interested or are neutral highlights the need for diverse teaching approaches that cater to different student preferences. This feedback underscores the importance of balancing group activities with individual tasks to accommodate all students' needs and to ensure an inclusive learning environment.

4.4.1.10 How much did you use digital tools to work with others (like Google Docs, Slides, etc.)?

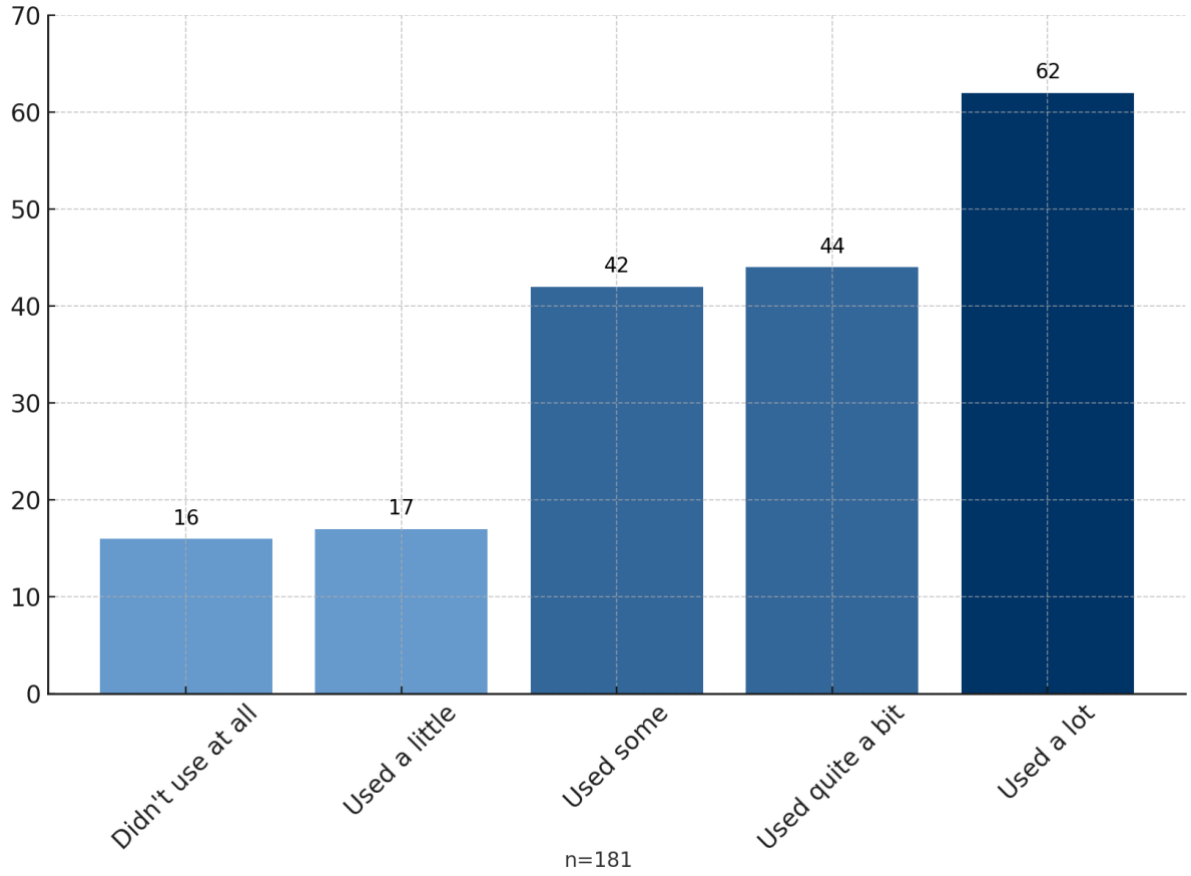


Figure 4-40: Usage of digital tools for collaboration

Digital tools were widely used by the students for collaborative work, reflecting their integration into the educational process. However, a small portion of students who used these tools minimally or not at all indicates variability in digital tool adoption. This feedback highlights the importance of ensuring that all students have the resources and skills needed to use digital tools for collaborative learning effectively.

4.4.1.11 Heatmap[23] of the core concepts

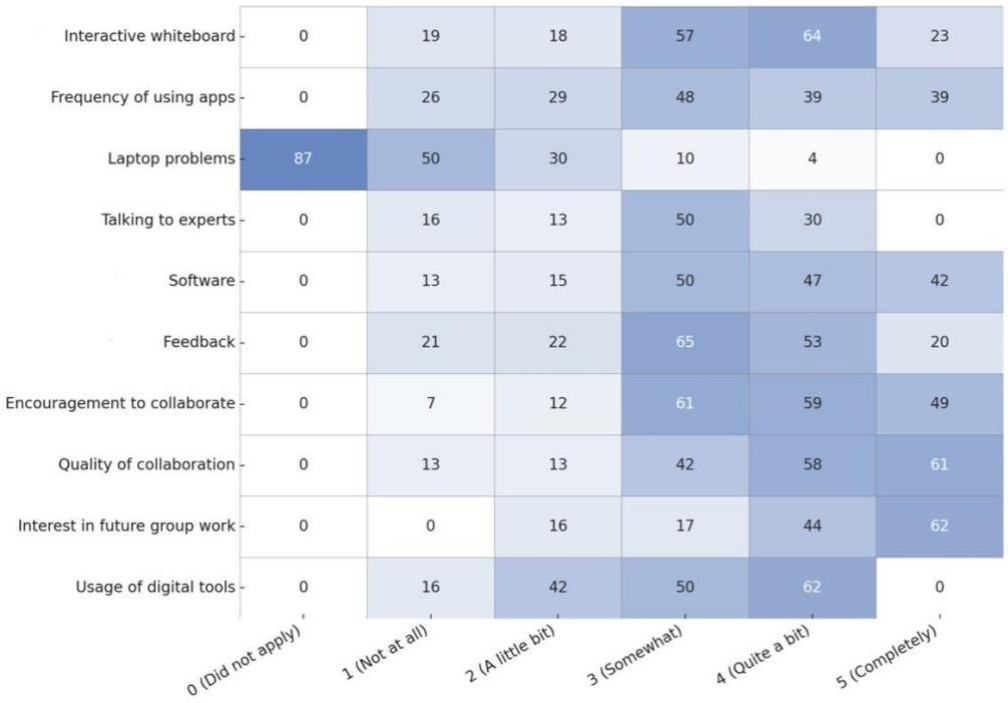


Figure 4-41: Heatmap of student responses[24] in core concepts

Both the interactive whiteboard and the educational software received high positive feedback, indicating their effectiveness in enhancing learning. Digital tools and collaboration show consistent usage, with many students frequently using computer programs and apps. This suggests a digital-first approach is effective and that additional training for less frequent users could be beneficial. Minimal technical problems support the high usage of digital tools, emphasising the need for reliable technology infrastructure and ongoing technical support.

Engagement with expert music teachers and constructive feedback could significantly enhance student understanding. Facilitating more expert interactions and ensuring detailed, clear feedback could improve outcomes more. Encouragement to collaborate correlates strongly with successful collaboration: the school should therefore continue

[23] The heatmap was generated using the coding analysis from the Google Forms. The heatmap allows for a quick visual comparison of the way participants responded to each question, with the intensity of the colour representing the frequency of each response. The darker the colour, the higher the number of responses in that category.

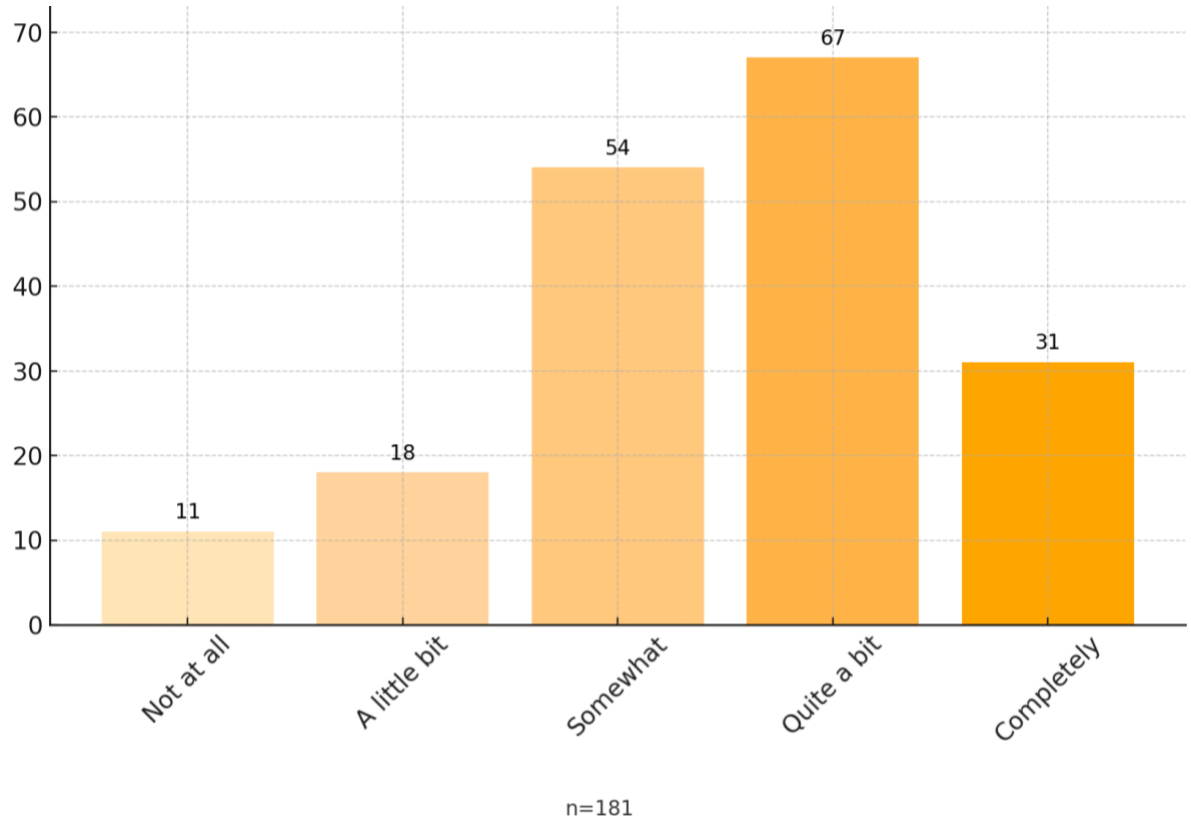
[24] For easier reading, the categories on the y-axis have been simplified to reflect the main idea of each question.

fostering a collaborative culture. High interest in future group work and positive current collaboration experiences indicate a readiness for more group projects, suggesting that structuring more group assignments would be advantageous.

4.4.2 Positive concepts[25]

In order to assess the positive concepts, a set of targeted questions was designed. This was done to assess the effectiveness of a student-centred approach, the impact of globalisation on learning and the value of practical experience. They also evaluated how well students are prepared for future pursuits, the benefits of real-time interaction and the accessibility provided by remote learning. By covering these areas, the questions may help identify key elements essential to achieving an enriched learning environment.

4.4.2.1 How much do you feel like your learning in this class is personalised to/for you?



[25] Discussed in 2.8.2 Positive concepts in chapter 2.

Figure 4-42: Personalised learning

Personalising learning instruction to individual needs appears to be a key strength of such a teaching-learning methodology, fostering a more inclusive and supportive educational environment. However, there may still be room for improvement to ensure that every student feels fully catered for.

4.4.2.2 How much do you feel like you get to actively participate in your learning?

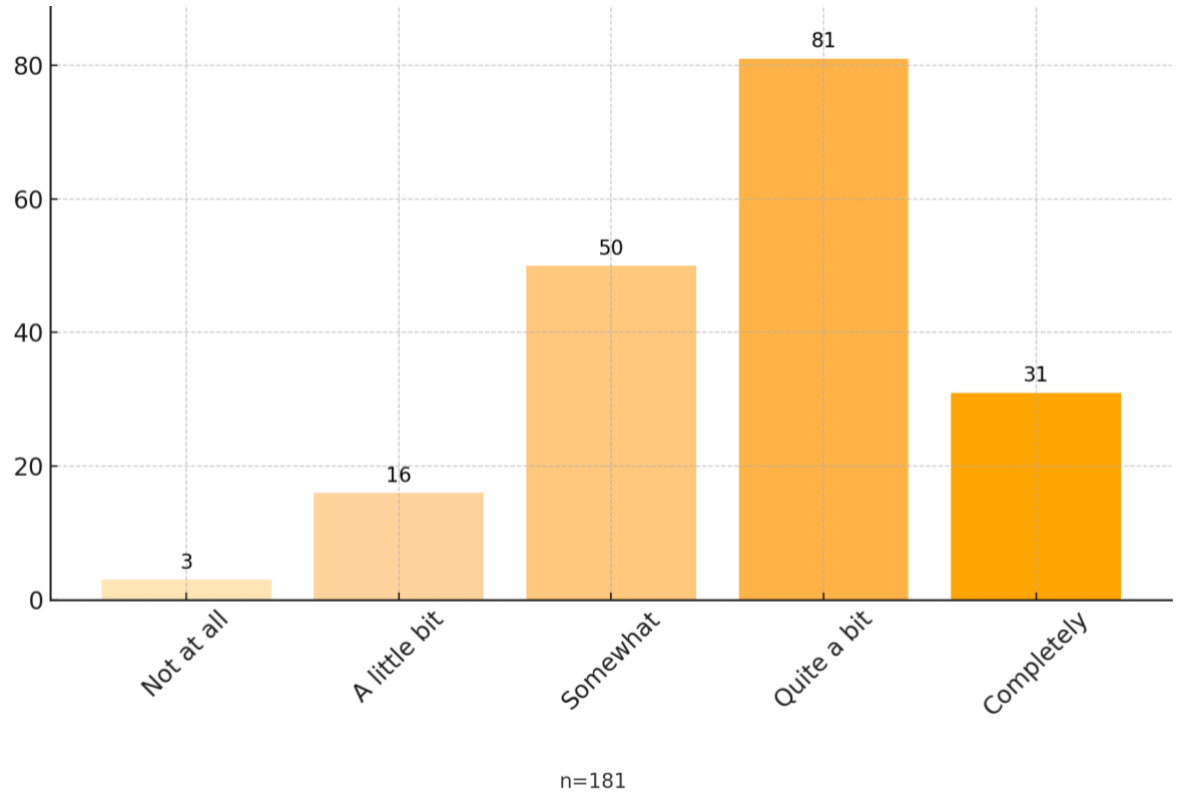


Figure 4-43: Active participation in learning

It appears that many students were actively engaged in learning across units. This created a more engaging and interactive learning environment, which might contribute to better a understanding and retention of material. However, a small number of students feel less involved, indicating that there might be advantages to further enhancing engagement approaches to ensure that all students participate actively. Promoting inclusive and varied participation in learning approaches can help to accommodate different learning preferences and increase overall student involvement.

4.4.2.3 How much do you feel like you get to make choices about your learning in the unit(s)?

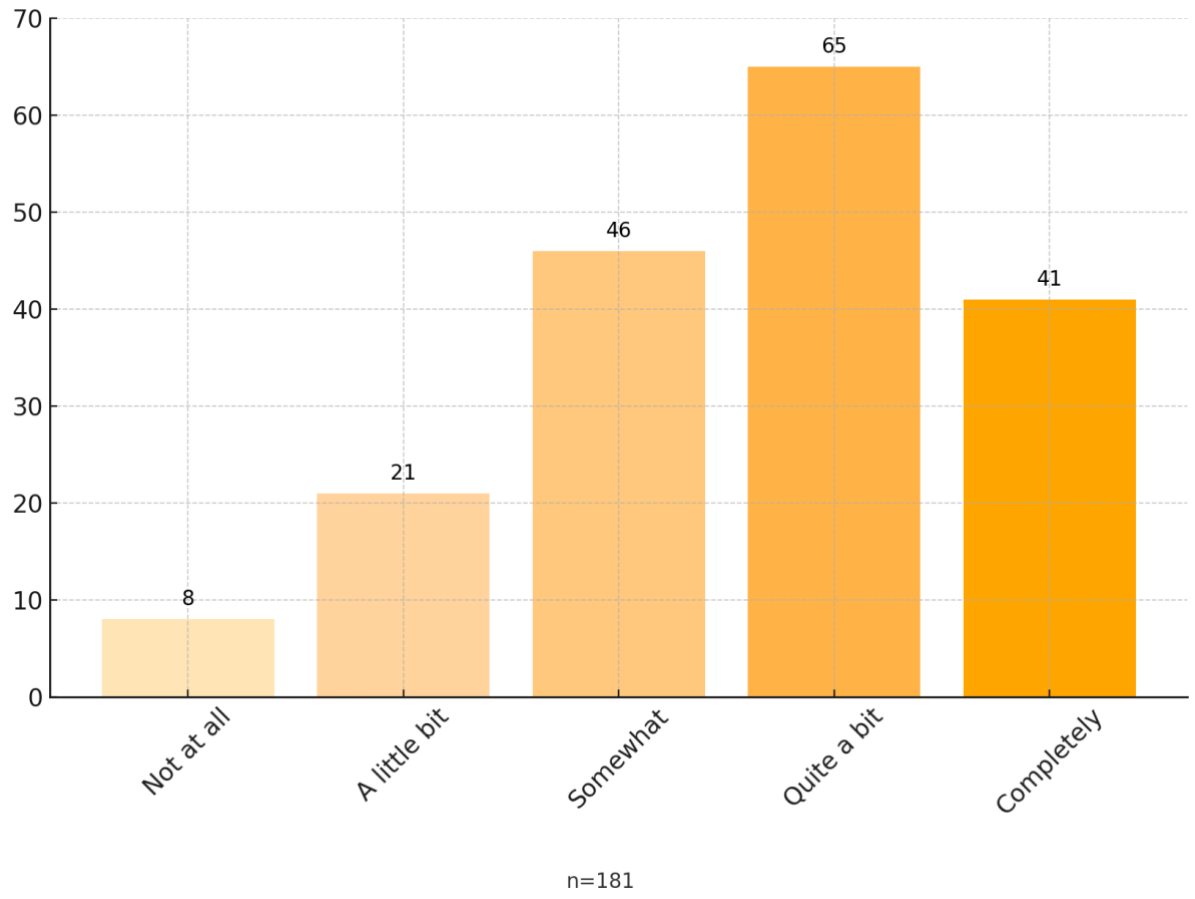


Figure 4-44: Choices in learning

The students generally felt empowered to make choices about their learning in the units, suggesting a flexible and student-centred approach. This autonomy probably enhances motivation and engagement as students can tailor their learning experiences to better suit their needs and preferences. However, a smaller group felt less able to make choices, indicating that there may be room for increasing student agency further. Ensuring that all students have the opportunity to make meaningful decisions about their learning can lead to a more personalised and effective educational experience.

4.4.2.4 *Would you want to connect with people outside of your music class through online discussions, chats, or learning from teachers in different countries in this unit?*

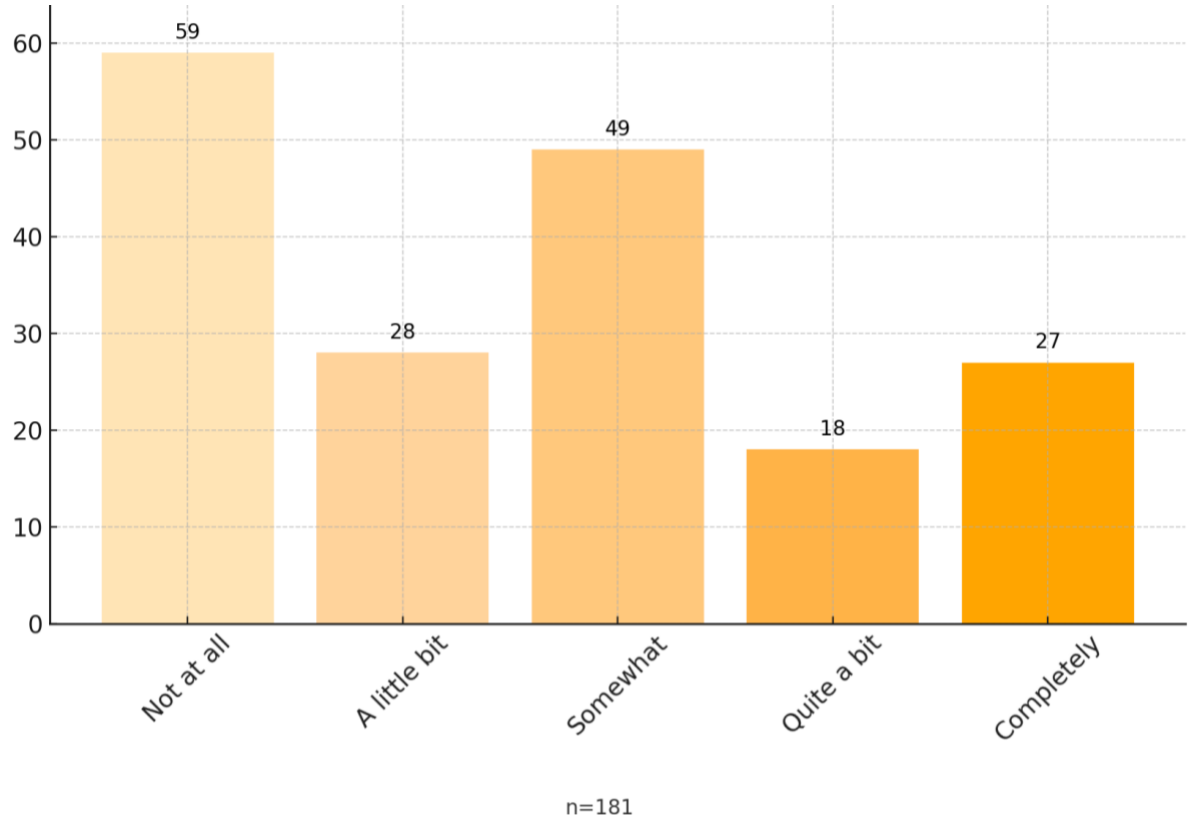


Figure 4-45: Interest in connecting outside the music class

The varied interest levels among participants in connecting with people outside their music class through online discussions, chats or learning from teachers in different countries suggest diverse preferences. Many students preferred more localised or traditional learning forms, as indicated by the significant number of respondents not interested in making such connections. However, a notable portion indicated that they are somewhat interested, indicating their openness to broader, diverse perspectives. The smaller group expressing strong interest highlights the potential for enhancing global engagement in the curriculum.

4.4.2.5 *Were you able to connect with people outside of your music class through online discussions, chats, or learning from teachers in different countries in the unit(s)?*

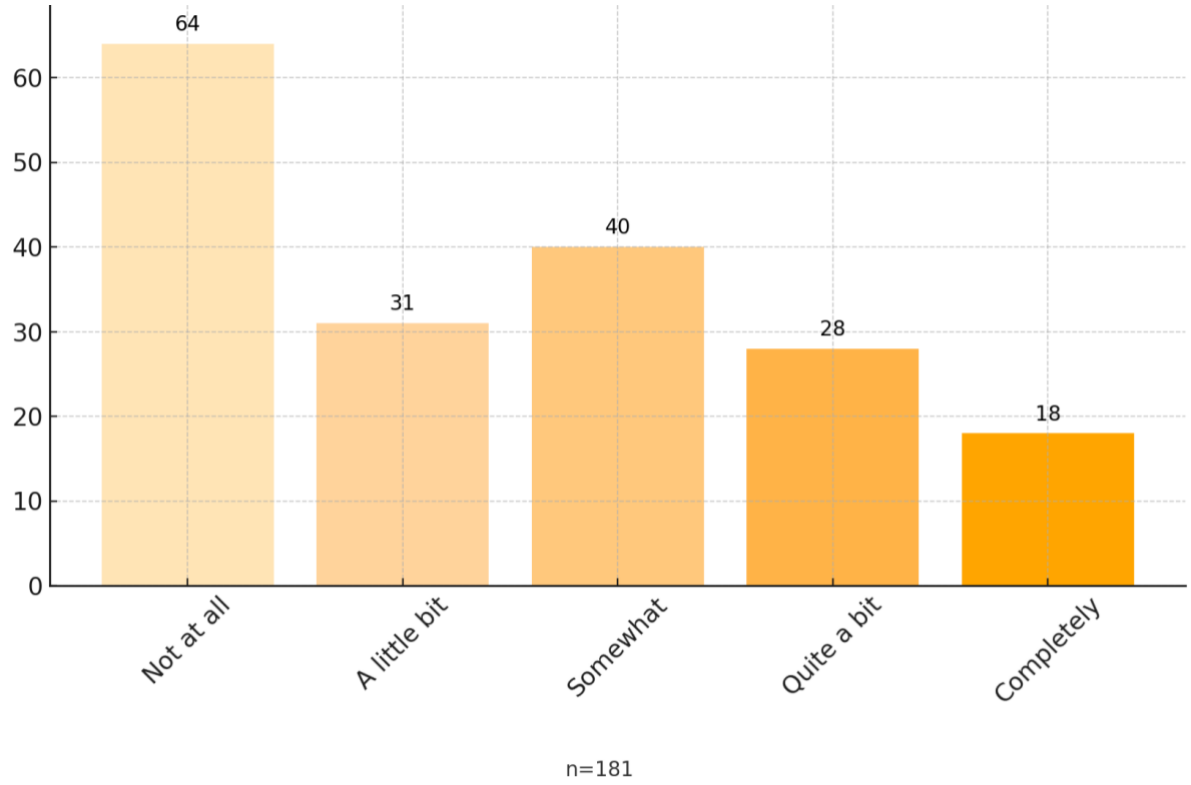


Figure 4-46: Connections achieved outside the music class

The responses indicate that most participants did not connect with people outside their music class through online discussions, chats or learning from teachers in different countries. A smaller but significant group managed to connect somewhat, showing some level of interaction beyond their immediate environment. A minority experienced a higher level of connection, suggesting that while opportunities for such interactions exist, they are not widely used or accessible. This pattern may reflect barriers to international and online engagement or a preference for more traditional, localised learning approaches among the majority of the students.

4.4.2.6 To what extent were you able to put into practice the theoretical knowledge you learned in the unit(s)?

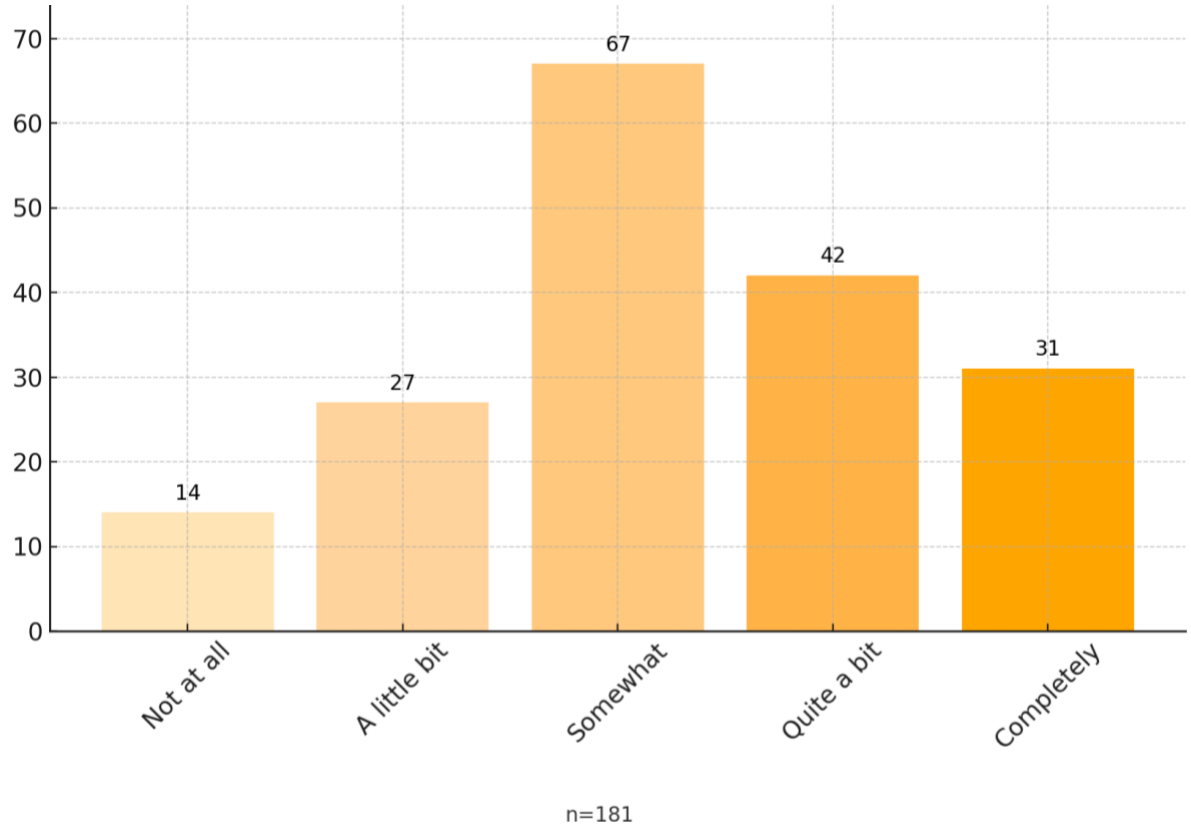


Figure 4-47: Practical application of theoretical knowledge

The varied levels of practical application among the participants suggest diverse experiences with integrating theoretical knowledge. Many of the students probably encountered opportunities to apply their learning in real-world scenarios, indicating that practical exercises and applications were incorporated to some extent. The fact that some students could extensively implement their knowledge suggests that the educational approach works well for them. However, the minority struggling with practical application points to different levels of readiness or accessibility to practical opportunities among students.

4.4.2.7 Did the unit(s) help you understand how it can prepare you for a job in the real-world?

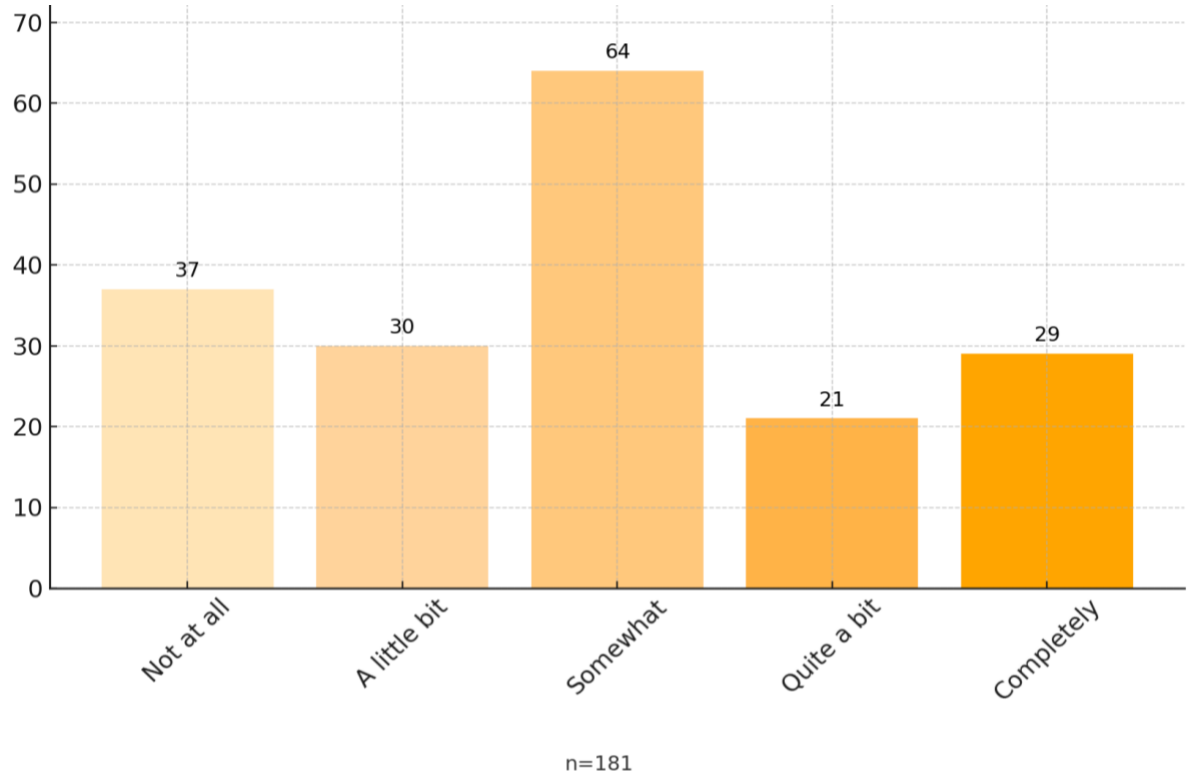


Figure 4-48: Preparation for real-world jobs

The responses reflect varying degrees of perceived effectiveness of the unit(s) in preparing students for real-world jobs. A significant portion of the participants felt moderately prepared, suggesting that the curriculum provides a foundational understanding of job-related skills and knowledge. Those who felt completely prepared probably experienced direct relevant applications of their learning, which helped them see the connection between their studies and their future careers. In contrast, a notable number of students felt minimally prepared, indicating that the curriculum may not fully provide those practical aspects needed for job readiness for all students.

4.4.2.8 Do you think talking to teachers and other students right away in class, so you can get quick feedback and feel connected, makes learning more fun and interesting?

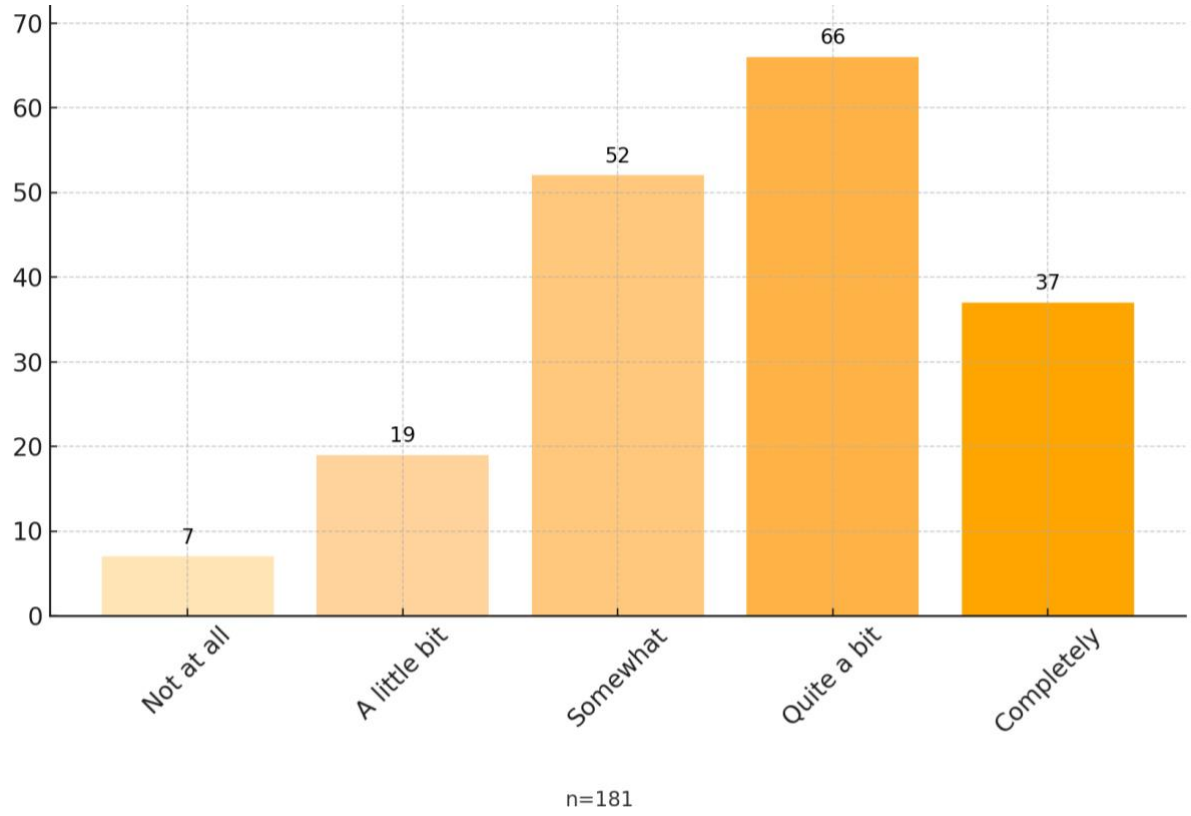


Figure 4-49: Importance of immediate feedback in class

The responses suggest that most of the participants found immediate interaction with teachers and peers beneficial to making learning more enjoyable and engaging. The majority valued the quick feedback and the sense of connection it fostered, indicating that these elements significantly enhanced their classroom experience. A smaller group felt only a small benefit, possibly preferring more independent or delayed forms of feedback. The very few who saw no benefit at all might not find immediate interaction necessary for their student preference.

4.4.2.9 *Were you able to learn from anywhere using technology and your own resources?*

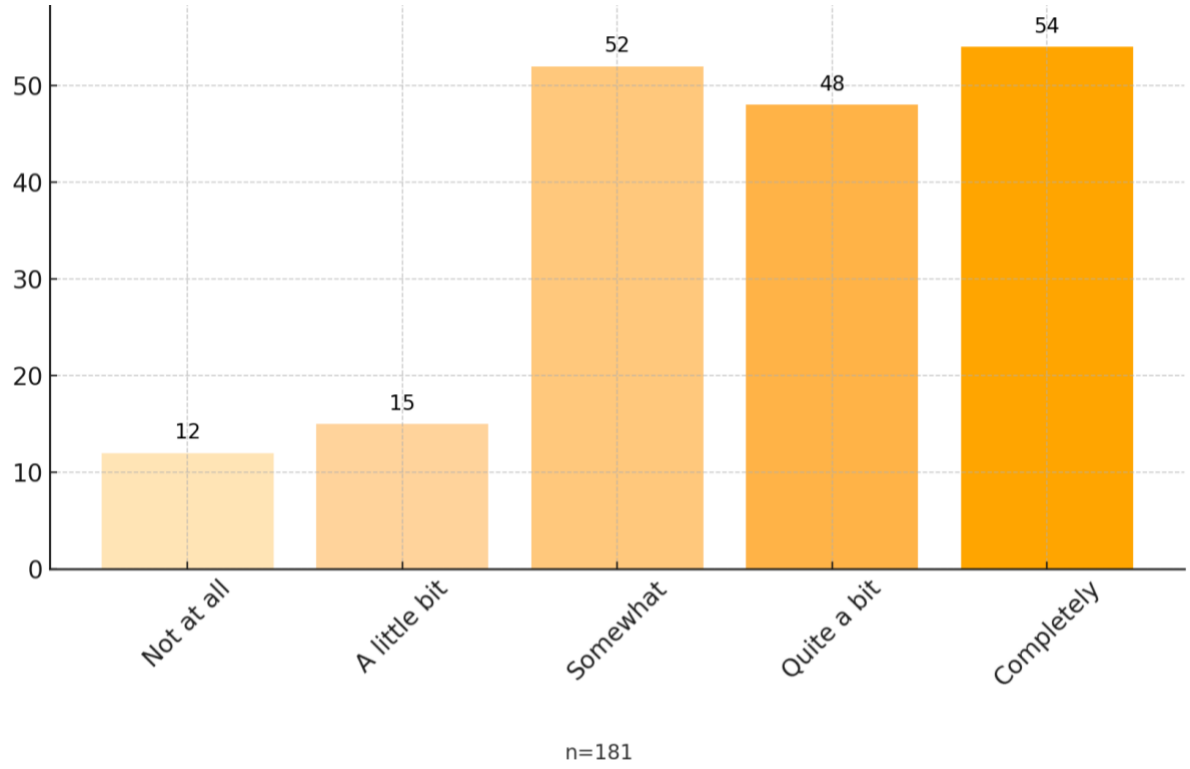


Figure 4-50: Ability to learn from anywhere in using technology

Most of the participants were able to leverage technology and personal resources effectively to facilitate learning from anywhere. A significant portion of students managed this quite extensively, highlighting the accessibility and effectiveness of digital learning tools. Those who completely embraced this approach probably found technology to be seamlessly integrated into their learning process. A smaller group experienced moderate success, suggesting that they experienced some challenges or limitations in using these resources fully.

4.4.2.10 Were you able to remotely work with other students in different places on your project in the unit(s)?

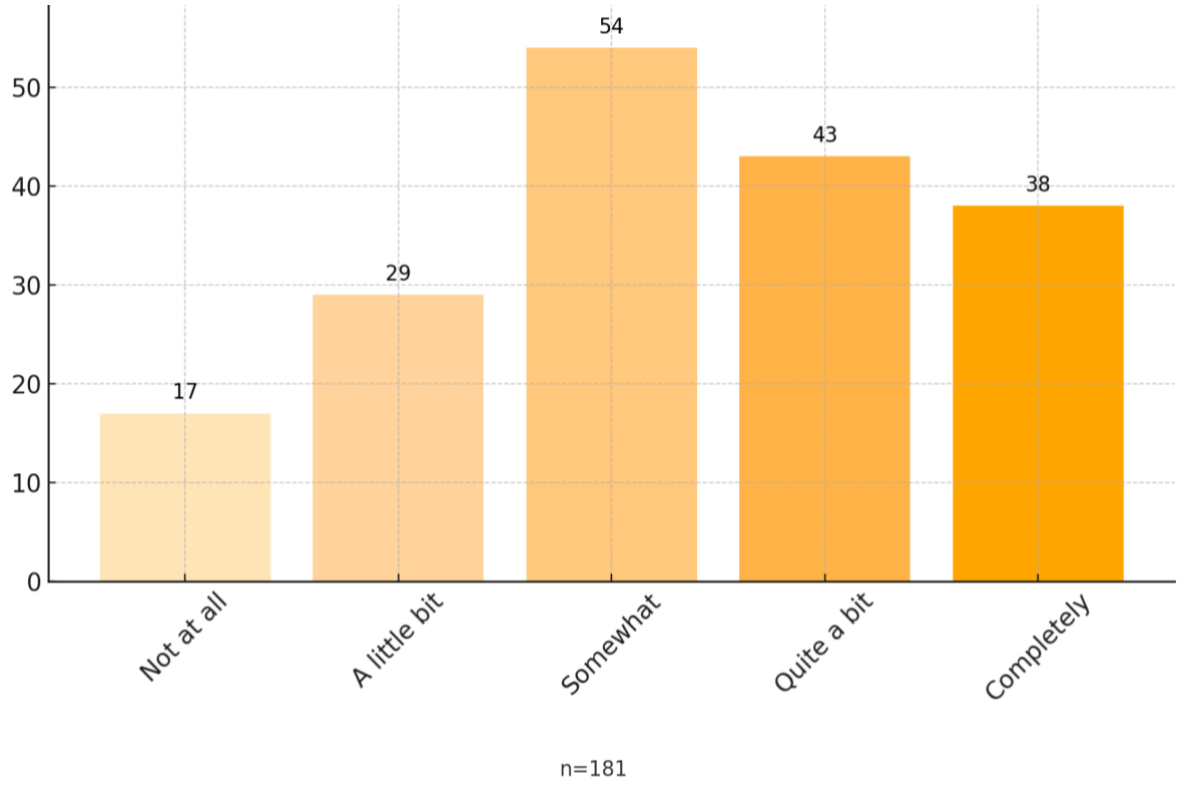


Figure 4-51: Ability to work remotely with other students on projects

The participants' experiences with remote collaboration on projects varied widely. A large portion were able to work somewhat or quite a bit with other students in different locations, indicating that remote collaborative tools and approaches were being used effectively by many of the students. Those who completely succeeded in remote collaboration probably found these tools integral to their project work. Conversely, a notable minority found remote collaboration challenging or ineffective, suggesting the existence of barriers such as technology challenges or difficulties in coordinating across distances.

4.4.2.11 Heatmap of positive concepts

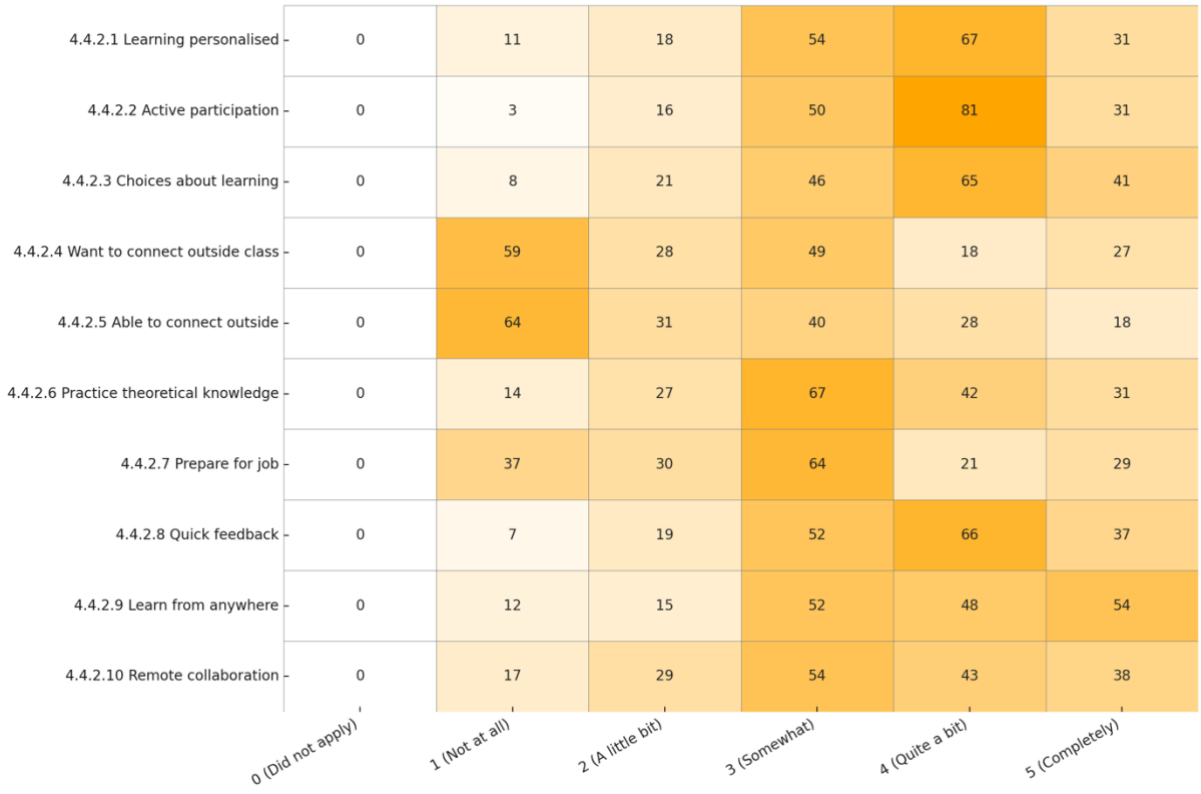


Figure 4-52: Heatmap of student responses in positive concepts

The response trends indicate that most students felt that their learning was personalised and that they participated actively. They generally have choices in their learning, though there is room for improvement. Interest in and the ability to connect outside the class were low, suggesting the existence of barriers or a lack of interest. The students successfully used technology to learn from anywhere, indicating good digital tool accessibility. Their practical application of knowledge and job preparation were moderately successful. Immediate feedback and interaction are highly valued, enhancing the learning experience. Overall, the educational approach displays strengths in personalisation, participation and digital learning, but could be improved in the areas of external connections and job readiness.

4.4.3 Practical concepts[26]

The practical concepts of the SLED framework focused on key factors such as technical resources, financial support, and legal considerations. These included access to data, Wi-Fi, devices, infrastructure, funding, policies, and software. Together, these elements formed the foundation for implementing seamless learning effectively.

4.4.3.1 Did you have trouble with internet and wi-fi connectivity during the unit(s)?

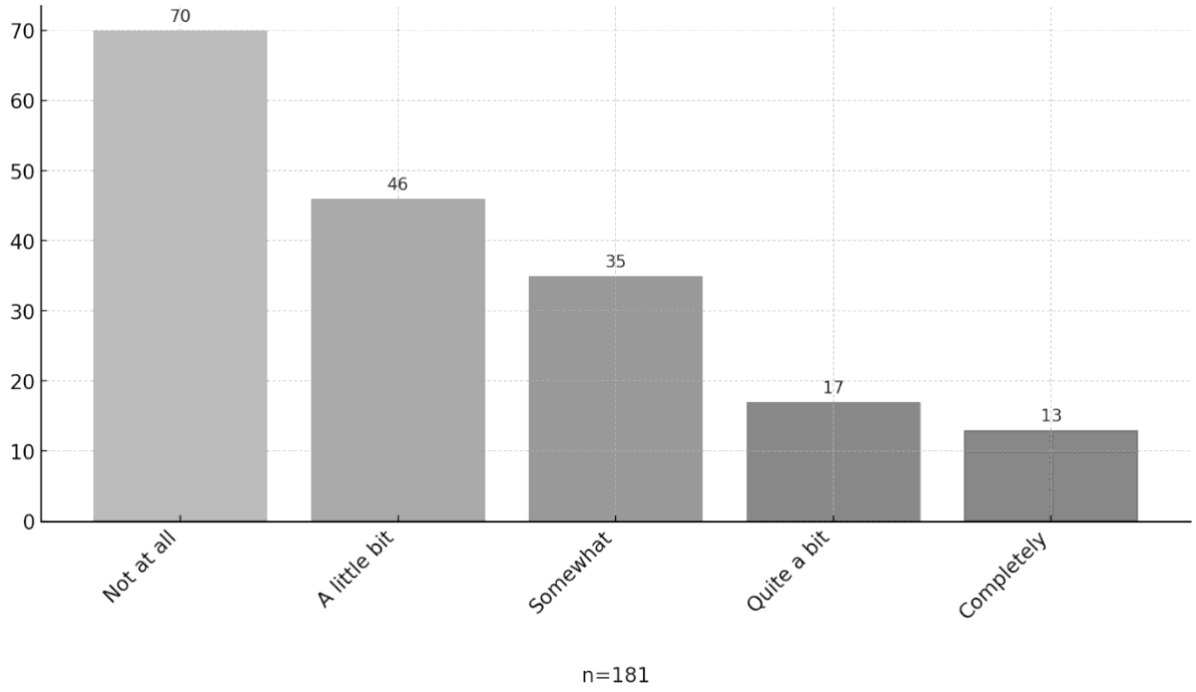


Figure 4-53: Challenges with internet and wi-fi connectivity

The schools reliable internet and wi-fi connectivity structure probably contributed to a more stable seamless learning experience for many students. However, the existence of connectivity challenges for some students suggests that improvements in technical infrastructure and household access are necessary. Whereas widespread wi-fi access is generally available in Sweden, the specific problems faced by some students could

[26] Discussed in 2.8.3 Practical concepts in chapter 2.

be due to household limitations rather than regional coverage gaps. Ensuring consistent access to stable internet can prevent disruptions and enhance the overall effectiveness of digital learning environments.

4.4.3.2 How much did using devices (chromebooks) help you acquire and process knowledge in the unit(s)?

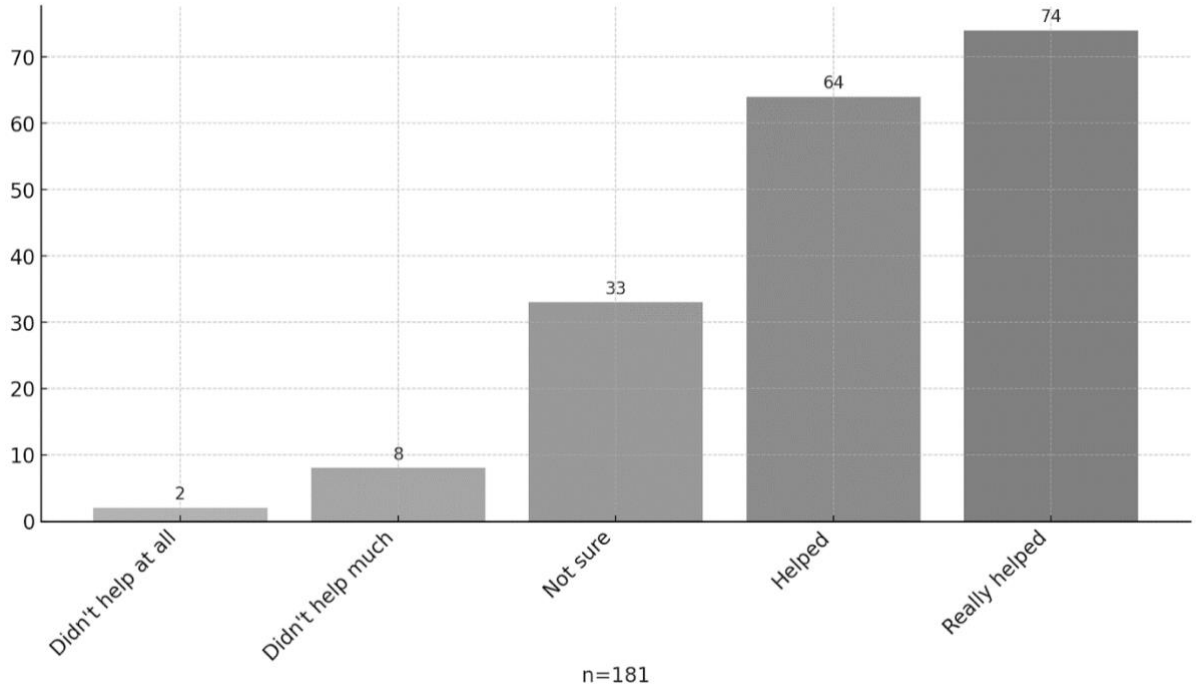


Figure 4-54: Using devices to acquire and process knowledge

Using devices such as Chromebooks appears to have significantly enhanced the students' ability to acquire and process knowledge in the units. This suggests that integrating technology into the learning process can support educational outcomes effectively. The strong positive feedback indicates that digital tools are valuable assets in modern education, promoting as they do engagement and facilitating access to information. The few students who found the devices less helpful might benefit from additional training or resources to maximise their utility. Overall, the reliance on Chromebooks seems to have been a positive approach for enhancing learning experiences.

4.4.3.3 How much did you experience challenges with devices (Chromebooks) during the unit(s)?

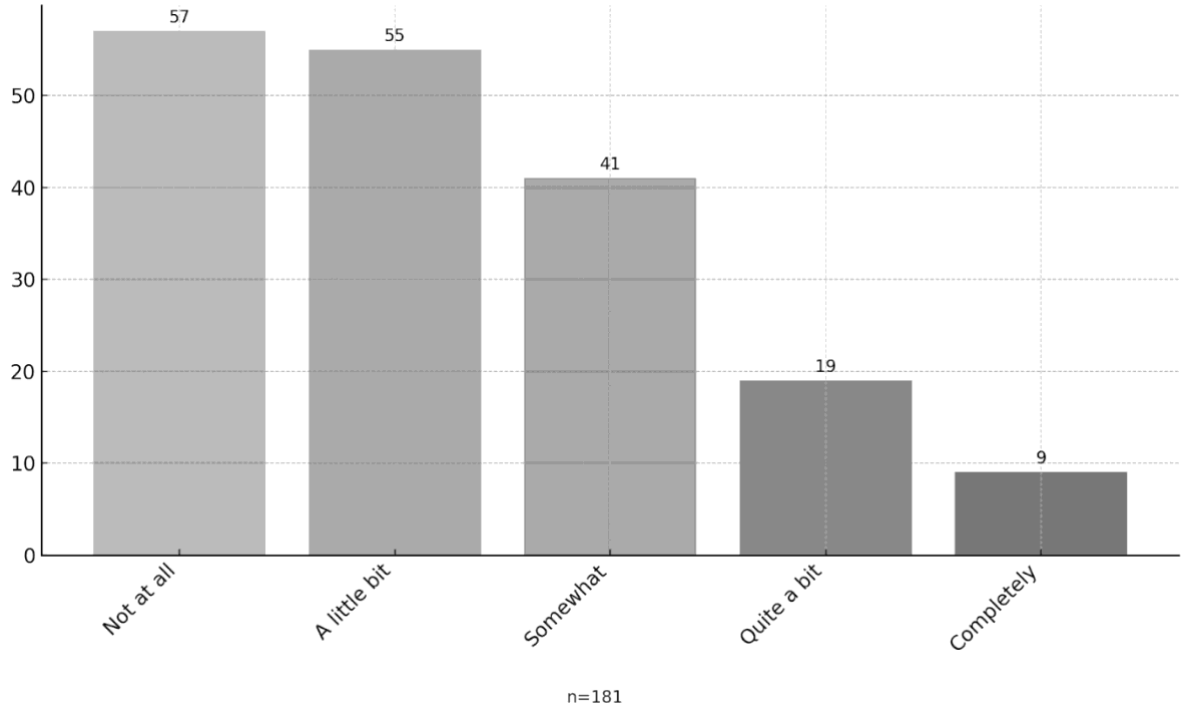


Figure 4-55: Challenges with handheld devices

Most of the students experienced few challenges with Chromebooks, indicating that these devices were generally reliable and user-friendly. However, a significant portion encountered some problems, which suggests that there are areas for improvement in device support and troubleshooting. The presence of moderate to severe challenges for some students highlights the need for better technical assistance and possibly more robust hardware or software solutions.

4.4.3.4 Did you worry about the cost of software (apps and programs) during the unit(s)?

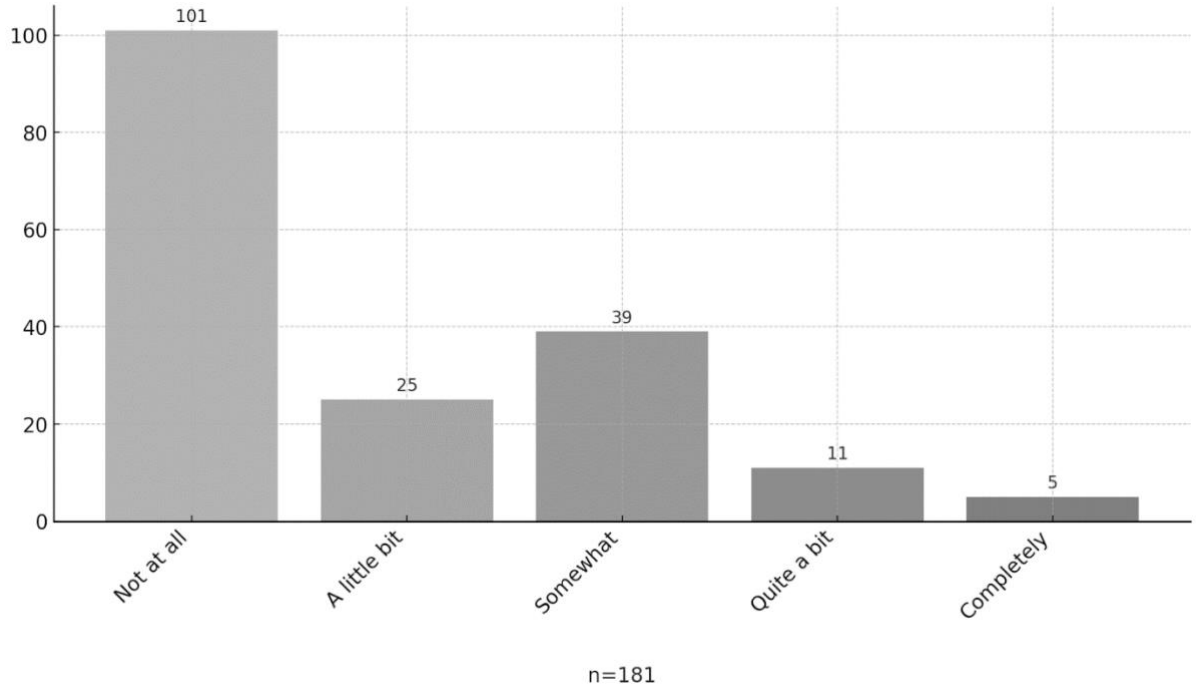


Figure 4-56: Concerns about cost of software

The minimal concerns about the cost of software among students can be attributed to the school's provision of these resources free of charge. This approach significantly reduces financial barriers, allowing students to focus on their learning without the stress of having to incur additional expenses. The few students who still experienced some worry might benefit from clearer communication about the availability and coverage of these resources.

4.4.3.5 Did you worry about the cost of hardware (chromebooks and other devices) during the unit(s)?

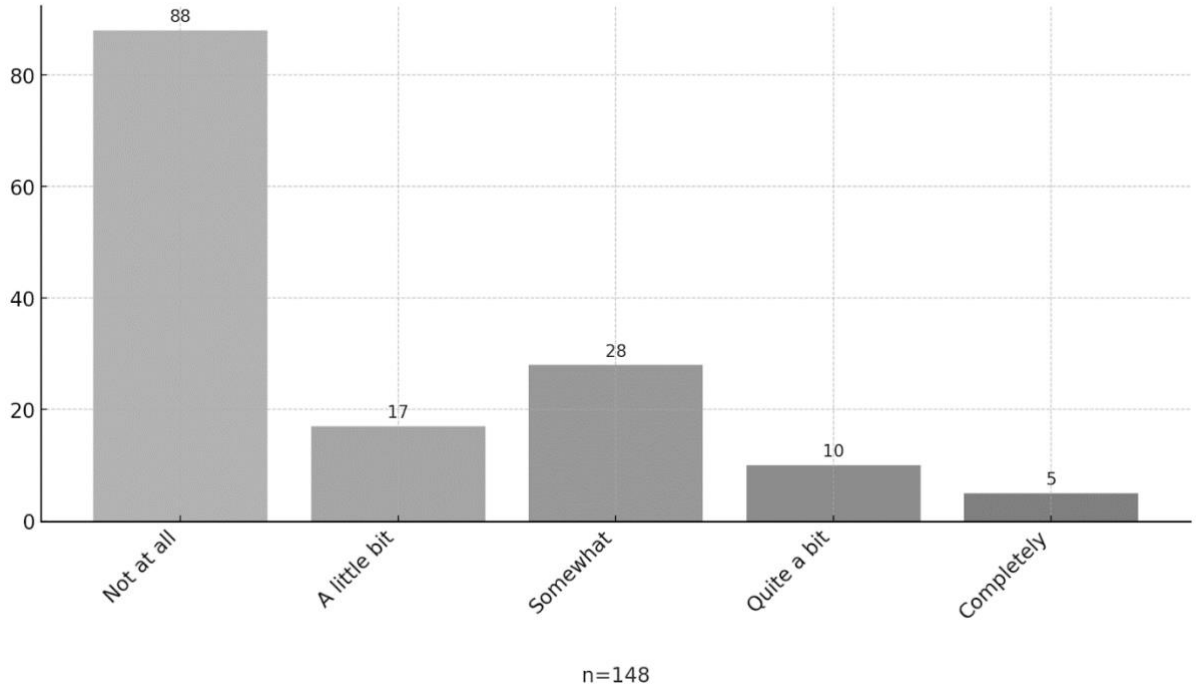


Figure 4-57: Concerns about the cost of hardware

Worries about the cost of hardware were minimal among the students, indicating that any financial barriers related to hardware were effectively managed, thanks to resources having been provided by the school. However, a minority of the students did experience some concerns, suggesting that while the provision of hardware is generally adequate, there may still be gaps that need filling. Ensuring clear communication about the availability and coverage of these resources can further alleviate any remaining concerns.

4.4.3.6 *Did you notice any challenges with the infrastructure, like the class schedule, during the unit(s)?*

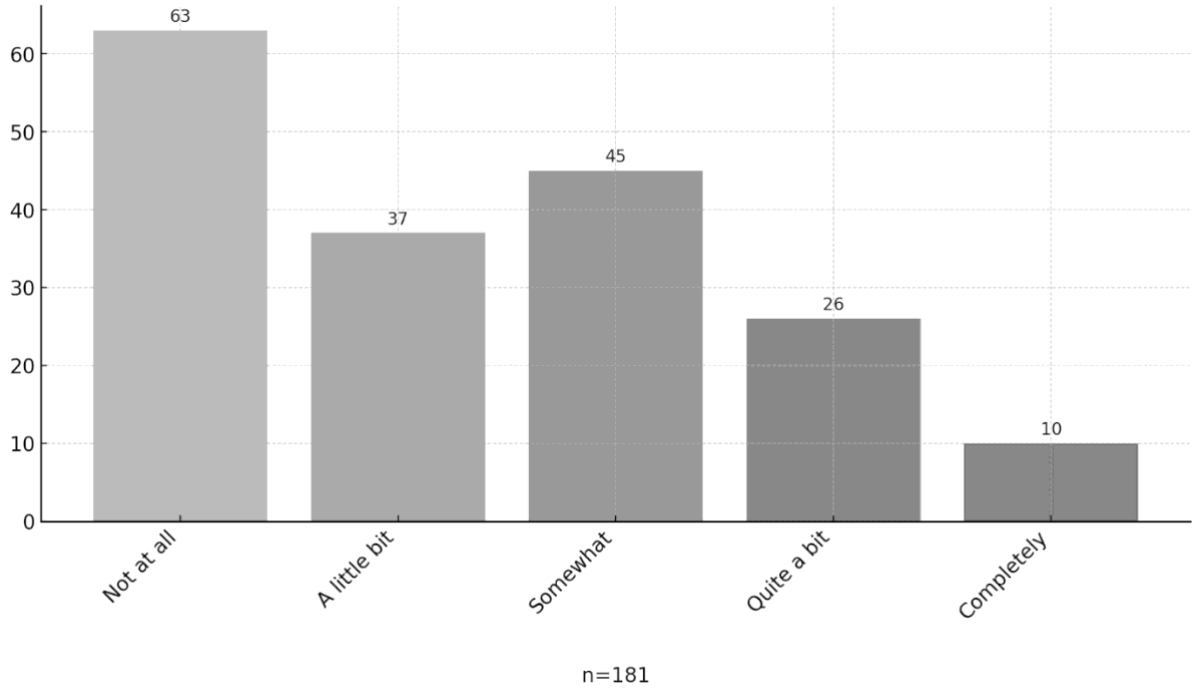


Figure 4-58: Challenges with infrastructure during units

The students focused on class scheduling when answering this question, even though the infrastructure encompassed many aspects. While many students did not experience significant challenges with the class schedules, a notable number did encounter problems. These challenges were probably related to the brief transition times between classes, which may not have provided sufficient time for the students to move from one class to another. Resolving these scheduling concerns by possibly extending the transition periods could enhance the overall student experience, reduce stress and improve punctuality.

4.4.3.7 Were the rules about using technology for learning in the unit(s) clear?

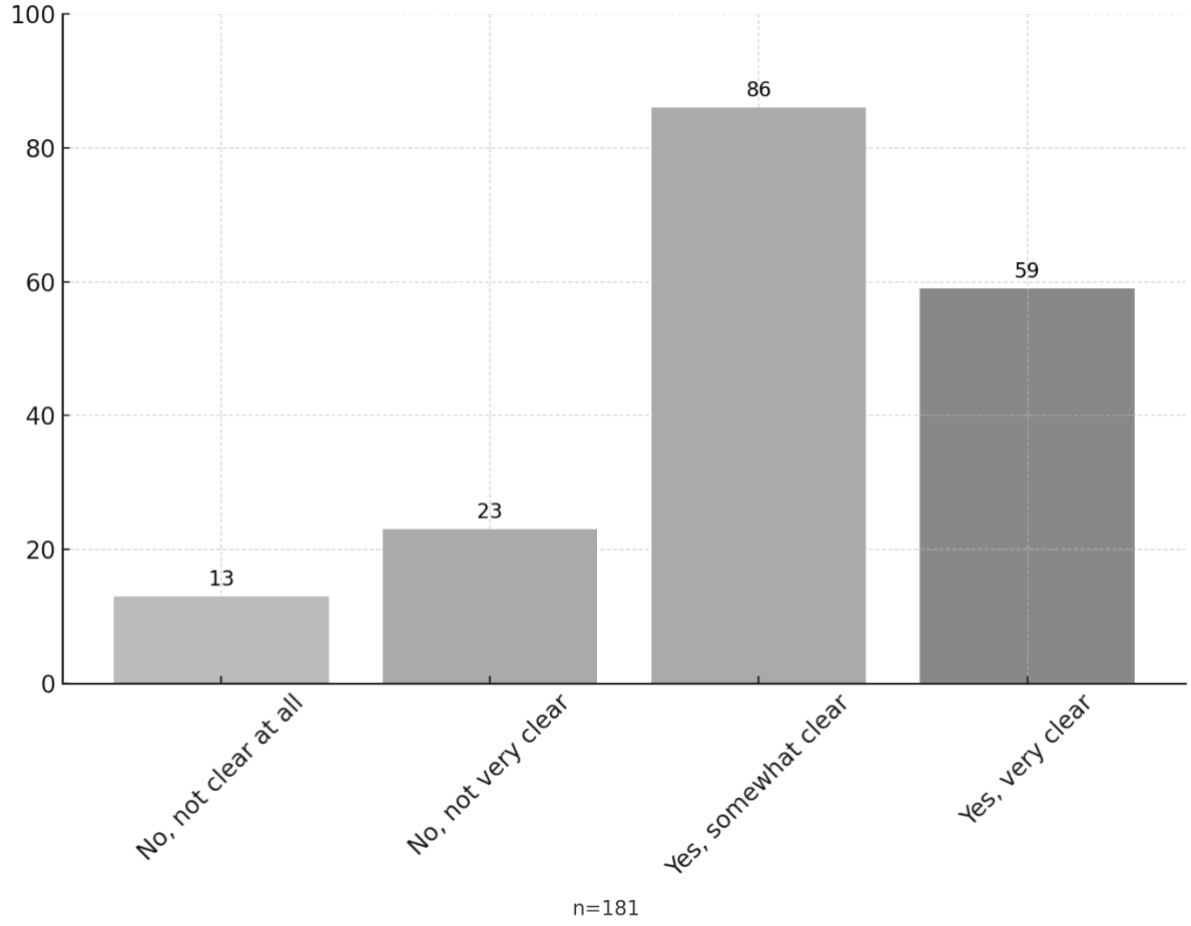


Figure 4-59: Clarity of rules for using technology

The lack of an established technology policy at the school created difficulties for some students in understanding how to use technology effectively for learning. This inconsistency probably led to confusion and uncertainty about appropriate technology use. Establishing and clearly communicating a comprehensive technology policy could alleviate these challenges, providing students with a clear framework and expectations.

4.4.3.8 How helpful were the apps or platforms used during the unit(s) for improving your learning experience?

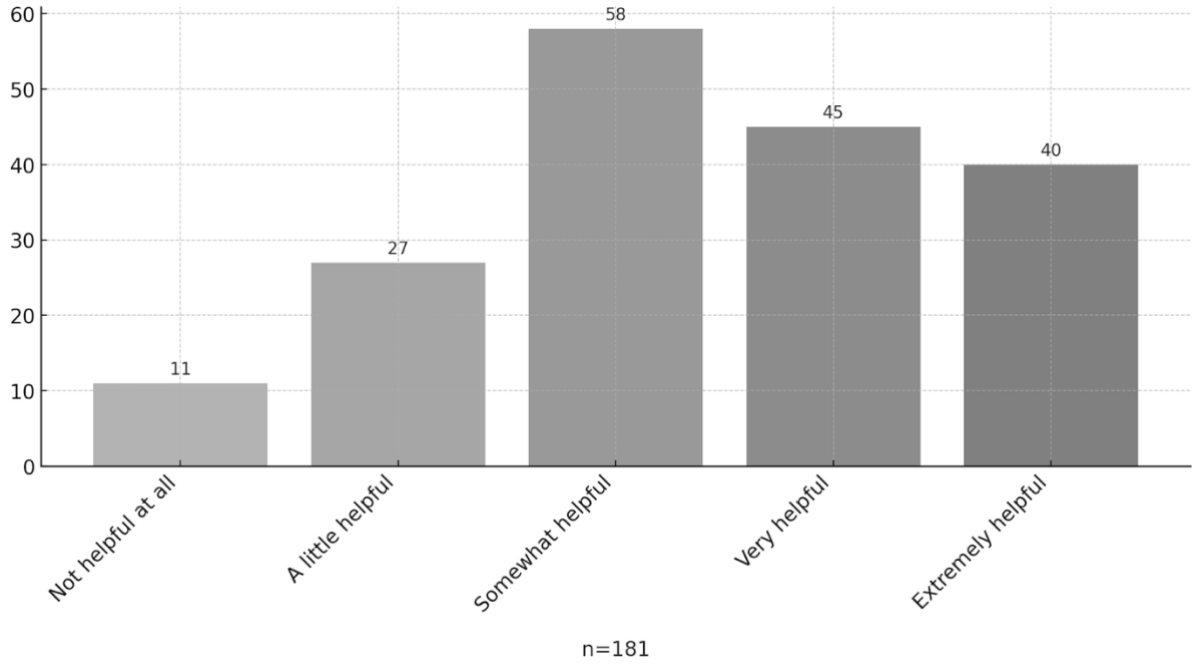


Figure 4-60: Helpfulness of apps or platforms

The use of apps and platforms during the units appeared to enhance the learning experience significantly for many of the students. These digital tools probably provide valuable resources and support, contributing to better engagement with and understanding of the material. However, the presence of some students who found these tools less beneficial indicates that there may be variability in how effectively different students can use them.

4.4.3.9 Did you find the apps used in the unit(s) readily available when you needed them?

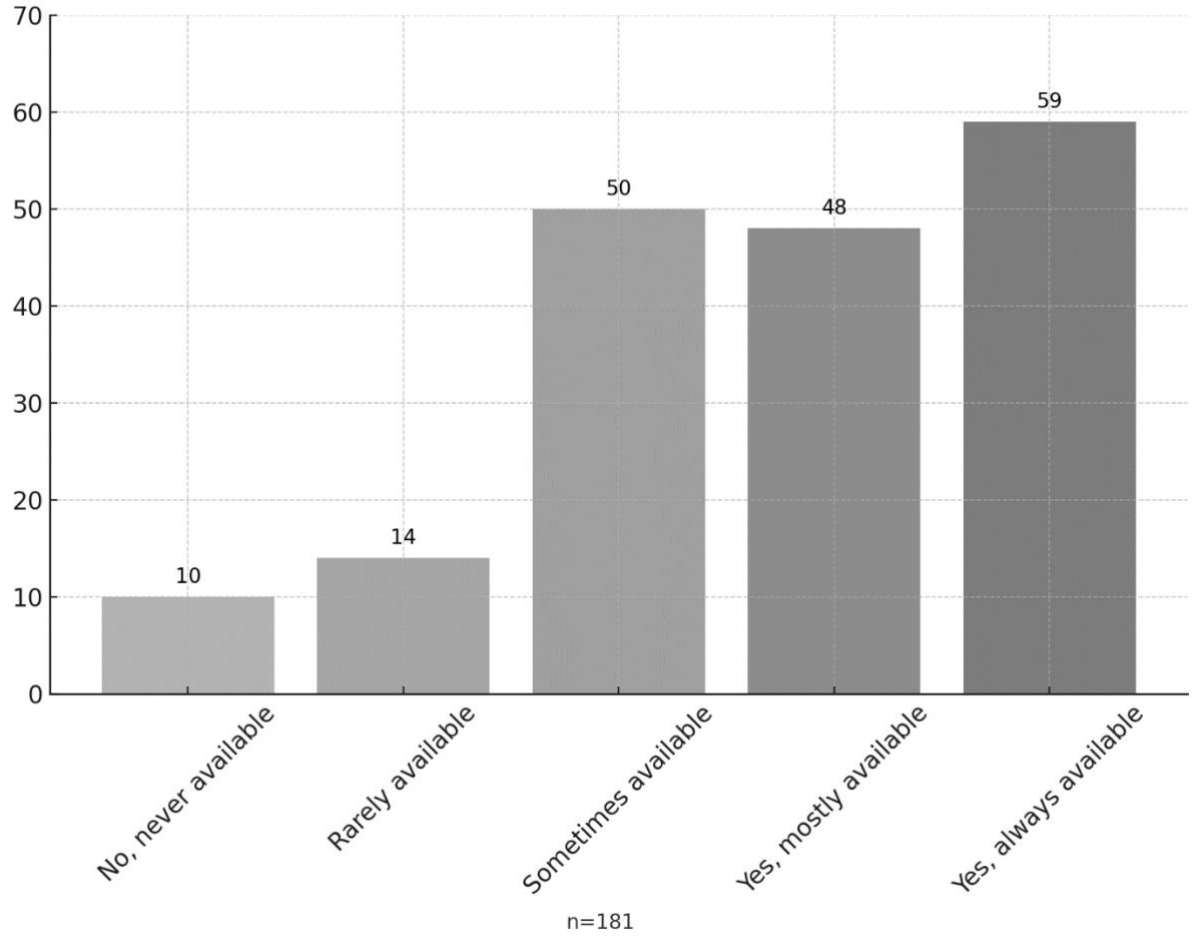


Figure 4-61: Availability of apps

Most of the students found the apps used in the units to be readily available when needed, indicating effective resource management and accessibility. This probably contributed to a smoother learning process and reduced frustration related to technical access. However, a small portion of the students faced challenges with app availability, suggesting that there may be occasional access problems.

4.4.3.10 How much help did you get when you had problems with the technology in the unit(s)?

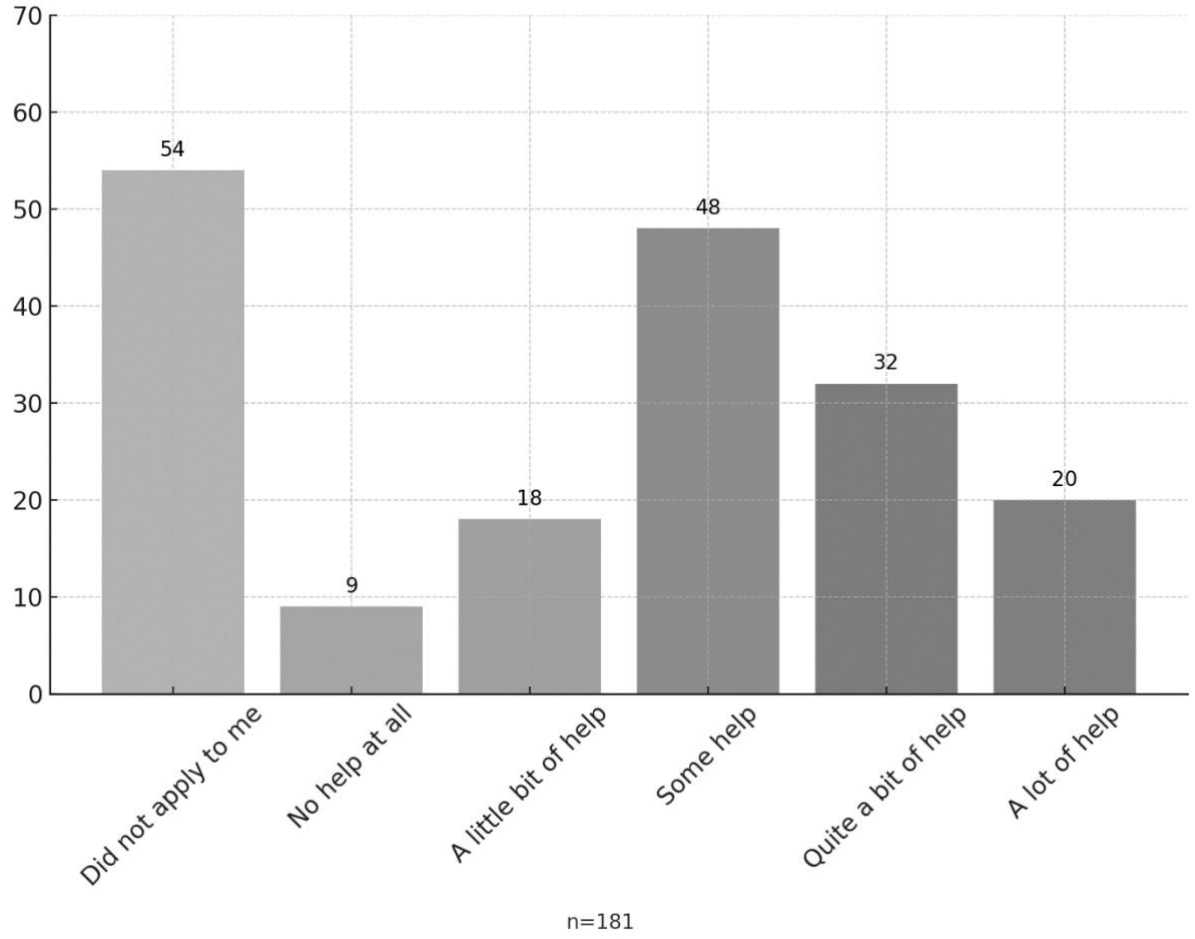


Figure 4-62: Helpfulness with technological issues

The support system for resolving technology problems appears to have been generally effective, with many students receiving at least some help when needed. A specialised IT support team is available to students at the school and they are given the opportunity to seek assistance from the IT support team whenever they encounter a problem. This suggests that the available support resources are responsive and accessible. However, a smaller group of students reported receiving little to no help, indicating a potential gap in the support system. Ensuring that all the students had access to timely and effective technical assistance could improve the overall learning experience and minimise disruptions.

4.4.3.11 How good was the help you got when you had problems with digital tools or music software in the unit(s)?

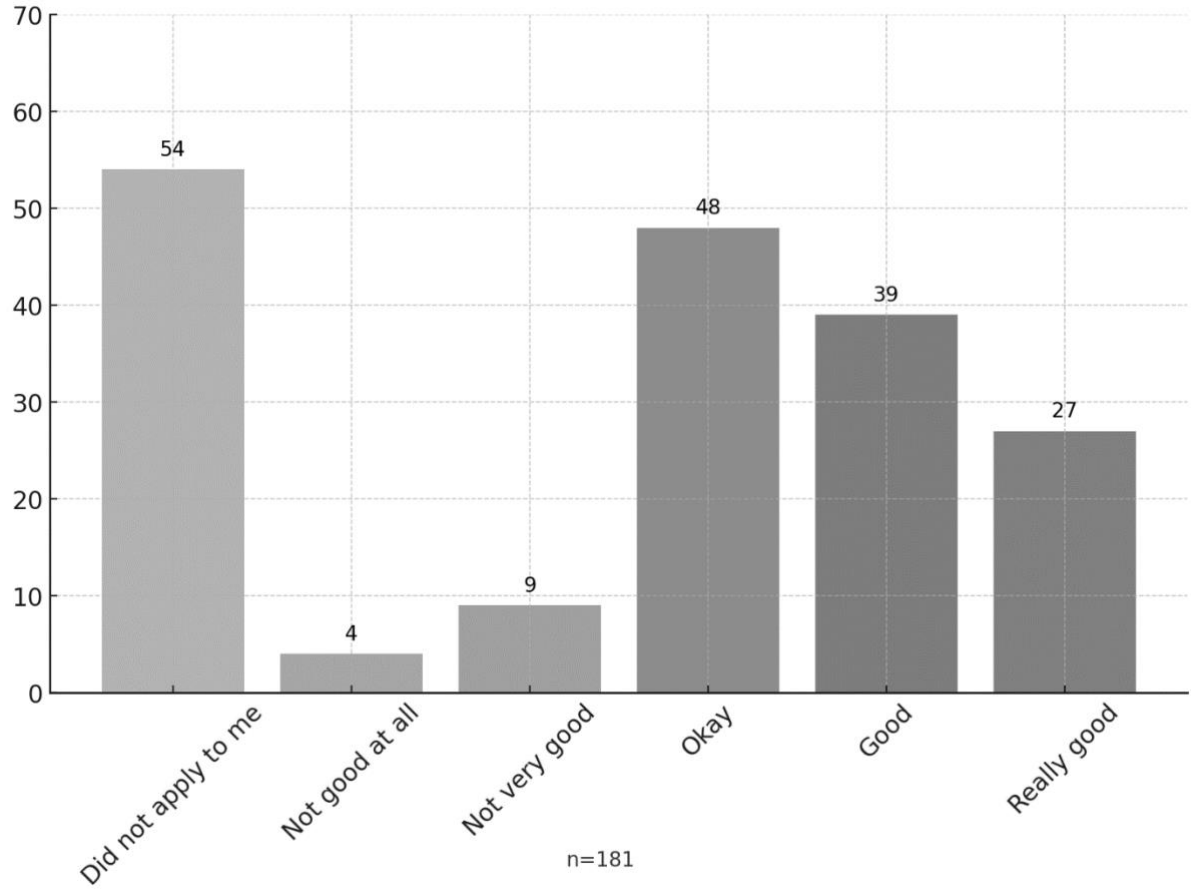


Figure 4-63: Helpfulness with digital tools/music software issues

The quality of help provided for problems with digital tools or music software appears to have been satisfactory for most of the students. However, a small group felt that the help they received was not very good or not good at all, suggesting that the support could have been inconsistent.

4.4.3.12 How effectively do you think technology was used for learning in the unit(s)?

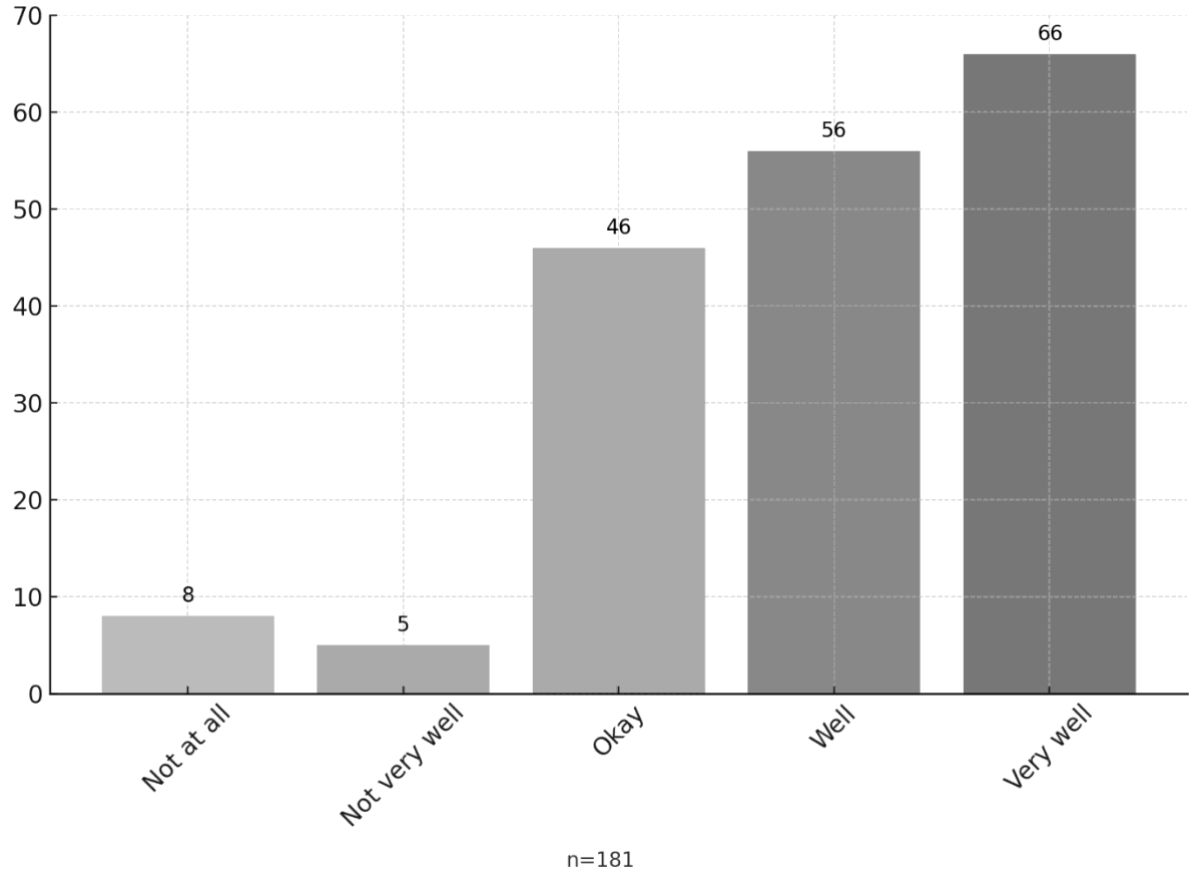


Figure 4-64: Effectiveness of technology for learning

The majority found the integration of digital tools to be beneficial, indicating that these resources were well selected and implemented. However, a small number of students felt that the technology was not used as effectively as it should have been, suggesting that there is room for improvement. One probable explanation for their belief that it was ineffective could be the impact of the slow speeds of the hardware and internet connection.

4.4.3.13 Heatmap for practical concepts

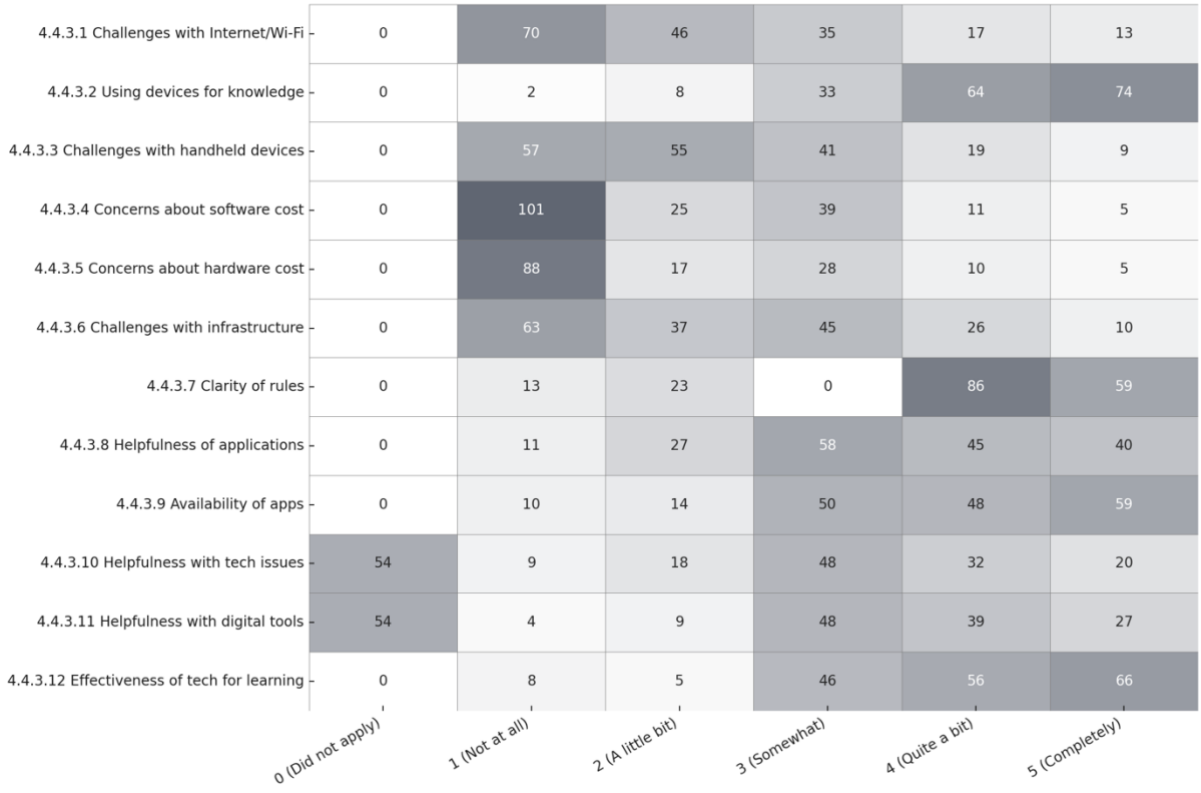


Figure 4-65: Heatmap of student responses in practical concepts

The accessibility of data and wi-fi connectivity was mostly reliable, although a notable number of students did experience some challenges with them. Hardware was generally accessible. The clarity of the rules about technology use received mixed feedback, highlighting the need for clearer communication and guidelines. Apps and platforms were generally found to be helpful and available, contributing positively to the students' learning experience. The level of support for technical problems and the use of digital tools was mostly adequate.

4.4.4 Human concepts[27]

The human concepts focus on assessing skill sets, time management and the adequacy of training. In addition, the questions examined the impact of differences in

[27] Discussed in 2.8.4 Human concepts in chapter 2.

norms and convictions, the pursuit of equality, the cultivation of a positive mindset, and the fostering of a positive outlook towards learning experiences. By covering these areas, the questions helped to identify those key elements essential to successful implementation of and engagement in seamless learning environments.

4.4.4.1 How well do you think the unit(s) helped you learn new software skills?

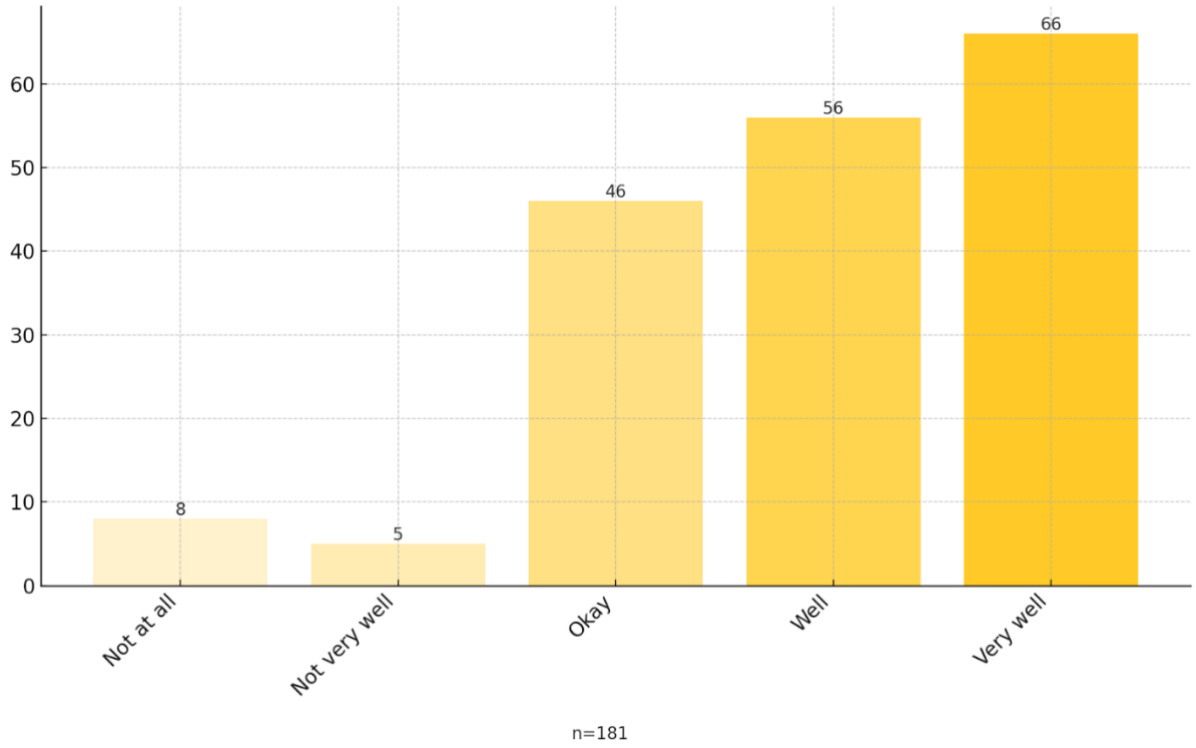


Figure 4-66: Effectiveness of learning software skills

The units designed to teach new software skills seem to be highly effective, as reflected by the strong positive responses from students. The instructional approaches or content likely met the students' needs well. With very few students finding the units unhelpful, the overall success of the instructional design is evident.

4.4.4.2 How well do you think the unit(s) helped you learn new musical skills?

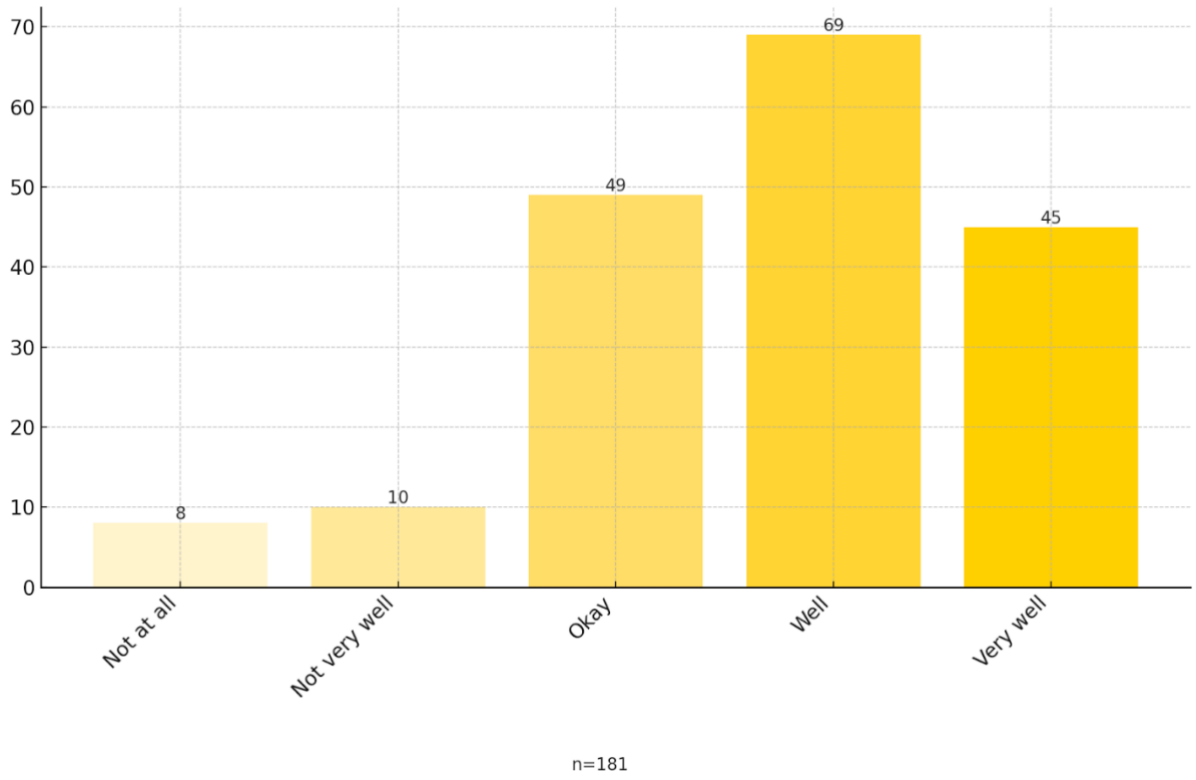


Figure 4-67: Effectiveness of learning musical skills

The effectiveness of the units in teaching new musical skills is evident from the predominantly positive feedback from students. The majority of students felt that the instructional approaches or content met their needs well. Despite a small number of students finding the units less effective, the overall positive response highlights the success of the instructional design.

4.4.4.3 How challenging was managing your time in the unit(s)?

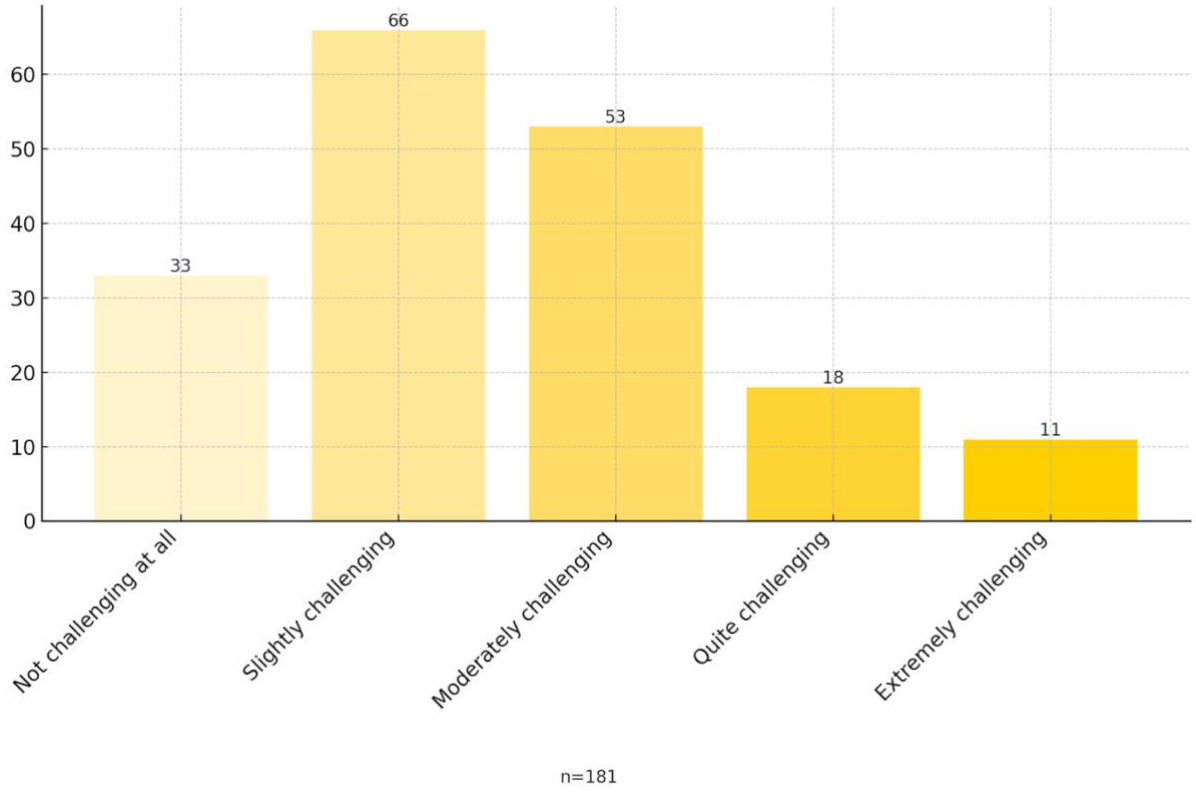


Figure 4-68: Time management

Students encountered varying levels of difficulty with time management across the units, with the majority finding it slightly challenging. However, a smaller group found it extremely challenging. This indicates that while many students could handle their time well, there are notable differences in time management skills within the student body.

4.4.4.4 How helpful were the teacher's instructions regarding the use of software for you to finish your tasks in the unit(s)?

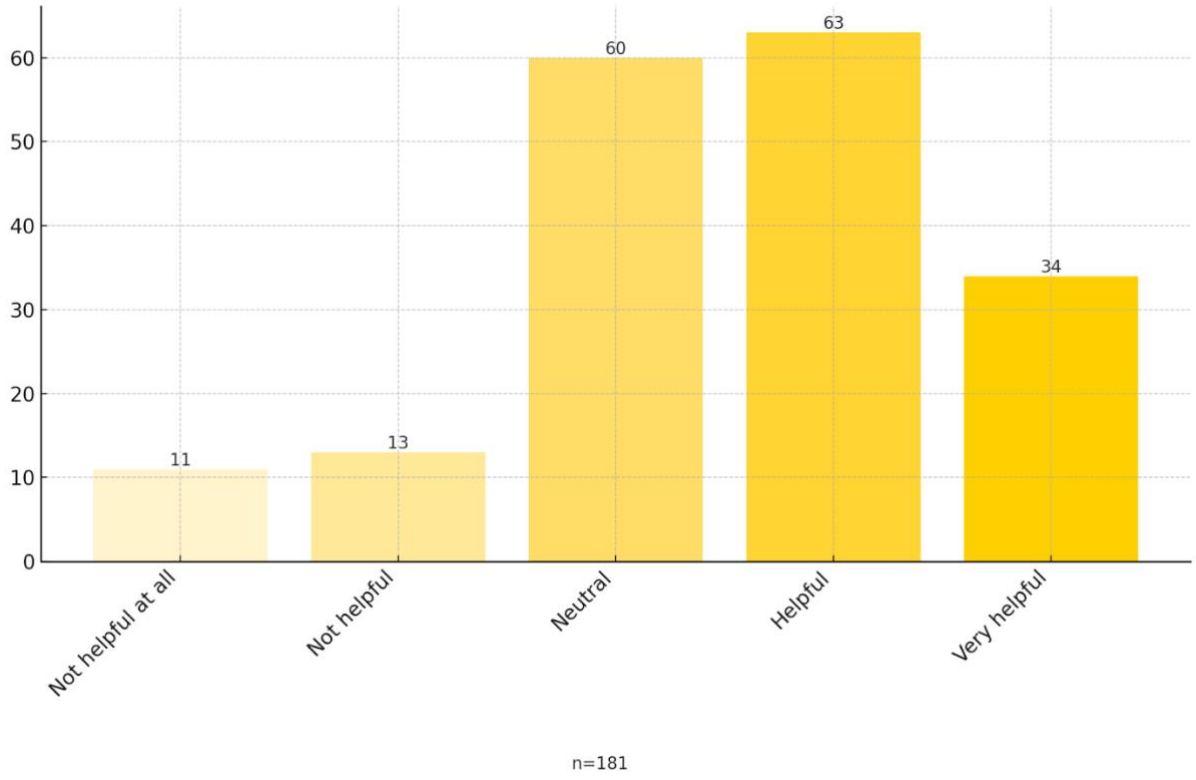


Figure 4-69: Helpfulness of teacher’s instructions

The teacher's instructions were generally well received, with a significant portion of the students having found them helpful. This indicates that the guidance provided was effective in assisting students with their tasks. However, a minority of the students found the instructions less beneficial, suggesting that there might be room for improvement in tailoring the instructions to meet all the students' needs.

4.4.4.5 How much do you believe cultural differences could create challenges for learning in the unit(s)?

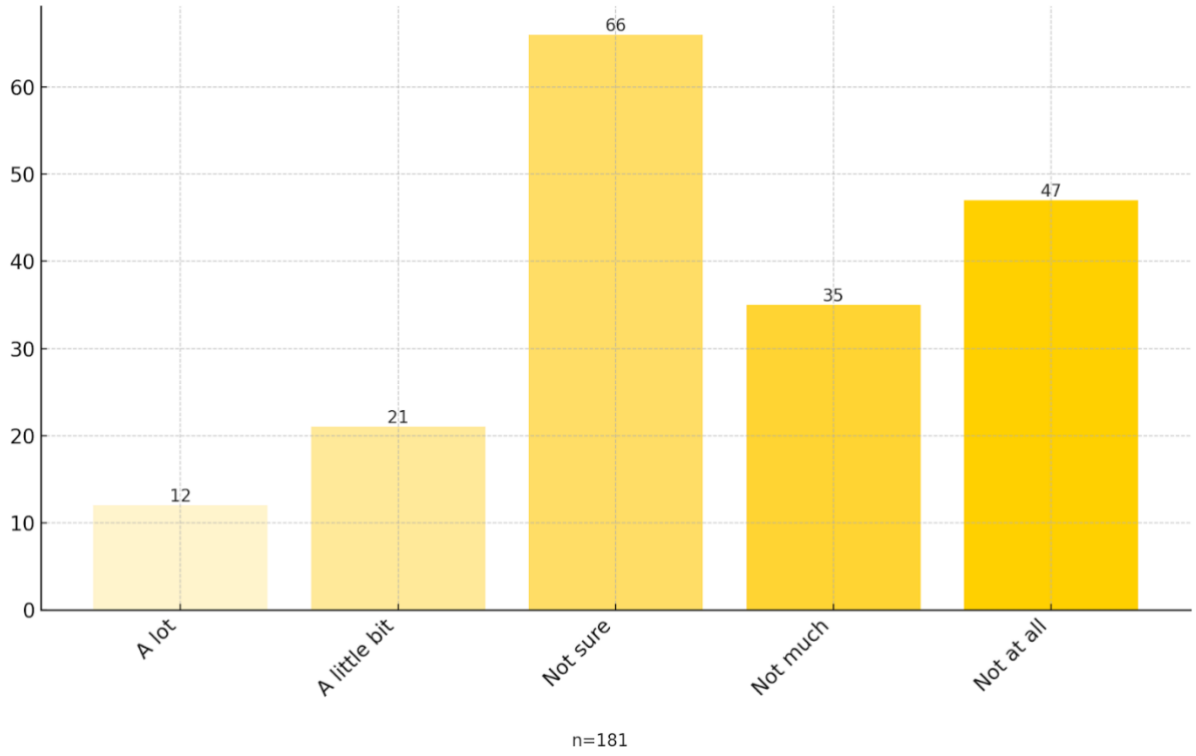


Figure 4-70: Impact of cultural differences on learning

The students displayed diverse opinions on the impact of cultural differences on learning, with a significant number unsure about their effect. This spread of responses suggests that while cultural factors are not a major obstacle for most, they could still influence the learning experience for a subset of students.

4.4.4.6 How much do you believe moral differences could create challenges for learning in the unit(s)?

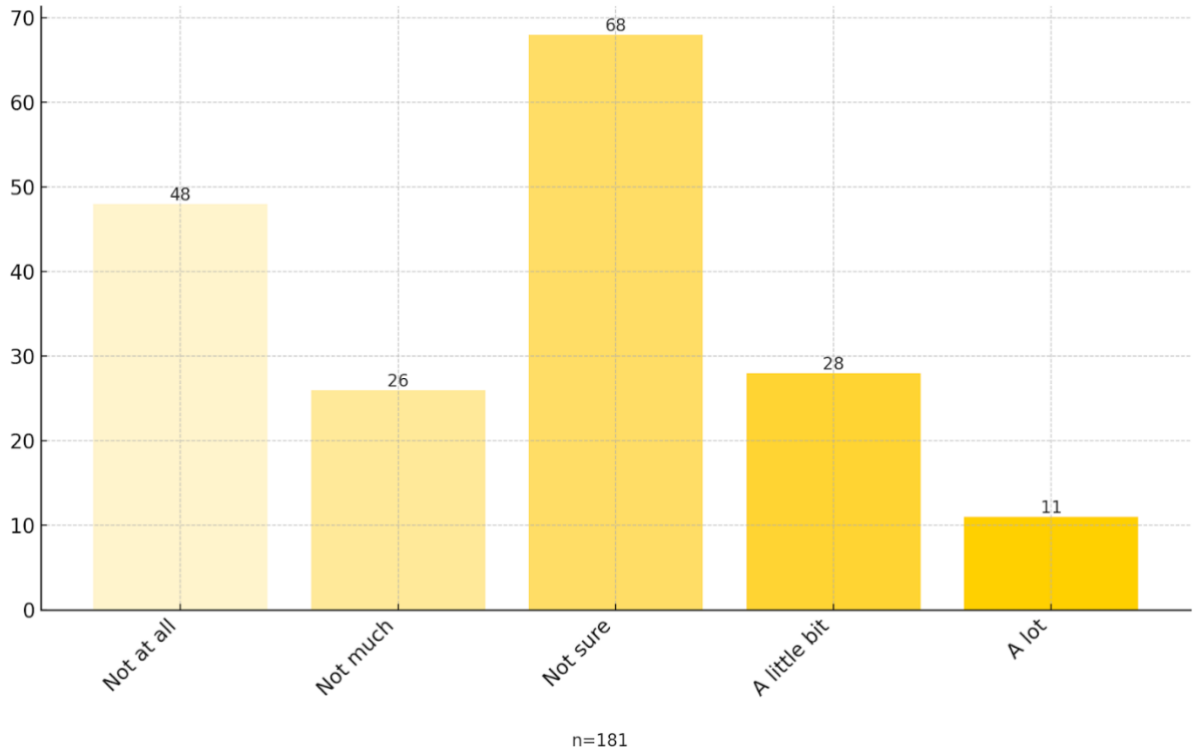


Figure 4-71: Impact of moral differences on learning

The impact of moral distinctions on education is a topic that the students had differing opinions about, with some being uncertain about it. In Sweden, the emphasis on inclusivity and equality probably reduces the perceived impact of moral differences in education, although for some students with strong personal or cultural values these distinctions may still be significant. Whereas a sizeable percentage of the students did not consider moral differences to be a significant challenge, some students believed that moral differences could present some challenges. This implies that, whereas moral opinions might not always matter to some students they might for others.

4.4.4.7 How much do you believe political differences could create challenges for learning in the unit(s)?

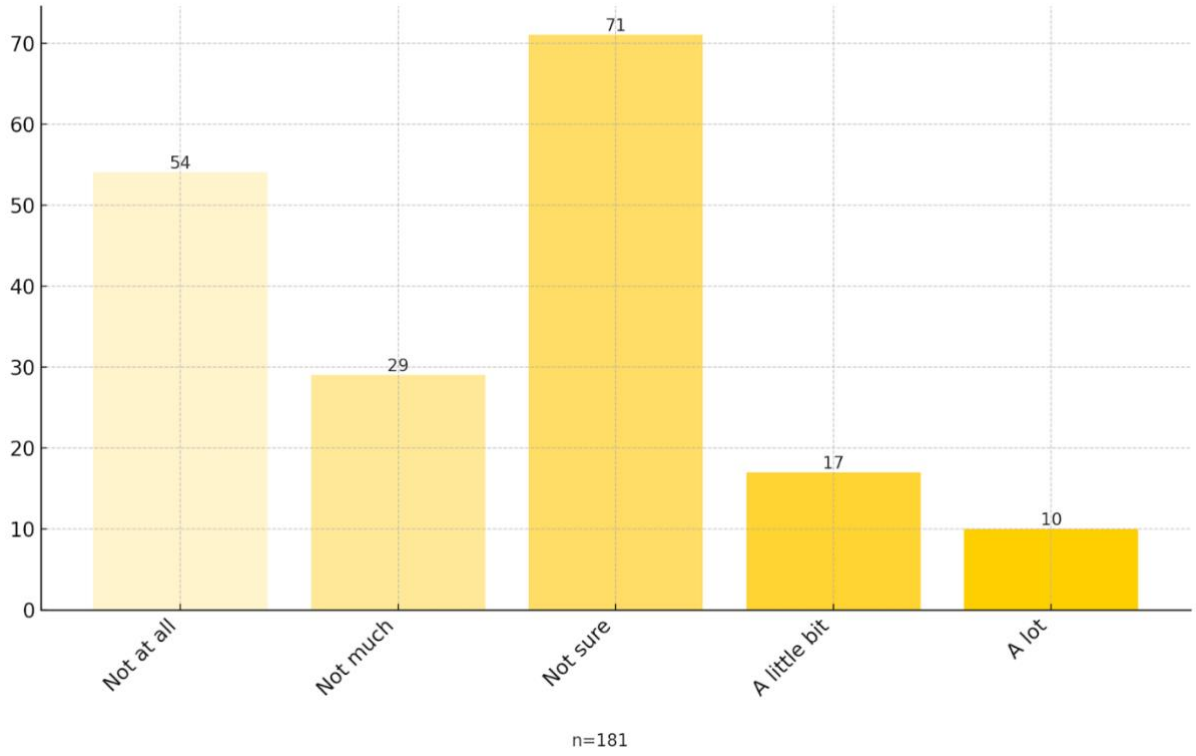


Figure 4-72: Impact of political differences on learning

There was significant uncertainty among the students about whether political differences could create challenges for learning in the units. Whereas many indicated that they do not view political differences as a major issue, a notable portion were unsure, indicating a lack of consensus or awareness on this matter. Some students perceived political differences as a minor challenge, suggesting that these factors might influence the learning environment for only a few individuals.

4.4.4.8 How well do you think everyone was treated fairly and equally in the unit(s)?

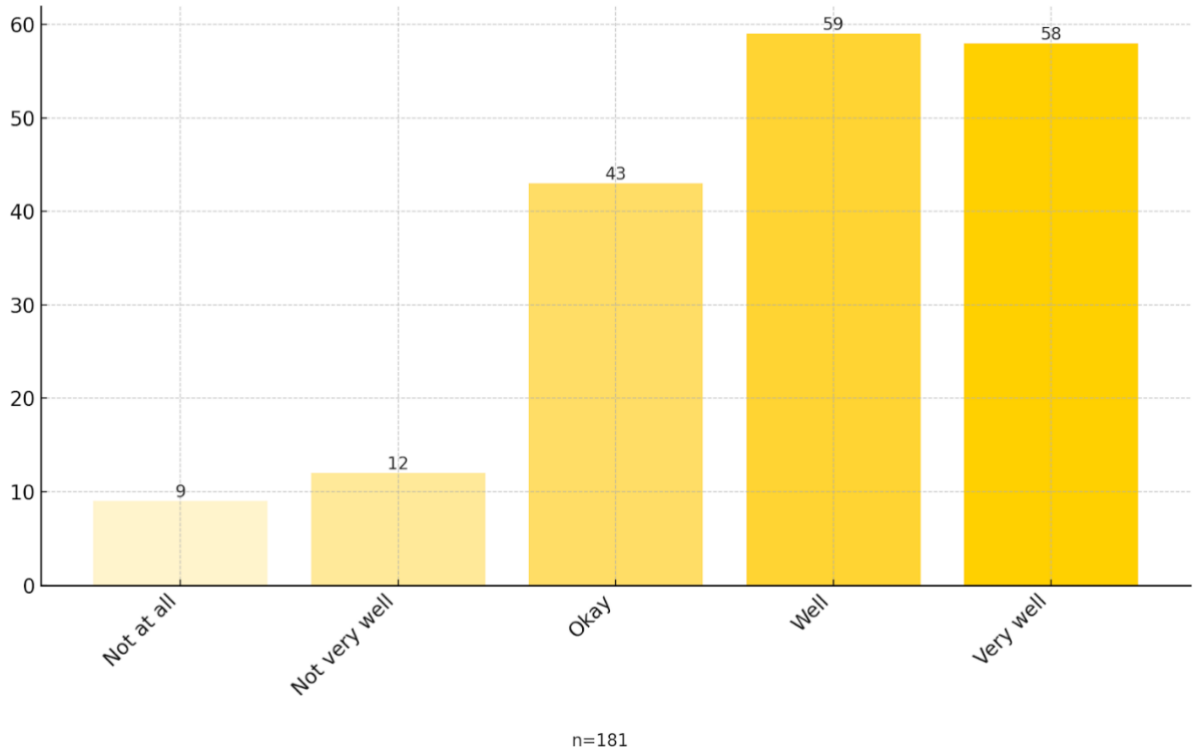


Figure 4-73: Fair and equal treatment

The students generally felt that fairness and equality were well maintained in the units, with a large number expressing positive views on this aspect of their experience. A smaller portion of the students were less convinced, indicating some variability in their perceptions of fairness. Overall, the majority of the responses suggest a strong commitment to equitable treatment, but there is still room for improvement to ensure that all students feel equally treated.

4.4.4.9 Do you think that having a positive attitude and mindset in the unit(s) could have helped others feel more engaged with using technology?

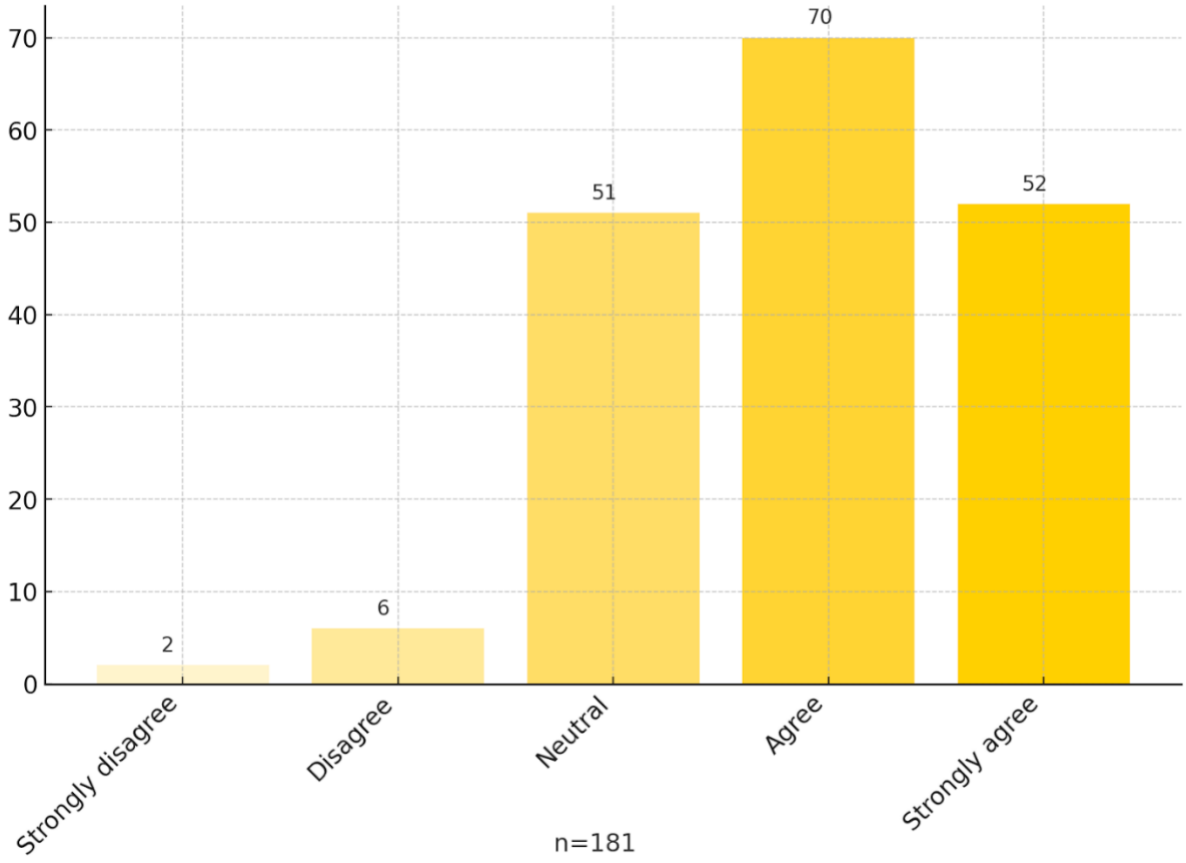


Figure 4-74: Positive attitude and engagement with technology

A large number of the students believed that maintaining a positive attitude and mindset in the units could significantly enhance their engagement with technology. This perspective highlights the importance of fostering a positive learning environment to boost technological engagement. The notable portion of students who remained neutral suggests that while positivity is beneficial, its impact might vary among individuals.

4.4.4.10 How much do you believe that the positive attitudes of both teachers and students contributed to making learning easier in the unit(s)?

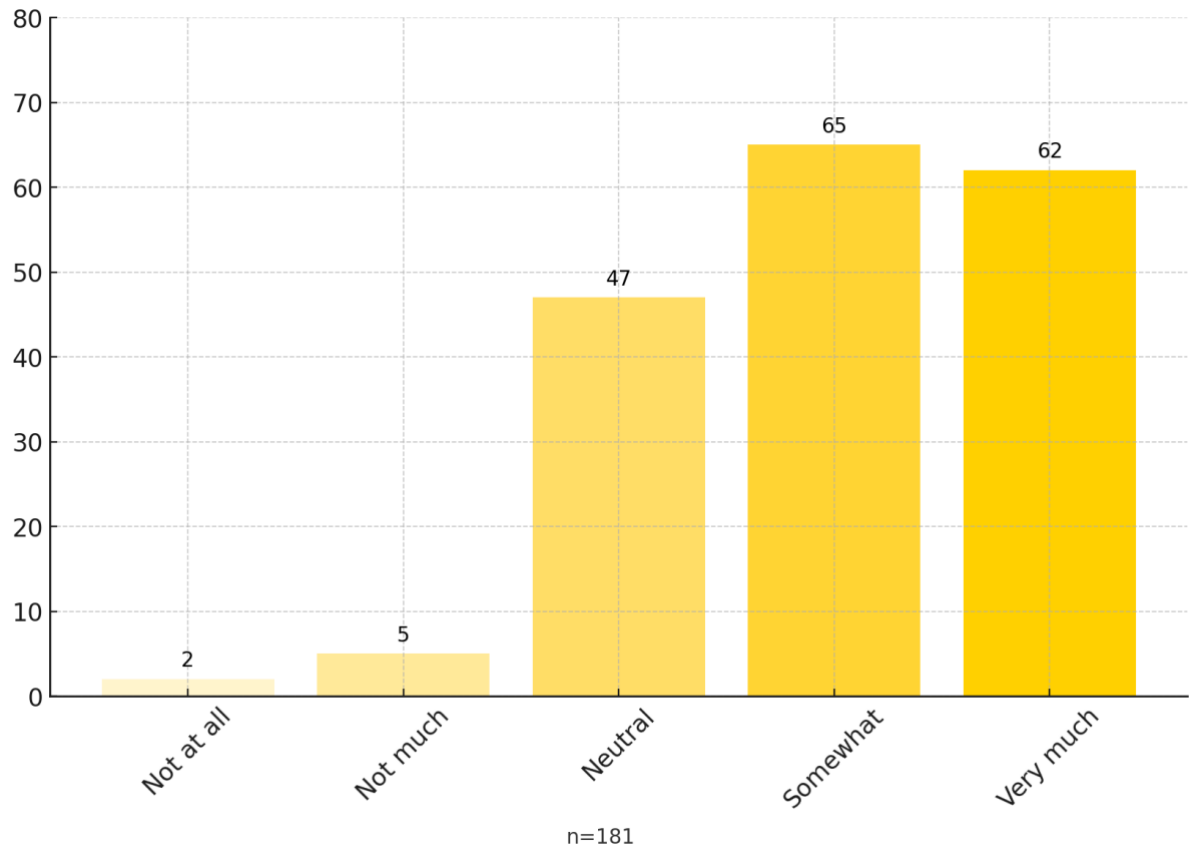


Figure 4-75: Impact of positive attitudes on ease of learning

The majority of the students indicated that positive attitudes on the part of both teachers and students significantly enhance the learning experience, creating a more supportive and effective educational environment. This shared positivity probably leads to better engagement and understanding, making learning tasks feel more manageable. The overall sentiment suggests that a collaborative and upbeat atmosphere is key to successful learning outcomes.

4.4.4.11 Heatmap of human concepts

Figure 4-76: Heatmap of student responses in human concepts

The high ratings for the effectiveness of learning software and musical skills indicate that the units are well designed to build these skill sets effectively. Time management, while generally positive, shows some variability, suggesting a need for improved support in this area. The strong positive feedback on the helpfulness of teacher instruction and fair treatment highlights the success of fostering an inclusive and supportive learning environment. Differences in norms and convictions, such as cultural, moral and political differences, appear to have a relatively minor impact on learning, pointing to a generally harmonious classroom dynamic. Finally, the emphasis on positive attitudes and mindsets by both teachers and students is crucial, as it significantly enhances engagement and the overall learning experience.

4.4.5 Design concepts[28]

The design concepts focus on evaluating the practical application of knowledge, the variety and effectiveness of assessment approaches and the comprehensiveness of the curriculum design. In addition, the questions under this category examine the feasibility of implementation, the approaches for effective implementation and the effectiveness of various learning approaches.

4.4.5.1 How well did you put into practice what you learned in the unit(s)?

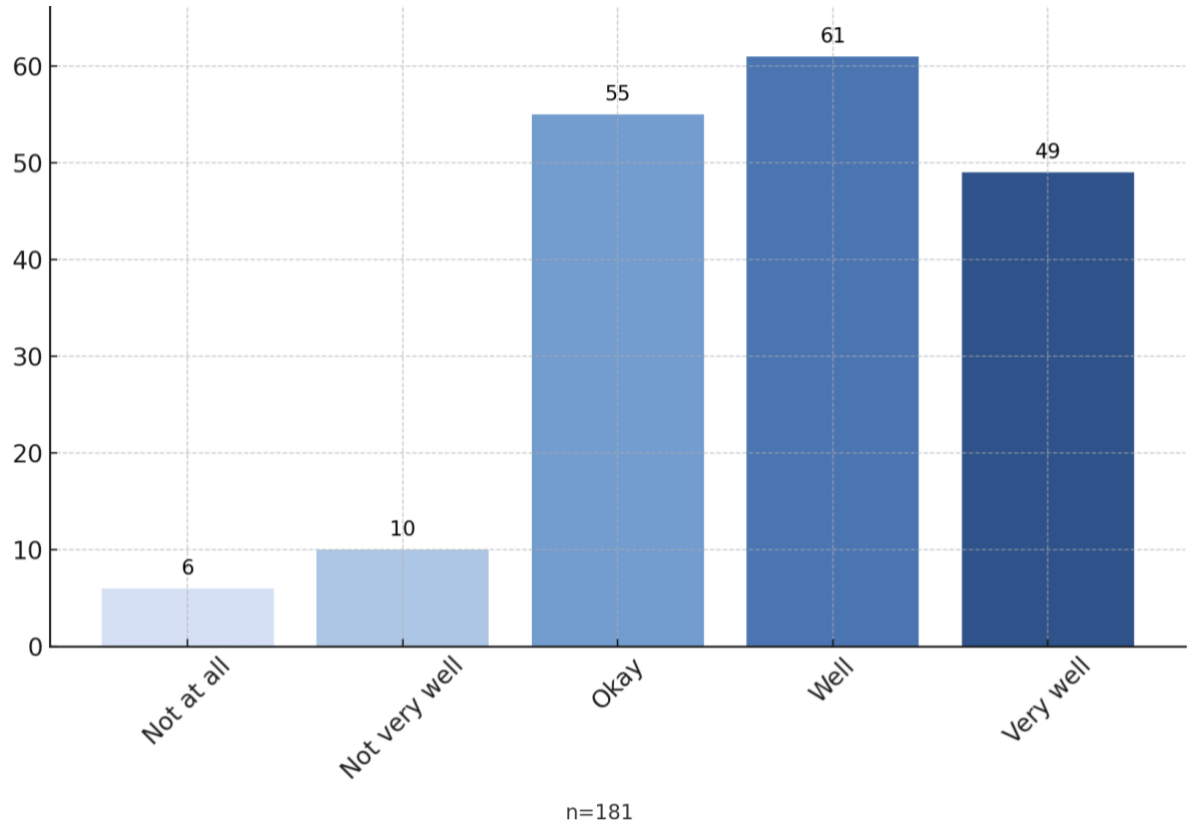


Figure 4-77: Effectiveness of putting concepts learned into practice

Most of the students felt they had applied what they had learned in the units effectively, with a significant portion indicating that they had performed well or very well in putting their knowledge into practice. This suggests that the units successfully facilitated the practical application of skills and knowledge gained throughout the course. More

[28] Discussed in 2.8.5 Design concepts in chapter 2.

hands-on practice and engagement approaches may also help students to apply concepts more consistently.

4.4.5.2 How helpful were the assessment approaches used in the unit(s) to understand new musical concepts?

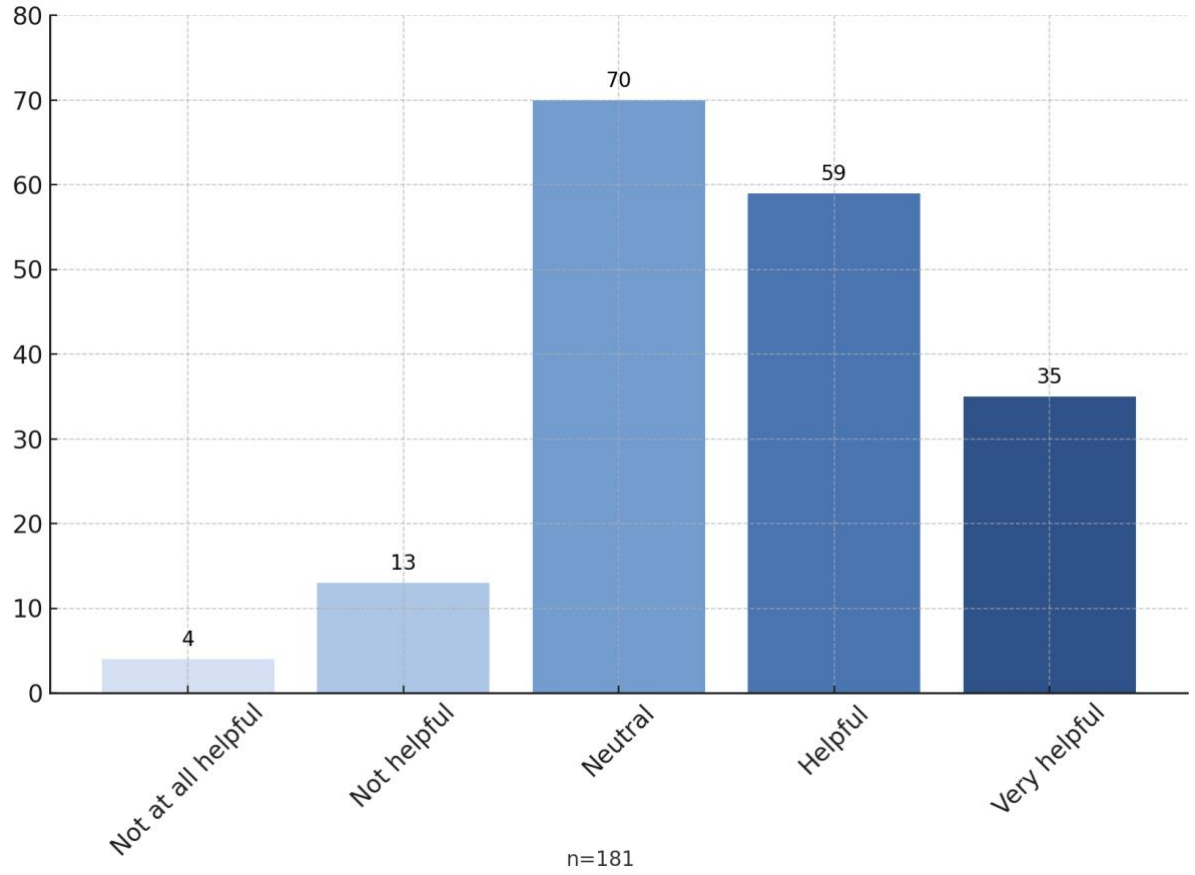


Figure 4-78: Assessment approaches

The students indicated that the assessment approaches were generally effective, indicating that they gained a solid foundation in understanding new musical concepts. However, the neutral responses suggest that these approaches could be more engaging. Positive feedback points to their potential if refined, while the small number of negative responses highlights areas needing improvement to better cater to all students.

4.4.5.3 How valuable were the formative assessment approaches during the unit(s) (quizzes, class discussions and peer evaluations) in order to complete future class projects more successfully?

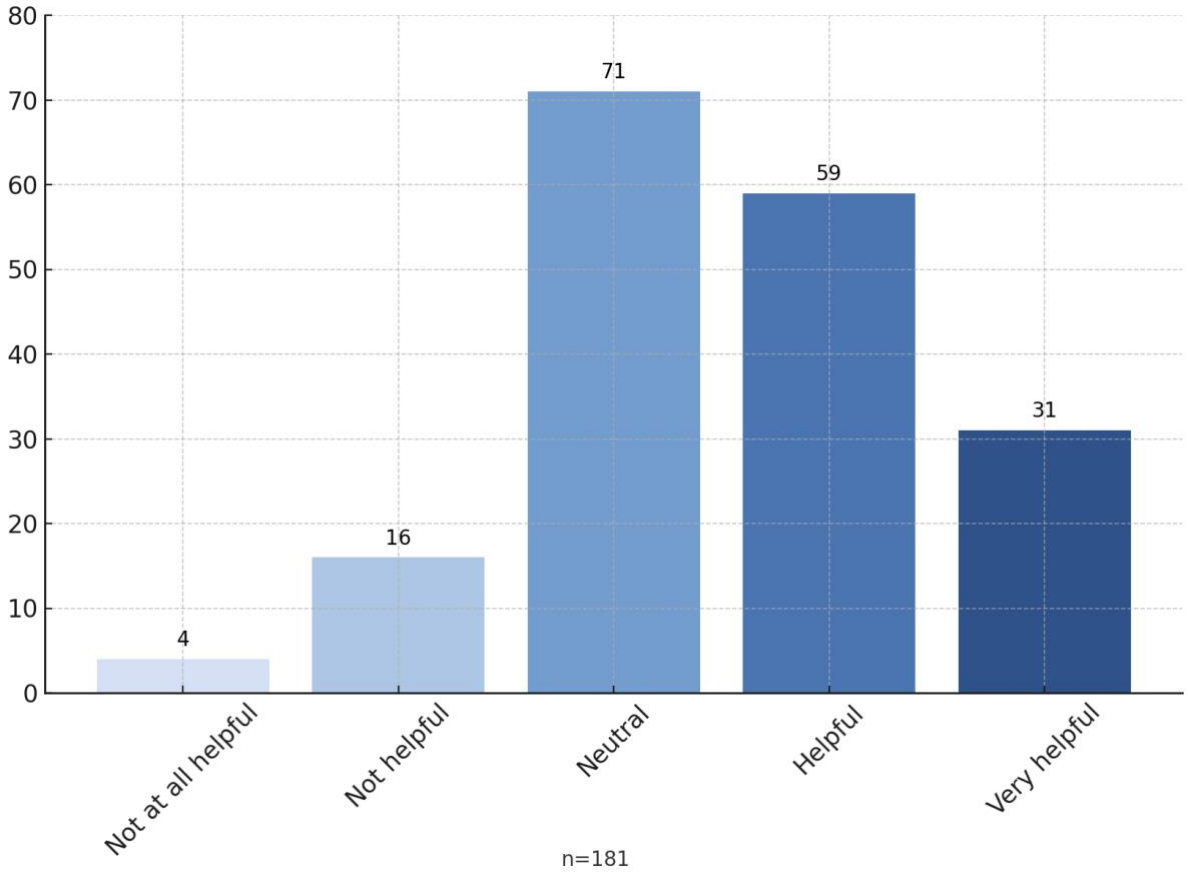


Figure 4-79: Value of formative assessment approaches

The formative assessment approaches used during the units were largely perceived by the students as being valuable, aiding as they did in the completion of future class projects. While many students responded positively, the neutral feedback suggests room for improvement in engagement and effectiveness. Responding to the small group of students who found these approaches less helpful could enhance the overall value and ensure broader benefits for all students.

4.4.5.4 How well do you think the lesson plans helped you learn different music topics in the unit(s)?

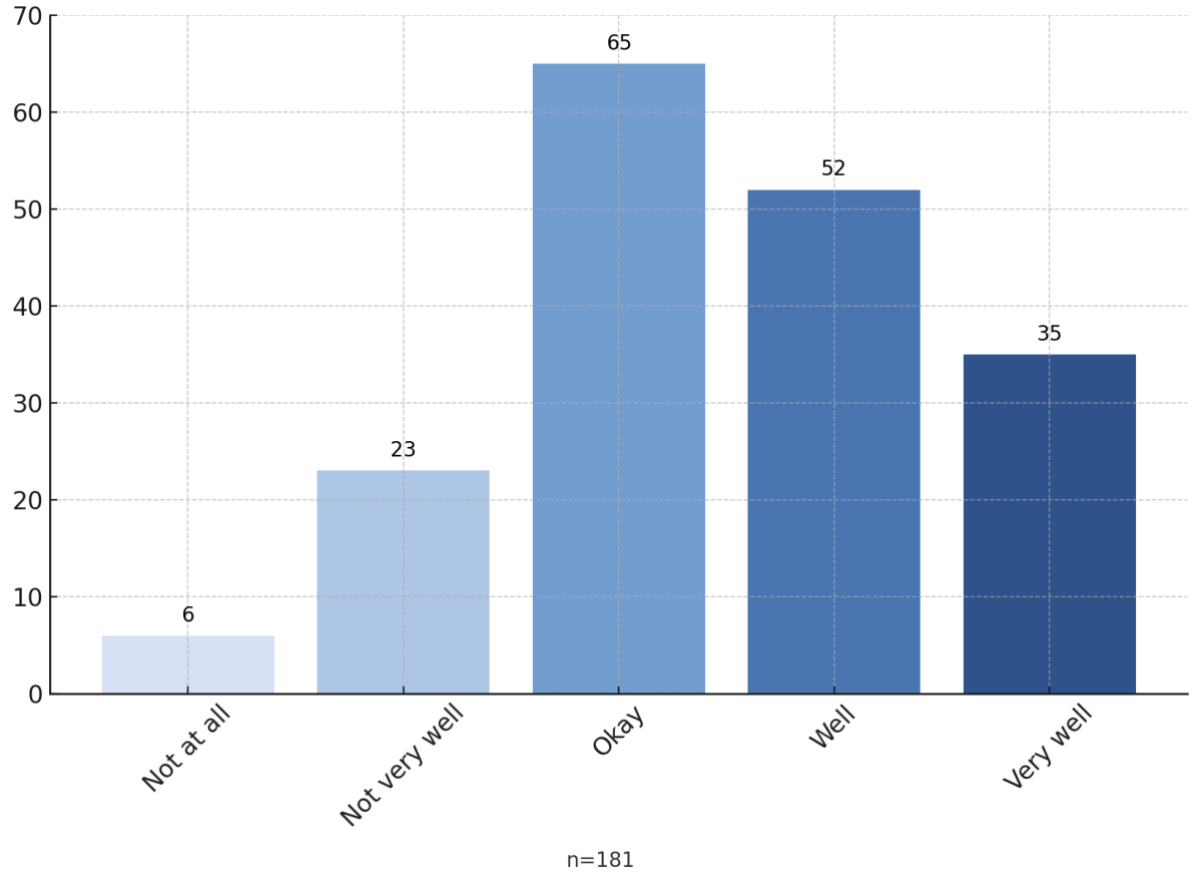


Figure 4-80: Effectiveness of lesson plans

According to the students' responses, the lesson plans were generally effective in helping students to learn different music topics, but there is room for improvement. The high number of neutral responses suggests that while the plans were adequate, they could be made more engaging or be tailored. The positive feedback highlights their strengths, indicating their potential if refined further. Responding to the needs of those students who rated the plans as being less effective could enhance their overall utility and ensure a more consistent learning experience for all students.

4.4.5.5 How well did you like the structure of the unit(s)?

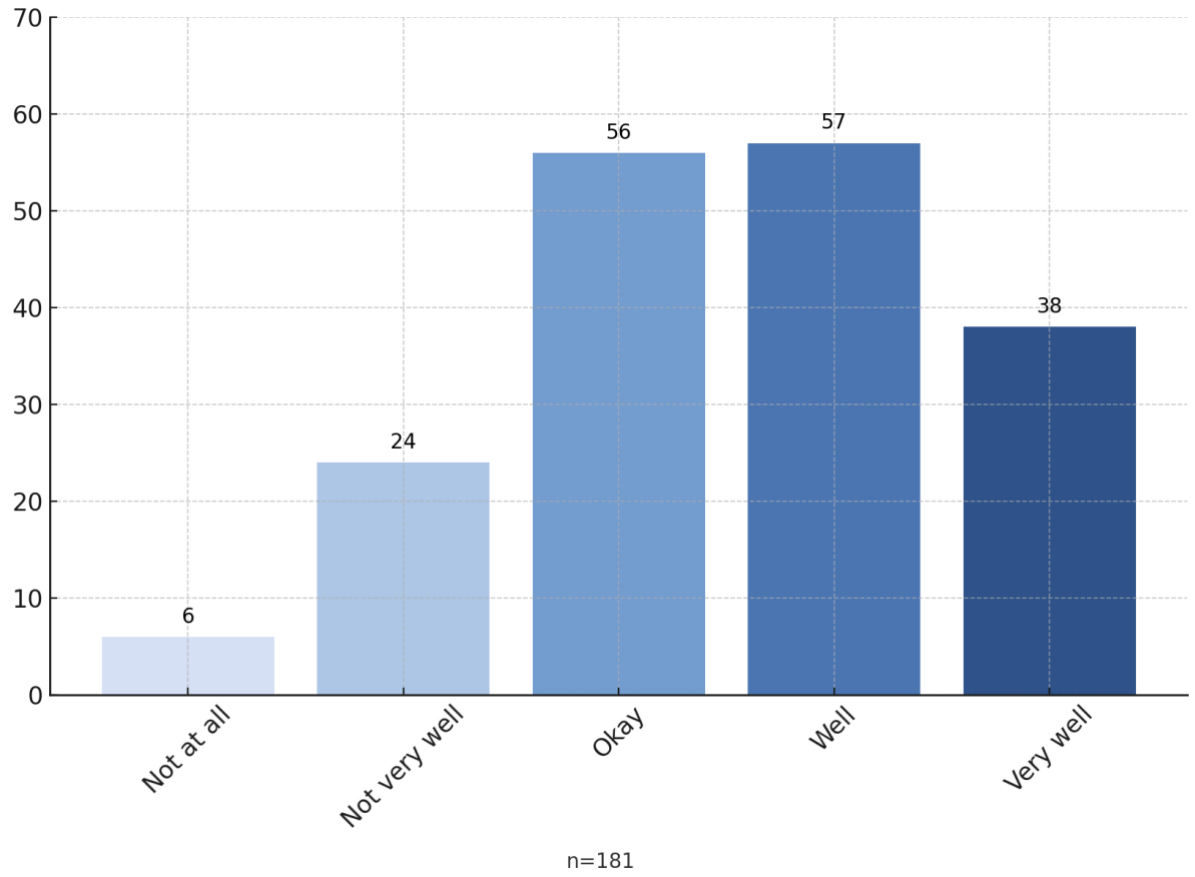


Figure 4-81: Perception of unit structure

Most of the students thought very highly of the unit structure and gave the unit(s) favourable feedback. However, the fact that minimal replies are neutral or unfavourable indicates that the usefulness and attractiveness of the unit structures might have to be strengthened. By responding to these experiences, a more uniform and enjoyable learning environment may prove to be advantageous for all students.

4.4.5.6 How well did you enjoy the assessment choices in the unit(s)?

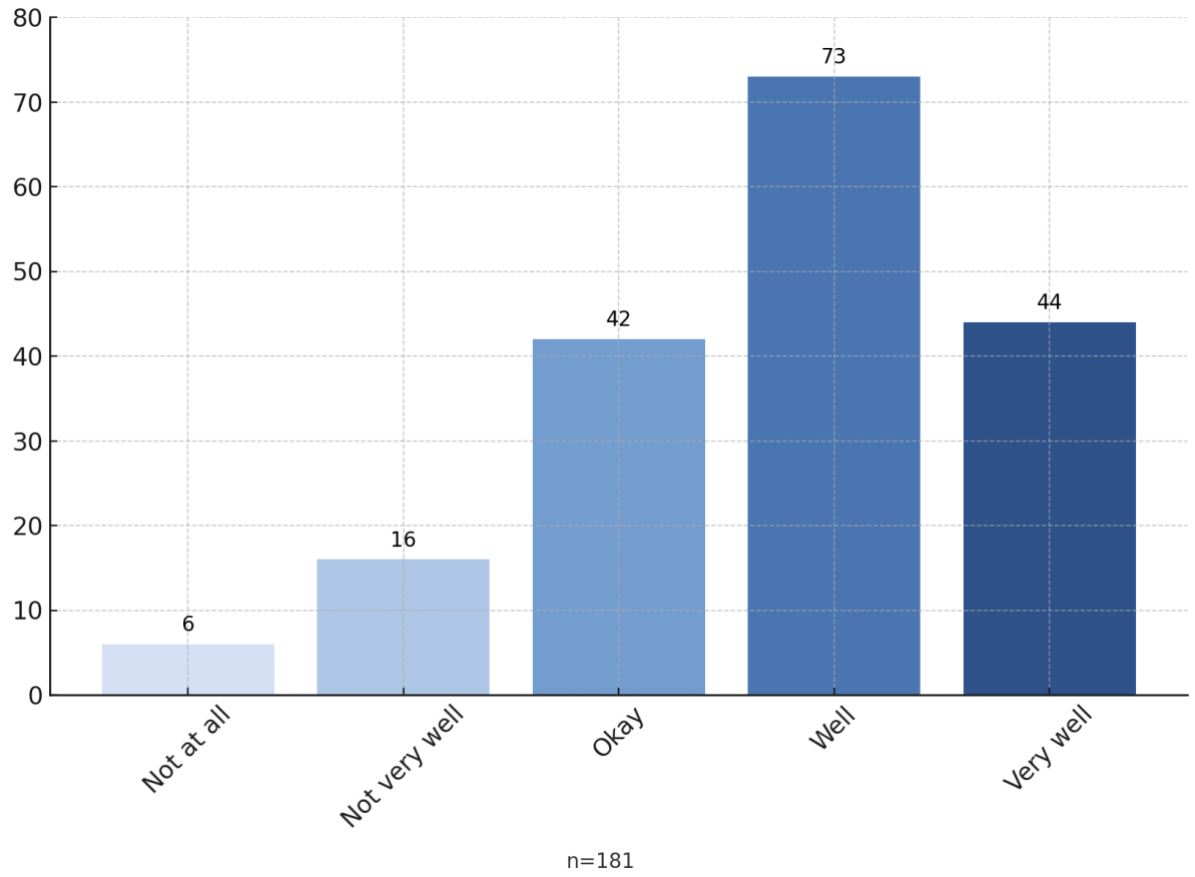


Figure 4-82: Enjoyment of assessment choices

Based on their enjoyment of the assessment options in the unit(s), the students generally expressed satisfaction with the variety and format of the assessments offered. The assessments appear to have been well liked and interesting, based on the large number of positive reviews they received from the students. However, the minimal presence of negative remarks raises the possibility that the evaluation procedure may need to be enhanced to better meet the unique requirements and preferences of each student.

4.4.5.7 How well did the timing of instructions about music activities and assignments reach you in the unit(s)?

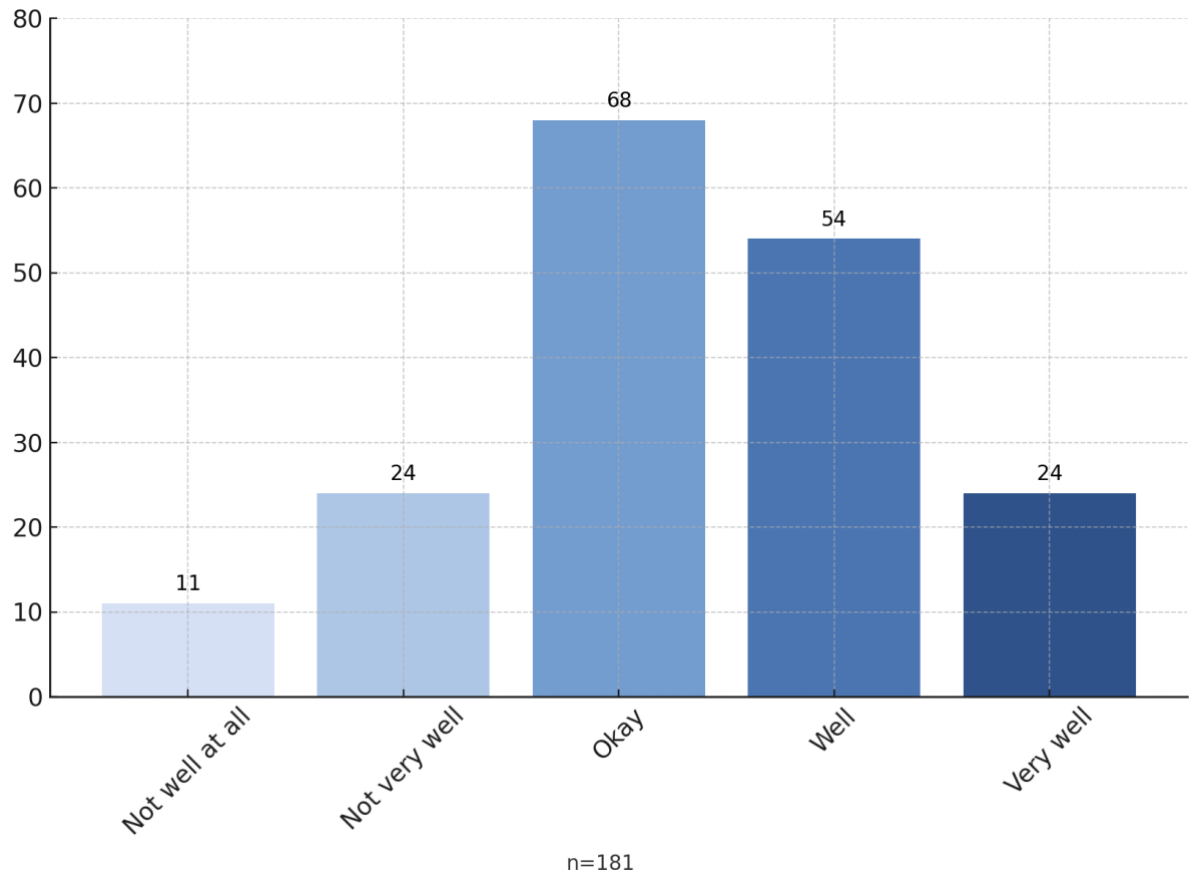


Figure 4-83: Timing of instructions

In general, the students seemed to find the timing of the instructions regarding the music activities and assignments satisfactory or even better. It could, however, be required to resolve the issues expressed by those who thought the timing was less successful in order to increase the effectiveness and clarity of the instruction delivery and enhance the learning experience for all students.

4.4.5.8 Was there an opportunity for you to apply your own learning strategies to the unit(s)?

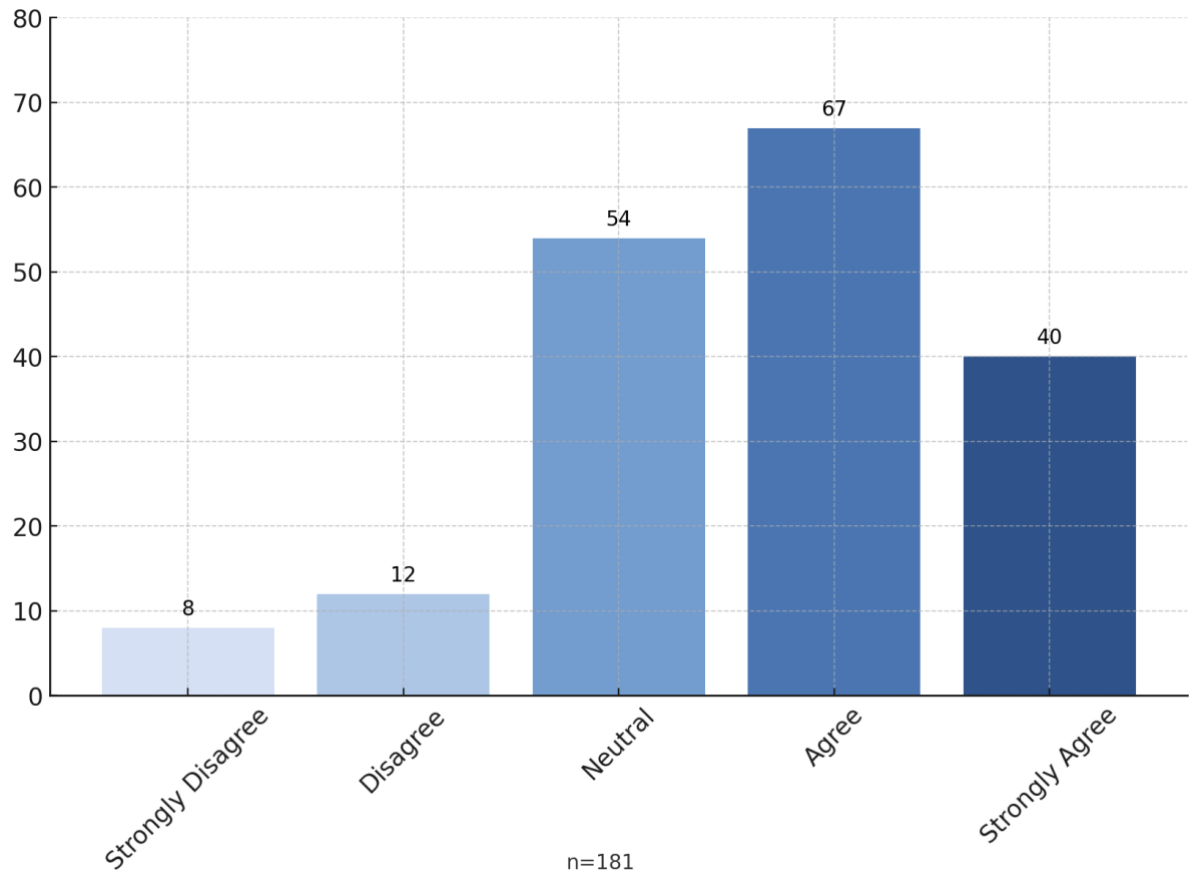


Figure 4-84: Opportunity to apply own learning approaches

A flexible and accommodating learning environment was suggested by the majority of the students, who felt they had opportunities to apply their own learning approaches within the unit(s). The overwhelmingly positive feedback suggests that a large number of the students were successful in customising their educational experience. Furthermore, the negative feedback indicates that more inclusive teaching approaches that accommodate a range of student learning preferences are required.

4.4.5.9 Did you feel that your learning preferences were accommodated in the unit(s)?

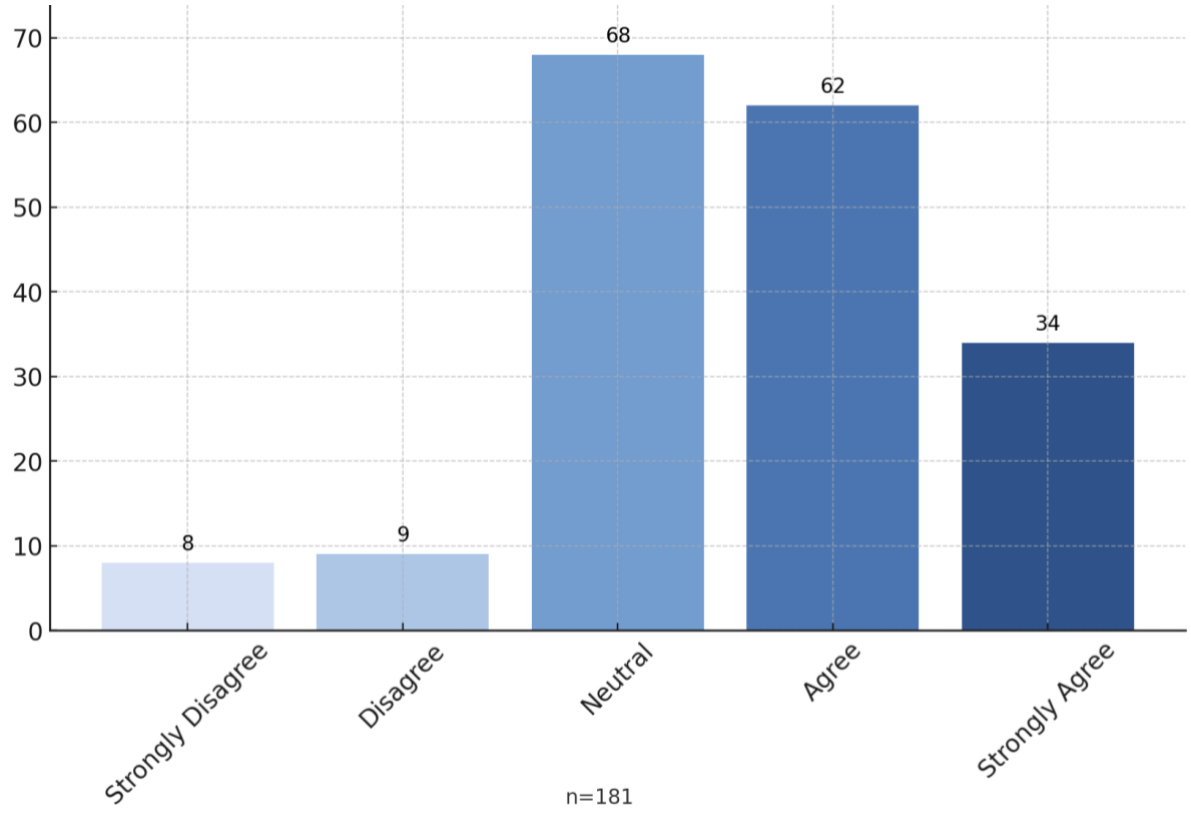


Figure 4-85: Accommodation of learning preference

The majority of the students responded that the unit(s) catered to their preferred style of learning, which suggests that the instructional design was generally flexible and inclusive. Good alignment with the needs of the students is evident from the overwhelming positive responses. The neutral replies, however, imply that some of the students may not have understood the accommodations as clearly. Furthermore, highlighting areas where more inclusivity could be attained is implicit in the few negative responses.

4.4.5.10 Heatmap of design concepts

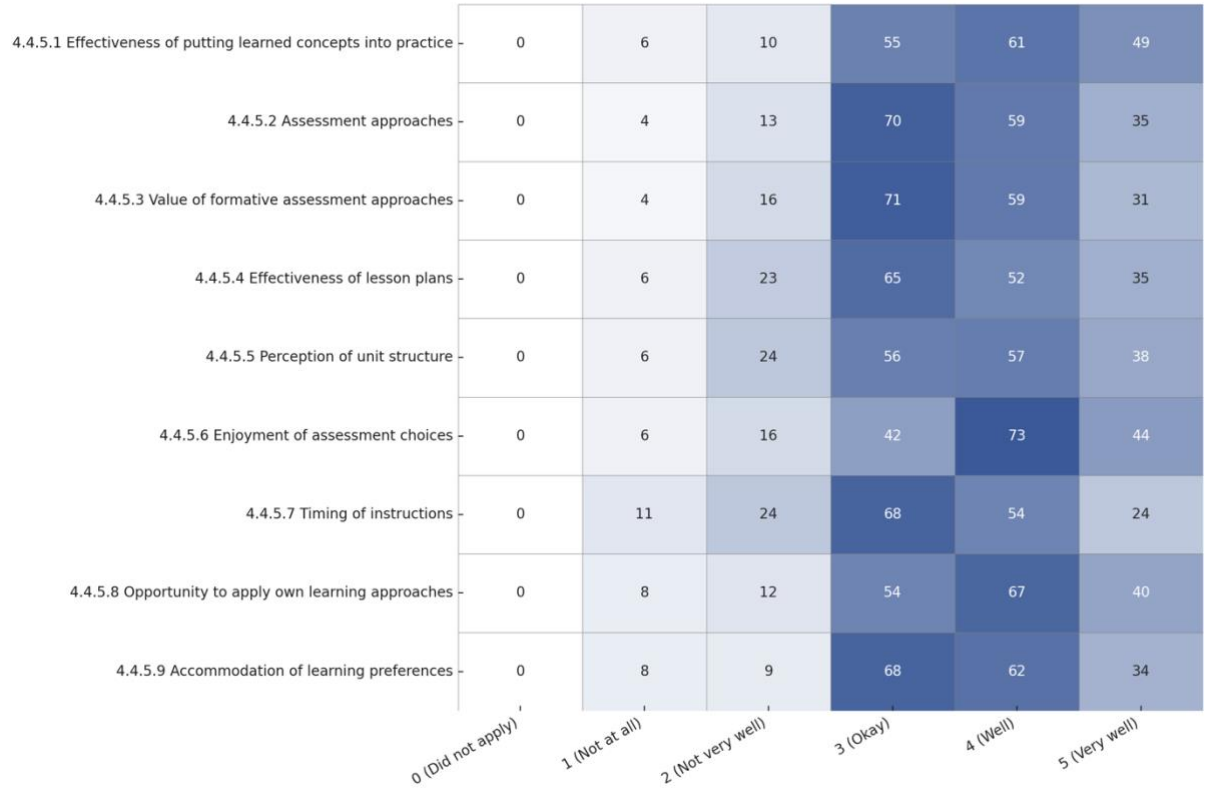


Figure 4-86: Heatmap of student responses in design concepts

High ratings for the effectiveness of applying learnt concepts, assessment approaches, and formative assessment approaches indicate that these aspects of the educational experience have been well designed to build students' skills. Positive feedback showed that the lesson plans and the unit structure created an inclusive and supportive learning environment. Most of the ratings for assessment choice enjoyment and instruction timing were positive, but there was some variability, suggesting that improved support is needed. Regular opportunities to apply their own learning approaches and accommodate the learning preference categories emphasise the importance of personalised learning. The emphasis on well-structured plans, supportive feedback and personalised learning suggests that they lead to improved student engagement and learning.

4.5 CONCLUSION

The interview data provide a nuanced view of the students' learning experiences, highlighting the strengths and areas for improvement in the music curriculum. Flexible learning environments and technological integration were well received by the students, enabling dynamic and accessible music studies. However, challenges such as unequal access to digital tools and the need for better technical support persist. Balancing group collaboration with individual work is crucial due to diverse student preferences. And whereas autonomy and self-management are valued, some of the students indicated that they need more guidance.

The end-of-lesson reflections from questionnaire 1 show that the students appreciate the curriculum's flexibility and accessibility, allowing them to study outside traditional settings. Autonomy in personalising their learning was important, though time management and focus were challenges. Technology generally enhanced their understanding and engagement, but occasionally caused technical difficulties. Collaborative efforts and peer support were crucial to fostering community and shared responsibility.

The end-of-unit reflections from questionnaire 2 highlight the curriculum's effectiveness and areas for enhancement. Interactive tools and digital apps were beneficial to acquiring and processing knowledge. Feedback throughout the units helped the students to understand their grades and improve their outcomes. Technical challenges and varying levels of support had an impact on their learning experiences. Collaborative activities were well received, emphasising the role of peer interactions and group projects. Consistent technical support and personalised feedback are needed to deal with individual learning needs.

The comprehensive analysis of the student feedback underscores a pivotal realisation: the future of education lies in adaptable, technology-enhanced and student-centred learning environments. The positive response to flexible, accessible learning opportunities suggests a shift from traditional classroom settings to models that embrace diverse needs. Responding to challenges such as technological disparities and support mechanisms is a moral imperative to ensure educational equity. This holistic approach, harmonising autonomy with support, technology with interaction, and

flexibility with structure, sets the stage for a transformative educational paradigm that prepares students for modern-day complexities – a true embodiment of Paul Klee's idea that 'a dot is a line that went for a walk'.

CHAPTER 5

Conclusion

Experiences, in order to be educative, must lead out into an expanding world of subject-matter. This condition is satisfied only as the educator views teaching and learning as a continuous process of reconstruction of experience – John Dewey[29]

5.1 INTRODUCTION

The thesis titled 'The application of a seamless learning approach in Year 9 of the LGR-22 Music Curriculum using the SLED framework: a case study' is concluded in this chapter. Starting with an overview of the study, the results are discussed in relation to the primary objectives and previous reviews of the literature. The approaches used to respond the research questions included classroom observations, questionnaires and interviews (see Addendum O). The chapter also identifies the limitations of the study and suggests future research areas.

5.2 BRIEF OVERVIEW OF THE STUDY

This research investigated how the SLED framework can be used to create a seamless learning approach in the Year 9 LGR-22 music curriculum. There is a scarcity of studies that focus on seamless learning within the field of primary music education in Sweden specifically; therefore this research holds some degree of importance. The COVID-19 pandemic has underscored the need to engage in teaching approaches that can easily transition between learning environments and modes. Seamless learning offers a solution to these challenges by combining informal and formal learning opportunities seamlessly. The SLED framework provides a basis for the study by promoting collaboration and self-directed learning across educational environments.

The sub-questions focused on specific modifications to support the learning objectives, foreground the benefits of seamless learning and indicate the advantages and

[29] Dewey, 2008: 59.

disadvantages of integrating the SLED framework. The data-collection methods included classroom observations, end-of-lesson and end-of-unit questionnaires and semi-structured interviews. Ethical protocols were adhered to by obtaining the consent of both the students and their parents to comply with GDPR regulations.

5.3 RESEARCH QUESTIONS

Four research questions guided this study. In this section, I begin by answering the sub-questions; this will serve as the foundation for answering the main research question. Before ensuring that my findings fall within the broader scope of the established literature on the subject, this analysis is carefully integrated with the existing body of data. Even though it is unlikely that any new findings will relate directly to previous literature, such findings may suggest the discovery of new knowledge. However, my primary focus remains on aligning these insights with the existing scholarly framework.

5.3.1 Sub-question one: What specific modifications can be implemented to adapt the curriculum to support its learning objectives while integrating concepts of the SLED framework?

To answer sub-question 1, it is necessary to consider both the theoretical underpinnings and practical findings of the study. This section maps out (Figure 5-1) how this answer is structured.

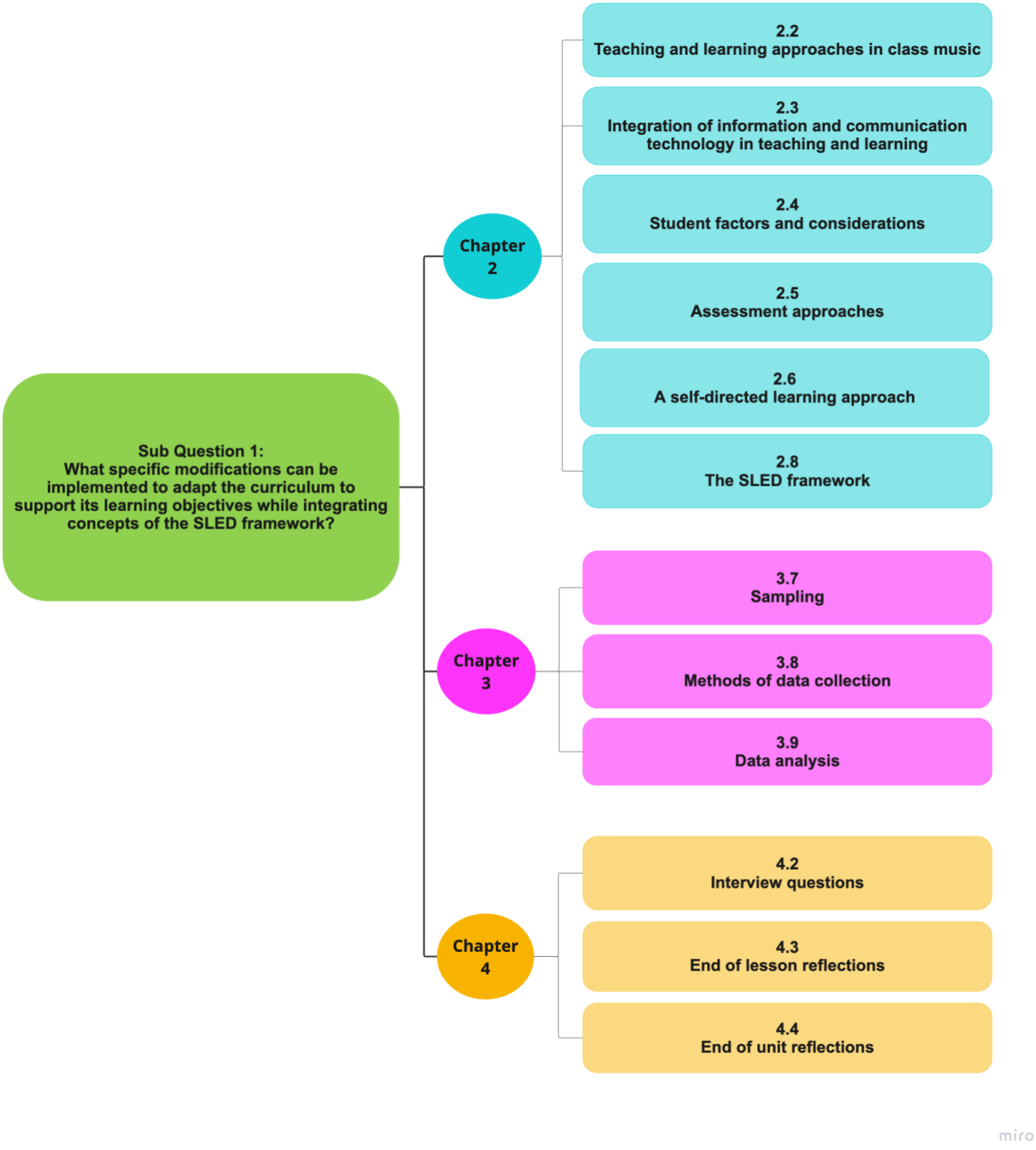


Figure 5-1: Sections aligning with answering sub-question 1

In order to adapt the curriculum to its learning objectives and incorporate the principles of the SLED, a number of modifications were made.

5.3.1.1 Core concepts

The curriculum was modified using knowledge gained from the literature while aligning it with the SLED framework,[30] integrating activities and tools to strengthen the connection between theoretical knowledge and practical application across different units. Each unit comprises an assessment task sheet (Addendum J) that includes Goal, Role, Audience, Situation, Product and Standards starter so that each assessment is focused on replicating a real-life task in the specific context of each unit. This also increases student involvement and reduces the likelihood of academic dishonesty as described by Power (2019, 2020).

To improve the students' engagement, experience and learning outcomes, the music units introduced **alternative teaching and learning** opportunities. The Music Theory unit was modified to include traditional approaches such as a theory booklet, direct teaching (Pozo, Torrado & Alacid, 2022) and rote learning (Lazaric, 2012), combined with positive reinforcement (Adamek, Darrow & Jellison, 2015) and the use of an interactive whiteboard. The responses showed that the students' understanding while using the whiteboard improved in the areas of note identification and staff notation (sections 4.3.3.3, 4.3.3.5) and that the end-of-unit feedback confirmed the students' greater engagement and understanding (sections 4.4.1.1, 4.4.1.11). The Music Performance unit promoted personalised learning (Tetzlaff, Schmiedek & Brod, 2020), where the students selected pieces of their own choice to promote ownership of their learning, also self-directed learning (Edmondson, Boyer & Artis, 2012), problem-solving and autonomy (Almulla, 2020). Vygotsky's Zone of Proximal Development (Fung & Groulx, 2012; Pozo, Torrado & Alacid, 2022) and ensemble playing (Slette, 2018) were used to enhance collaborative peer learning.

The Music History unit was adapted to offer more autonomy (sections 4.2.10.1, 4.2.13.4, 4.3.2.1, 4.3.7.4, 4.4.2.3) through a self-directed approach (Morris, 2019),

[30] The sub-concepts from each of the five main concepts of the SLED framework will be **bolded** throughout the text for clarity.

while differentiated (Tomlinson, 2001; Darrow, 2012) and personalised teaching (Wright et al, 2019) responded to individual needs. This was confirmed by Snap, who stated: Multimodal teaching (Tomlinson, 2001) included listening to music, watching videos and reading text as learning tools. The students delivered presentations of between five and nine minutes in length (Appendix K) about different genres and artists. The goal of the music composition course is to teach students how to compose songs using personalised choice about musical elements such as theme, lyric, rhythm and melody (Wright et al, 2019). The course is taught using Flat.io music notation software (Pozo, Torrado & Alacid, 2022) and includes teacher guidance to ensure effective use of the platform.

The main **challenge** in modifying the theory unit lay in transitioning to a more student-centred approach (section 4.3.2.3). Creating customised materials took significant time (Tomlinson, 2001); and although a larger budget for new apps would have been ideal, it was not feasible (Bennett, 2023). GDPR regulations further limited our options, and even when a free, compliant tool was identified, it underwent over more than months of IT department vetting, with no clear outcome. In the performance unit, limited access to instruments and inadequate classroom spaces also hindered learning. Some students could not practise at home and transporting borrowed instruments led to their being damaged. Neuropsychiatric factors also had an impact on learning: ADHD students benefited from shorter structured sessions (Barkley & Peters, 2012; Prior, 2023), HSPs needed quieter spaces (Acevedo et al, 2014), ELD students required visual aids and additional time (Leonard, 2009; Prior, 2023), dyslexic students thrived in auditory learning and rhythm exercises (Farrell, 2022; Kirby & Snowling, 2022; Skeide, 2022) and GAD students were supported by low-pressure environments to manage their performance anxiety (Thobaben, 2005; Tyrer & Baldwin, 2006; Gale & Davidson, 2007).

In the music history unit, the emotional and social dynamics played a significant role in the learning experiences of the students. Group work helped to reduce anxiety and fostered a supportive learning environment, but differences of opinion and enforced peer interaction sometimes hindered progress (section 4.2.5.2). In the Music Composition unit, technical challenges arose from time-management problems,

internet access problems and over-concern to maintain concentration in the classroom (section 4.3.1.5).

Expert engagement, aligned with Kolb's (1984) concept of experiential learning, was initially planned as a compulsory surgery session in the music theory course. Through such engagement, students would work with an expert teacher (a colleague who is also an industry professional). However, scheduling conflicts prevented some students from attending. This limitation highlighted the need for more flexible scheduling or additional support to ensure that all the students could benefit from these expert interactions. Students such as Flex who were able to attend extra surgery and were able to engage with an expert reported positive outcomes: 'it's beneficial for an expert because they can, like, spot all the little details that you're doing wrong, that you're not noticing yourself.'

Although expert engagement outside of the surgery sessions was limited due to time and budgetary constraints, multimodal teaching and learning approaches were integrated to foster innovation. Surgery sessions with music teachers who are also industry professionals (section 4.2.6.1) provided personalised feedback and expert insights, while the after-school sessions benefited those who attended them (section 4.4.1.4), offering inspiration for projects and insights into musical careers, therefore enriching the overall learning experience.

Innovation across all the units was fostered by integrating technology and multimodal approaches as described by Philippe et al (2020); this enabled the students to engage with the content in creative and practical ways. In the music theory unit, this was achieved through interactive quizzes (Miranda, 2020) that enabled the students to apply theoretical concepts in real-time, and receive instant feedback (Blau, 2019) to identify and correct mistakes quickly. This resonated with Lit, who commented:

> I could work on it anytime due to it being online. You could always do the quizzes at home. You can always train on it at home, during breaks at school or whenever you'd like ….

In addition, real-time feedback (Moandouit, 2018) helped students to monitor their progress and the integration of digital tools and communication platforms (Pozo, Torrado & Alacid, 2022) made the challenging content more accessible, as confirmed

by the student feedback in section 4.2.2.2. Positive responses from students regarding formative assessments (section 4.4.5.3) further supported this process, adding value to the learning experience.

Students in the Music History unit used resources such as Google Slides and video applications to document and present their work creatively, embodying multimodal learning (Tomlinson, 2001). The integration of digital tools, online platforms for quizzes and research, and a variety of applications for music composition and presentations (section 4.2.2.2) enabled the students to work flexibly (section 4.2.2.1) across units and continue their learning on their personal computers or mobile devices at home. Experiments with digital tools such as generative artificial intelligence (Deep.AI) and chord generators (chordchord.com), which helped the students to develop their compositional voice, encouraged innovation in the music composition unit. Using their understanding of music theory and integrating technology into flat.io, they created melodies, lyrics and rhythmic patterns (sections 0, 4.2.7.2, 4.2.7.3, 4.3.6.4, 4.4.1.2).

The modification of the Music Theory unit involved enhancing the **measurement of success** by incorporating a combination of rubrics, lesson reflections and assessments (sections 4.2.4.1, 4.2.4.2, 4.2.11.1, 4.3.4.1, 4.3.4.2, 4.3.6.1) designed to provide students with knowledge of pre-grade level one music theory. The assessment tasks were expanded to include a music theory booklet, online quizzes and a final test, with rubrics assessing students' ability to apply theoretical concepts and understand the role of music (Addendum J). Unlike traditional assessments, this modification introduced continuous reflection and self-assessment. Structured feedback, as outlined by Peng and Wang (2022), from peer evaluations (Boubouka & Papanikolaou, 2013) helped the students to increase their understanding, as is evident in Wave's comment: 'In music theory, a peer helped me understand challenging pages.' In-class, and surgery teachers provided further ongoing support throughout the learning process. Lesson reflections, as described by Mahdavinia, Tabatabaei and Rahimi (2011), and Wood and Kurzel (2008), were integrated to offer real-time feedback into student progress, enabling timely adjustments and personalised support, which ensured a more tailored learning experience.

Networking with other students was encouraged by group assignments (sections 4.2.1.2, 4.3.5.1), which included discussion (section 4.4.1.7) and peer learning.

Although they experienced minor challenges, it is clear from section 4.4.1.8 that the students felt that they were able to collaborate with other students in a positive way, as evidenced by Snap:

> So the option to choose who you wanted to work with was very good for me because I'm very close to small number of people. And if I work with them, I can get a better grade ….

It was also helpful for the students to use the interactive whiteboard (section 4.3.3.5) to visualise the digital version of the theory book, which fostered an active learning environment, as suggested by Patiño, Ramírez-Montoya and Buenestado-Fernández (2023). This was evidenced by a student: 'The whiteboard was used by the teacher to explain the topic …, the teacher was [also] able to explain the name of the notes well with the interactive whiteboard.' The students were expected to work together in class either physically or by using digital tools (section 4.4.1.10), to participate actively with the teacher and to use their knowledge to help others understand concepts (section 4.3.5.2). The discussion, peer support and collaborative problem-solving that this interactive approach promoted improved both individual and collective understanding and also the students' communication skills (section 4.2.12.2). The students also felt that they would be interested in the possibility of continuing to work in groups in future units (section 4.4.1.9).

Networking and working together were highlighted even further as the students, in groups, performed together to strengthen teamwork and the collective music-making element of the course project work. For composing music, the students followed the guidance of Lebler (2015), Zhukov (2015) and De Vito et al (2019), by using technology to obtain input from a minimum of two classmates, whom they documented feedback from, in their project submissions. Through the sharing and receiving of feedback on their compositions, the students improved their creativity, polished their work and gained a deeper understanding of the creative process. According to section 4.3.5.2, peer support and feedback helped to improve the quality of the students' compositions and the learning experience as a whole.

5.3.1.2 Positive concepts

The curriculum included a holistic approach to learning that encouraged cognitive, emotional and social development. This included promoting the discovery of a variety

of musical genres and cultures and supporting diverse learning needs, as discussed in chapter 2 under Student Factors and Learning, in an inclusive learning environment. In this case, culturally responsive learning is essential to ensure that the students' different backgrounds are valued and reflected in the learning materials and activities.

A **student-centred approach** must be prioritised in educational design, and different student learning preferences and skills were taken into account when modifying the units. The Music Theory unit used constructive concepts that prioritised student motivation (Howe & Watson, 2021: 2). Similarly to this, the Music Performance unit included concepts to raise motivation and engagement levels in the students (Kokotsaki, Menzies, & Wiggins, 2016: 267–277). Throughout the Music Performance unit, the students were given the freedom to select pieces from a variety of genres, including jazz, classical music and contemporary art, to enhance the relevance and personalisation of their learning process (Shemshack & Spector, 2020: 2). This was described by Hype:

> For the music performance, … it's very personal …, because we can choose almost whatever we want. We … can choose our own music, our own [instruments] we want to play it on … and we also have access to everything that we need. We can ask our teacher, we can go on YouTube, for instruction on how to do it.

In addition, the Music History unit incorporated positive concepts to enhance student engagement and learning by using a student-centred approach and using multimodal resources such as videos, texts and audio clips to ensure inclusivity – adapting the teaching approaches to the students' unique student learning preferences as described by Philippe et al (2020: 421–442). Similarly, the Music Composition unit integrated positive concepts to promote self-directed learning (Morris, 2019), and it gave the students the opportunity to explore and make compositions at their own pace. Across all of the units, positive responses showed that the students felt that their learning was personalised for them (section 4.4.2.1) and that they had the option to choose actively what works for their student learning preference (sections 4.2.5.1, 4.4.2.2).

The process of **globalising** education entails developing a common platform that combines various international approaches and resources. In the Music Theory unit, this was achieved by offering a global perspective through an online environment that

provided the students with access to global resources and enabled remote learning via platforms such as Google Classroom (Taskiran, 2021; Yuliansyah & Ayu, 2021). Moreover, the Performance Unit improved the students' practice by providing them with access to global resources that included instructional videos and sheet music from other cultures. Through collaborations and virtual rehearsals, the students were able to explore and perform music from many cultures, further integrating globalisation. As noted in section 4.2.3.1, Glow asserted that 'Google Classroom made it easier to follow unit instructions'. Globalisation also had an impact on the Music History unit through cooperative initiatives that have brought students from all backgrounds together to foster cross-cultural understanding and the virtual investigation of several musical traditions. The students also responded that they were not able to connect (section 4.4.2.5) and did not necessarily have a need to connect with people outside of the music class through online discussions (section 4.4.2.4).

The use of the GRASPS framework (goal, role, audience, situation, product or performance and standards) emphasised **practical experience** as a crucial component of skills development and offers a framework for real-world evaluations. The students learnt how to apply theoretical concepts such as the chords and scales needed for composition and music analysis in the Music Theory subject (section 4.2.4.1). The students developed a stage presence through both live and virtual performances in the Music Performance unit (sections 4.3.4.1, 4.3.4.5). This was described by Drop:

> For music performance, I use Spotify to both learn the lyrics and to listen to the beats and learn the song to play.

In the Composition unit, although there were varying levels of practical application among the participants, many of the students had opportunities to apply their learning in real-world scenarios, demonstrating the inclusion of practical exercises to some extent (section 4.4.2.6).

The units were modified to assist students' **preparation for future** musical endeavours by emphasising real-world experiences and practical applications. Modifications have been made to the Music Theory unit (sections 4.4.2.7, 4.2.11.1) to ensure that the students could perceive the significance of their theoretical knowledge in practical

music-making, such as composing or analysing popular music. In order to provide the students additional opportunities to provide feedback to their peers and teachers, the Music Performance unit has also been modified. The students' theoretical foundational skills were strengthened for potential further studies, as mentioned by Slay:

> … for the performance, I would know how to play the piano …. So I can use that at the, Gymnasium …

However, other students stated that there was a lack of performing experience that would enable them to study music at the gymnasium level, and that they would benefit from having more real-world experiences (section 4.2.11.2). Assignments and projects that mimic real-world situations have also been used in the History and Composition units. This experiential learning, as noted by Kolb (1984) and Cahyani (2021), improved the students' creativity and problem-solving skills and helped them to become ready for jobs as composers and arrangers (section 4.4.2.7). These modifications collectively ensured a more practical (section 4.2.4.1), future-focused learning experience across the curriculum.

The four units were modified to incorporate **real-time interaction**, which fosters immediate feedback and stronger student relationships. The importance of browser-based digital audio workstations (DAWs) in music education has increased, changing student engagement in creating music (section 2.3.2). Technology can provide real-time feedback that improves learning and skills development in the moment (Mandouit, 2018), and digital tools can amplify the impact by monitoring feedback and making it more visible (Winstone, 2019). Such feedback improved the students' nonverbal communication skills (Barmaki & Hughes, 2015) and benefited them in alternative assessments about possible real-world jobs (Blau, 2019). The majority of the students were grateful for real-time feedback, which caused a significant improvement in their classroom experience (section 4.4.2.8). Real-time feedback supported continuous learning in the across all the units (section 4.3.1.4).

Finally, the units were adjusted to incorporate **remote access**, allowing for varying levels of technological integration and student engagement through the integration of ICT (section 2.3). In the Theory unit, music theory.net provided remote access to theory lessons and quizzes. The Music Performance unit implemented a flipped classroom

paradigm, as per the guidelines by Bergmann and Sams (2012). Under this approach, the students rehearsed on school instruments in class after receiving tutorials at home to learn a particular piece on the instrument of their choice. The students could use virtual instruments on portable devices if they did not have access to instruments at home (section 4.2.2.3). Across all units, adjustments included offering a variety of online resources, websites and apps to ensure that the students could explore music history at their own pace, regardless of their location (sections 4.2.2.1, 4.2.2.2, 4.2.3.1, 4.3.1.1, 4.3.1.2, 4.3.1.3, 4.4.1.2, 4.4.2.9, 4.4.2.10). This is also evidenced by Remix:

> The anytime, anywhere one was helpful for me because … all of the things we're doing are on computers. So we can do it at any time – at home, outside, in a cafe, at school, whether we have spare time …

5.3.1.3 Practical concepts

The school provided access to **data and wi-fi** connections with relatively reliable networks, as discussed by Zhu, Yu and Riezebos (2016), ensuring consistent and accessible connectivity during classes. This made learning smoother for many students (section 4.4.3.1), as evidenced by a student:

> I worked on my computer as I was researching a music genre …. The particular work we are doing in this unit is one that I can perform in many different places (home, school, the train) and in different ways (using the internet, google docs, google classroom, paper or PowToon). So if I were to miss a lesson, I could easily catch up and/or do the work I missed at home.

However, challenges with connectivity for a few students (section 4.3.3.7) underscore the necessity of enhancing home access and the technological infrastructure. While most students in Sweden have access to wi-fi networks, some of the issues they face may not be due to geographical coverage gaps but rather to constraints in their homes. This underscores the need to have access to a steady internet connection in order to prevent disruptions and to enhance the value of digital-learning environments.

Furthermore, as per Nocar, Tang and Bártek (2016), the school provided every student with a Chromebook, emphasising the importance of **devices and hardware**. Thanks to platforms such as musictheory.net, the Music Theory unit included interactive online lessons and quizzes, which allowed the students to access theoretical concepts and

tests remotely and promoted more self-directed learning (Morris, 2019). In the Music Performance unit, the flipped classroom model enabled the students to learn pieces at home via tutorials and practice at school, while virtual instruments were available for those without physical instruments (sections 4.2.2.3, 4.2.3.1). This is evidenced by a student: 'We … practised our songs … and … I could … learn about notes and music staffs by for example [by] watching a YouTube video on the topic ….'

By providing the students with a range of online resources and apps, the Music History unit has been modified to allow students to learn at their own speed, no matter where they are (section 4.3.3.2). In the Composition course, students used digital resources to make music whenever and wherever they chose, which in turn encouraged flexibility and originality (section 4.2.12.1). Across all the units, the students appreciated the practical benefits of using their devices – such as efficiency, portability and the ability to work during breaks or outside of school. However, others reported feeling frustrated as a result of problems with their gadgets or the Internet (section 4.3.3.6).

The school provided all the necessary funding to cover the costs of hardware, software, wi-fi and data, which pre-empted concerns related to **funding and costs** and ensured that the students had access to the resources needed, as noted by Mansyur, Akidah and Sulaiman (2022). The minimal concerns about the cost of software among the students can be attributed to the school's provision of these resources free of charge, significantly reducing any financial barriers and allowing students to focus on their learning without the stress of incurring additional expenses (section 4.4.3.4). Similarly, worries about the cost of hardware were minimal among the students, indicating that financial barriers related to hardware were effectively managed because the school provided these resources (section 4.4.3.5).

The school offered the **infrastructure** that catered to the majority of the students' requirements: campus internet access and the necessary equipment (Sarkar 2012: 32). Nevertheless, a few students faced difficulties with their timetables, especially due to the breaks between classes. Although the school's support systems were mostly successful in promoting diverse learning approaches, making scheduling adjustments, such as extending break times, could have enhanced the student experience further by easing their stress and enabling them to be more punctual (section 4.4.3.6).

The units were modified to incorporate plagiarism **policies** on technology use, emphasising ethical practices, particularly in assessments, with a focus on AI. During one of the lessons, I spent the entire lesson trying to convince the students to use Deep.ai in their work; but they resisted, believing that the school had an AI policy in place because their other teachers had advised them against using it. However, during a middle-management meeting, it was confirmed that no such written policy existed yet, though one was in the process of being devised (as at 2023). This highlights the urgent need for the school to finalise and implement an AI policy to ensure responsible and consistent use of technology in the classroom.

The sections of the music curriculum were modified to include different types of **software**, with digital tools being used to establish a consistent learning environment for seamless learning. With the advent of online DAWs, the students could record, edit and work with audio while having access to features such as virtual instruments and mixing tools, hands-on practice, improved comprehension of music theory and the development of technical and critical thinking skills (Buffa & Vidal-Mazuy, 2023: 545). These modifications were successful, as evidenced by the majority of students' knowledge acquisition and favourable feedback on the helpfulness of software to their education (sections 4.4.1.5, 4.4.3.8). Particularly successful was the availability of the digital tools and apps (section 4.4.3.9); the efficiency of the instructional design was further demonstrated by the significant positive responses from the students, which indicated that the teaching approaches matched the students' learning demands effectively (section 4.4.4.1).

The units were based on Krause, McEwen and Blinco's (2009) description of a teacher–student **support** system. In order to balance creative teaching with classroom management, this support included an IT coordinator, AI professional development for staff, fair access to technology and technical help (section 2.2.8.1). The school's IT support staff made sure that the students could be helped to solve problems with their computers and the school's wi-fi network. Following Schukei's (2020) suggestion for chat and assistance options, the units were altered to provide student support. Yu et al (2023: 42) highlight the significance of individualised instruction to fit each student's unique requirements and talents. For the majority of the students, the level of support provided in the form of digital tools and music software was adequate (sections

4.4.3.10, 4.4.3.11); in particular, the students noted that the introductory sessions helped them to understand how to use these digital tools effectively (section 4.2.8.1).

Finally, as was witnessed throughout the units, **technology** played a key role in the units' modifications overall. A majority of the students (section 4.4.3.12) stated that they found the integration of digital tools and apps to be beneficial – a clear indication that these resources were effectively used for learning through all the units. This is evidenced by Lit:

> It benefited me because … I could work at home or outside of the classroom …, it spared me time, … if I needed to do some quick research fast or if the teacher was occupied with another student, then I could just … use the computer fast instead … waiting for my turn ….

Although the lack of an established technology policy at the school led some students to be confused and uncertain about appropriate technology use (section 4.4.3.7), the students nevertheless felt that technology still increased their understanding (section 4.3.3.3) and engagement (section 4.3.3.4) during their music lessons. Throughout the units there were several technological difficulties (sections 4.2.4.2, 4.3.3.6), such as Hype's dissatisfaction with using a certain music theory platform – '… It was a bit frustrating because we had to get 60 out of 60 for all of them. So that took a few tries …' – referring to the interactive quiz in which a double-click would indicate that a response was incorrect. This was due to technology issues such as having a problematic keyboard or mouse (sections 4.4.1.3, 4.4.3.3).

5.3.1.4 Human concepts

The units have been specifically modified to integrate technology across all the aspects of their structure. This decision is supported by studies indicating that incorporating technology in alternative evaluation approaches enhances students' **computer literacy skills** (Balajthy, 2007; Smith & Qayyum, 2015; Kaeophanuek, Jaitip & Nilsook, 2018). The modifications correspond to the sub-theme of skillset, which includes fundamental knowledge, digital literacy and technical proficiency. The objective of these modifications was to enhance the students' application abilities as well as their job prospects. The students mentioned that using resources and online platforms for quizzes and research purposes was beneficial to their learning experience (section

4.2.2.2). They also highlighted the development of skills such as conducting online research and improving their presentation abilities (section 4.2.7.1), developing composition skills (section 4.2.7.2) and honing their performance and practice techniques online (section 4.2.7.3).

Those students with a low level of computer literacy received **training** in the form of informational sessions to prepare them for the new technologies and they also benefited from targeted support, as noted by Taylor and Newton (2013: 3). The units were modified to include instruction and specialised training for the students, ensuring their effective use of the required technologies. Each music unit included an introductory session (section 4.2.8.1) on the apps and websites being used. This was clearly described by Snap:

> … I think Mister Coetzer was very good at that, as he taught the whole class simultaneously but also individually how to do different things if we had struggles with them …

Furthermore, the students responded that they enjoyed working with the different digital tools, apps and programs (section 4.2.8.2). Alternatively, a self-directed approach, as described by Morris (2019), was implemented, which allowed the students to find their own apps and websites for presentations and to learn how to use them through YouTube tutorials. The teacher's instruction was generally well received, with many students finding it helpful, indicating that the guidance supported the students effectively in completing their tasks (section 4.4.4.4). This approach also emphasised student responsibility, with many of them acknowledging that, while support was available, learning was ultimately their own responsibility (section 4.2.10.2).

Opinions differ on the effect of **differences in norms and convictions** in education, with some seeing barriers and others recognising the benefits for global engagement. The units were adjusted to include personalised learning, as described by Shaw (2016: 45), which promoted equity and inclusivity by responding to individual needs in a culturally responsive manner (Ladson-Billings, 1995: 469; Shemshack & Spector, 2020: 3). By allowing the students to choose cultural presentations and culturally relevant performance pieces, diverse musical traditions were integrated. The students

also valued learning about different music genres and their historical contexts (section 4.3.4.4). Given Sweden's strong culture of inclusion, many students viewed cultural and moral differences as having only a minor influence on their learning (sections 4.4.4.5, 4.4.4.6). Similarly, there was uncertainty regarding political differences, with students seeing them as not having an effect on their learning in the music classroom (section 4.4.4.7).

The focus on **equality** was incorporated by emphasising fairness, equity of access and inclusion of all disabilities, advocating equal opportunities and the use of open-source resources to enhance accessibility throughout the units. Equality was ensured through differentiated assessment opportunities and feedback sessions which accommodated different experience levels. The students highlighted the benefits of using handheld devices to enhance their accessibility in their work (sections 4.2.3.1, 4.3.1.2, 4.3.3.2). Growing up in the digital age has provided Gen Z individuals with prompt exposure to mobile and internet technologies (De Witte, 2020). The units were further modified to take into account any factors affecting learning, such as motivation, attention span and neuropsychiatric disabilities (Darrow, 2012). Many students felt that fairness and equality were well maintained throughout the units (section 4.4.4.8).

The growth **mindset** philosophy promoted continuous learning by encouraging the students to accept challenges and view setbacks as opportunities for growth (Dweck, 2009; Rosenshine, 2010). Fire made a comment regarding overcoming the setbacks of the interactive quizzes: ‘It was a bit annoying sometimes because … sometimes you would press the wrong thing and then you had to start over ….’ A growth mindset was further encouraged by peer support, celebrating performances and projects worked on together, and by learning from mistakes made. Chill stated: ‘I really enjoyed using the different digital tools that we were given, and I feel like I was very quickly able to understand how to use them’ (section 4.2.8.2). Although some students remained neutral, many students also felt that maintaining a positive mindset significantly improved their engagement with technology (section 4.4.4.9).

Throughout the music units a **positive outlook** was maintained to foster problem-solving skills (Tomlinson, 2001: 2), planning (Edmondson, Boyer & Artis, 2012) and enjoyment of the learning experience; these are essential to establishing a seamless learning environment. Moreover, the students emphasised the significance of effective

time management; they mentioned that having a planned schedule aided them in staying on track and meeting project deadlines in their music assignments (section 4.2.1.3). The modifications implemented in the music units also had an impact on the students' motivation levels, leading to an increase in their enthusiasm for and engagement with studying music. The shift to an organised approach and the inclusion of interactive exercises that enhanced student engagement (section 4.3.3.4) were well received by a large number of the students (section 4.2.9.1). Positive attitudes that both teachers and students adopted and upheld helped to establish a seamless learning environment (section 4.4.4.10). As stated in sections 4.2.10.1 and 4.2.10.2, the students felt more accountable for and empowered in their own development.

5.3.1.5 Design concepts

While participating in the units, the students applied what they had learnt through the practical **application of knowledge** (Kolb, 1984; Dewey, 1986; Peng & Wang, 2022). The GRASP assessment starters were used to support the learning objectives associated with roles in the field of music education, such as composer, museum curator or musician and performer. Although some students felt that there were inconsistent opportunities to meet and engage with experts (section 4.2.6.2), those who were able to connect with experts in the field of music and receive comments from them on their work, as well as project ideas and career advice, found those opportunities to be essential to enhancing their educational experiences (section 4.2.6.1). The instrumental skills of the students increased, and they saw that note recognition and music theory helped with both composition and playing instruments like the piano and the ukulele (section 4.3.4.1). The units also promoted teaching and research, while sharing knowledge to enhance the students' comprehension in the process of preparing them for future career opportunities (sections 4.3.4.2, 4.3.4.3). The students' appreciation of various genres and their participation through discussions enhanced their grasp of history and culture (section 4.3.4.4). According to section 4.4.5.1, the majority of the students said that they applied what they had learnt, demonstrating that the students were successful in engaging in practical learning.

The music units used different approaches to **assessment**, including the use of technology and progress tracking (Pozo, Torrado & Alacid, 2022). These approaches improved the flexibility and visibility of feedback for ongoing or recurring assessments

(Irwin & Hepplestone, 2012; Winstone, 2019). Digital instruments, online platforms and applications that enable music composition and presentations were made accessible to the students through technology integration (section 4.2.2.2). Problem-based learning promoted motivation, collaboration and understanding (Power, 2019, 2020). In addition, flexibility in the music projects enabled effective time management (section 4.2.2.1). Self-assessment questionnaires helped the students to monitor their own progress and their reflective journals supported self-expression, feedback literacy and peer assessment (Zhukov, 2015; Chen, 2019; Coppens, 2023). Overall, the assessments provided a strong basis for developing musical skills (sections 4.3.2.2, 4.4.5.2, 4.4.5.4) and supported the completion of future music projects better (section 4.4.5.3).

To respond to challenges, the **curriculum and design** used a variety of teaching and learning approaches, including the use of AI. The Theory and Composition units used a direct teaching approach (Usman & Makassar, 2022) with technology to reinforce concepts. The History and Performance units adopted a self-directed approach that uses AI to gain inspiration. Obstacles included technical difficulties, data security and financial limitations (Dan-Zhu, 2005; Martinez, 2013; Robertson & Muirhead, 2019). The students found the lesson plans to be effective (section 4.4.5.4), praised the unit structure (section 4.4.5.5) and were satisfied with the structure of the units (section 4.4.5.6).

Using free applications that comply with GDPR, combining immersive and self-directed learning techniques, and encouraging a growth mindset to encourage meaningful engagement all contributed to the units' **feasibility**. Regarding performance, the curriculum made a variety of instruments more accessible.

The **implementation** throughout the units focused on topics such as class sizes, challenges, coordination and technical support. The maximum class size throughout the course was 16 students. The students' enjoyment of the assessment choices was overwhelmingly positive, indicating general satisfaction with the variety and format of the assessments, with many finding them engaging and well received (section 4.4.5.6). Some students expressed frustration with the digital tools due to technical difficulties, while others, such as Chill, found them easy to use and beneficial to their learning experience (section 4.2.8.2).

In every unit, the **learning approaches** incorporated improved communication, creative opportunities (Tomlinson, 2001) and multi-dimensional experiences (Almulla, 2020). Using digital instruments, online platforms for research and quizzes, and programs for music creation and presentations, a number of students noted how technological integration improved connectedness (section 4.2.2.2). The students' use of applications such as AI voice creation for presentations and music projects and rhyming tools for songwriting were further examples of their creativity (section 4.2.4.3). In addition, by organising duties such as note identification, researching music history and locating lyrics or sheet music for performances, the students adopted technological aids to enhance their multifaceted learning experience (section 4.2.4.2).

Finally, the curriculum was modified to incorporate the fundamentals of the SLED framework while also taking into consideration design, fundamental, human and positive themes. The students felt that the content was sometimes difficult (section 4.2.1.1), as evidenced by Remix: '… it was a bit complicated at the beginning because we didn't study any of this stuff last ….' But through the use of technology, practical applications and both traditional and alternative teaching approaches, the students were able to interact with and understand the material more, as stated by Hype: '… we were encouraged to use new programs to present …, so I think it was a fun and creative way of learning ….' The units fostered creativity, self-directed learning (sections 4.2.3.2, 4.3.5.3, 4.4.5.8, 4.4.5.9) and collaboration (sections 4.2.1.2, 4.3.5.1), while also help the students to overcome technical, financial and logistical obstacles. Positive feedback from the students highlighted the effectiveness of diverse assessments (section 4.4.5.6), the lesson structures and the use of handheld devices and the internet (section 4.3.3.1), despite some frustrations having been experienced with technical difficulties.

5.3.2 Sub-question two: What are the benefits of implementing a seamless learning approach in the year 9 LGR-22 music curriculum?

Using the overarching themes identified from the interviews and end-of-lesson reflections, I have structured the answers to the second sub-question as shown in Figure 5-2. These themes, along with literature from chapter 2 and student quotations

from both interviews and anonymous[31] reflective questions in the end-of-lesson survey, should shed light on the **benefits**[32] of seamless learning. This approach should show how seamless learning affects different aspects such as learning environment, collaboration, technology integration, time and self-management and learning preferences, ultimately shaping learning outcomes.

[31] Since the end-of-lesson reflection questionnaires were anonymous, quotes taken and used in this research will not reflect a specific name, but rather a general prompt like: 'as stated by a student'.

[32] The perceived benefit from implementing a seamless learning approach will be **bolded** throughout the section for clarity.

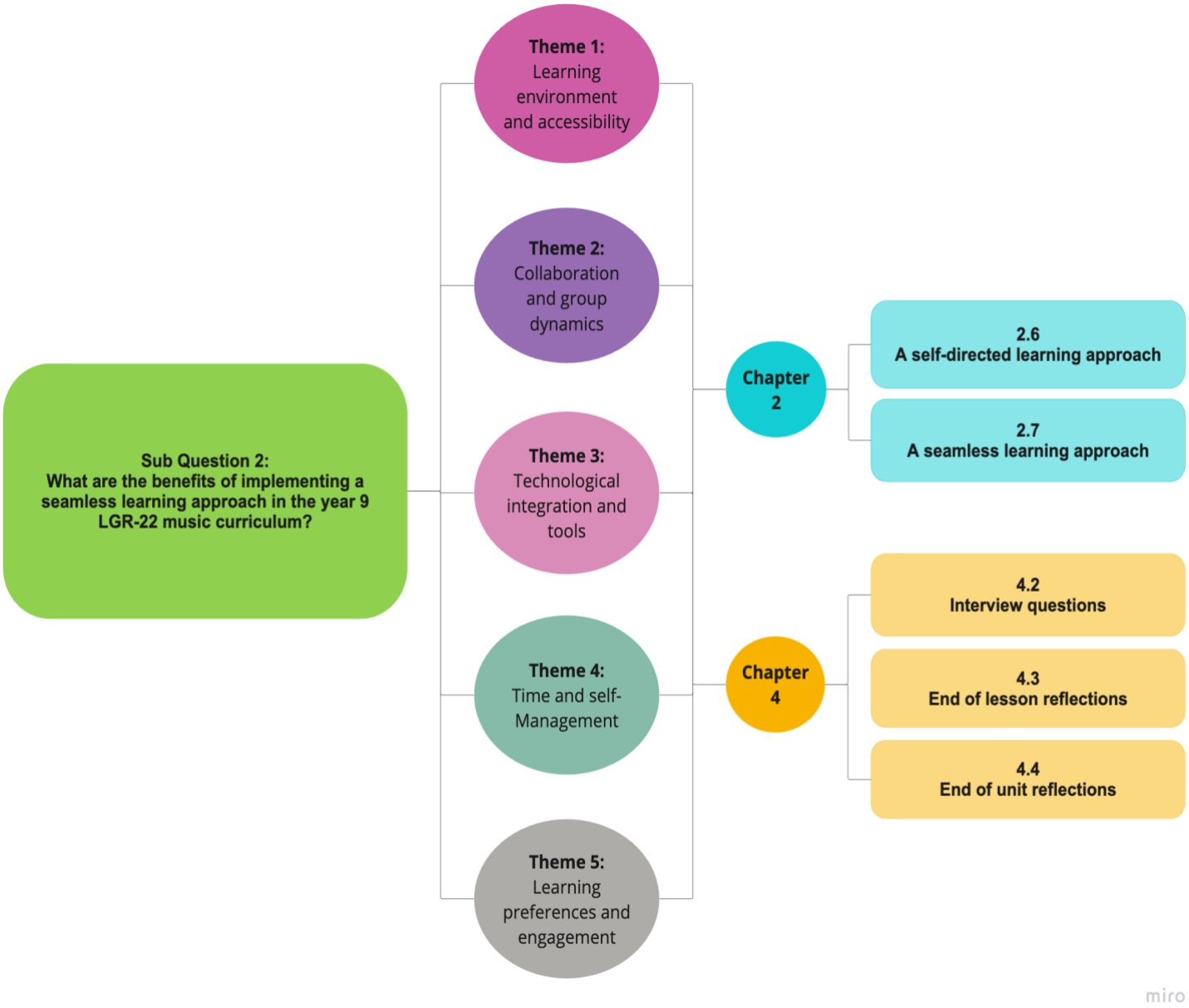


Figure 5-2: Sections aligning with answering sub-question 2

5.3.2.1 Learning environment and accessibility

The overarching theme of learning environment and accessibility (sections 4.2.13.1, 4.3.7.1) influenced the understanding of the benefits of seamless learning. Sharples Taylor and Vavoula (2007) assert that seamless learning produces a **flexible** and **self-directed learning** environment that meets the needs of every single student. Self-directed learning empowers students to set their own objectives, choose learning

approaches and assess their progress, promoting active engagement in the learning process (Alizadeh & Barat, 2015; Bester, 2021: 3). This is evidenced by Slay: 'The computer helped me to find notes and the answers, and I watch a YouTube video to understand ….' This flexibility is especially beneficial in music education, where students' skills acquisition is highly variable (Chan et al, 2006). Many students (sections 4.4.2.9, 4.4.2.10) highlighted this flexibility (sections 4.2.2.1, 4.3.1.3) by acknowledging they were able to learn **anytime**, **anywhere** (sections 4.2.12.1, 4.3.1.1). As Lit mentioned, '… I could work on it anytime due to it being online … at home … during breaks at school or whenever you'd like.'

This **accessibility** (section 4.2.3.1) was further enhanced, as discussed by Sharples et al (2012) and Looi et al, (2012), by the availability of handheld devices, technology as described by Setyosari, Kuswandi and Ulfa (2020) and also online resources. One student reflected: 'I could do music history at home by using my computer to log into Canva and work on my video.' Others frequently mentioned the **autonomy** (sections 4.2.10.1, 4.3.2.1) and the self-directedness (sections 4.2.3.2, and 4.3.5.3) throughout the units, which resulted in the students taking more **ownership** of their own learning (section 4.2.10.2).

5.3.2.2 Collaboration and group dynamics

The second overarching theme regarding collaboration and group dynamics (sections 4.2.13.2, 4.3.7.2) offers some additional benefits of implementing a seamless learning approach. Through the integration of formal and informal learning experiences, seamless learning promotes collaboration (Kinshuk, 2014). By allowing students to collaborate on real-world issues that spark their creativity and critical thinking, project-based learning further strengthens this (Okolie et al, 2021). Likewise, cooperative learning is strengthened through **networking and collaboration** (section 4.2.12.2); and flipped classroom approaches that foster **active participation** and **deeper understanding** are encouraged (Torrado, Echeverría & Pozo, 2022). Numerous students emphasised how their classmates helped them to improve their comprehension and advancement (section 4.3.5.2) and numerous positive experiences with classroom cooperation were noted, suggesting the existence of a **supportive learning environment** (sections 4.4.1.7, 4.4.1.8, 4.4.1.9).

For example, Remix commented: ‘Collaborating with fellow students is highly beneficial. We share ideas and help each other understand challenging concepts.’ Other students also commented on how **group work** (sections 4.2.1.2, 4.3.5.1) improved their **social and emotional dynamics** by reducing anxiety. Fire commented:

> Group work, especially in performance … it can be scary to work and perform by yourself. So being in a group, of people that you're comfortable with … helps make you more comfortable.

5.3.2.3 Technological integration and tools

Further insights into the benefits of seamless learning were provided by the third overarching theme, which dealt with technology integration and tools (sections 4.2.13.2, 4.3.7.3). In a broader sense, ICT is defined by Ratheeswari (2018) as those technologies that facilitate information access via telecommunication. According to Demirer Aydın and Betül Çelik (2017), and Wong & Looi (2011), seamless learning requires a connection to the internet through handheld devices. The technology used in the music units (section 4.2.2.2) included computers and internet (section 4.3.3.1) to provide the students with **access to information** (section 4.3.3.2). The software used in the music units appears to have been quite effective in helping the students to **acquire and process knowledge**. The high levels of positive feedback suggest that these digital tools played a significant role in the learning process (section 4.4.1.5). These tools led to **foundational theoretical knowledge** (section 4.2.11.1) and **cultural and historical understanding** (section 4.3.4.4).

The use of computer programs and apps in the music units suggest positive levels of **technological integration** and **student engagement** (section 4.4.1.2). The use of apps and platforms during the units provided **valuable resources and support**, contributing to an **enhanced learning environment** (section 4.2.4.2) and increased **student understanding** (section 4.3.3.3). Throughout the units, the students **developed music skills**, including music theory (section 4.3.6.1), performance with online practice (sections 4.2.7.3, 4.3.6.2), music history with online research and presentation (sections 4.2.7.1, 4.3.6.3) and composition using online composition tools (sections 4.2.7.2, 4.3.6.4).

5.3.2.4 Time and self-management

The fourth overarching theme (4.2.13.4 & 4.3.7.4) is about managing one's time and oneself. This section sheds light on yet more benefits of seamless learning. According to Bester (2021), Edmondson, Boyer and Artis (2012) and Gureckis and Markant (2012), **self-directed learning** fosters **problem-solving** and **self-reflection** while enabling students to set goals to manage their learning and improve **time management,** autonomy and retention.

According to section 4.4.5.7, most of the students expressed satisfaction with the timing of the instructions regarding music activities and assignments, which helped them to manage their **planning and organisation** for each unit. The students still found it challenging to manage their time to differing degrees (section 4.2.1.3) throughout the music units, the majority finding it to be only slightly difficult, as demonstrated in section 4.4.4.3. In section 4.2.5.1, a number of the students indicated that they preferred to be able to decide whether to work in groups or alone and that this decision positively affected their educational experiences, enhancing their degree of **autonomy** (sections 4.2.5.1, 4.2.10.1, 4.3.2.1).

5.3.2.5 Learning preference and engagement

The preference for learning and how it affected engagement constituted the fifth overarching theme (sections 4.2.13.5, 4.3.7.5). **Personalised learning** increases motivation and student engagement (Bačlija Sušić & Županić Benić, 2017). One of the main benefits is that it allows for a more **inclusive and supportive** learning environment by **tailoring learning instruction** as far as possible to each student's learning needs (section 4.4.2.1). Section 4.4.2.3 showed that the students were more **motivated** when they tailored their experiences to suit their needs and interests, and they usually felt more **empowered** to make decisions about their education, which exemplified an **student-centred approach**.

The majority of the students perceived their learning preferences to have been catered to, indicating that the curriculum provided a **flexible and inclusive** learning environment (section 4.4.5.9). As described by Maros et al (2021), allowing students to apply knowledge in real-world scenarios through **experiential learning (**section 4.2.4.1) resulted in an increase in **student engagement** (sections 4.2.9.1, 4.3.3.4).

This approach led the students to learn from making mistakes in order to foster a **growth mindset** (Cents-Boonstra et al, 2020). This was evident during the interactive quizzes, with Hype stating: ‘It was a bit frustrating because we had to get 60 out of 60 …. So that took a few tries ….’

Furthermore, the students indicated that they were **moderately prepared** for **understanding** the job-related skills related to real-world jobs (section 4.4.2.7). One student stated that music:

> … could be useful if I someday decide to become a musician. Singing could also be helpful because it improves our confidence to talk (in this case sing and play) in front of others ….

This statement confirms that at least some of the students benefited from the **music performance skills** (section 4.3.6.2) as these activities not only developed musical skills, but also built a foundation of transferrable skills such as **team work** and **self-expression**, which are beneficial in various real-world jobs.

I saw students using technology in ways that matched their unique learning preferences when I observed them in the classroom. High-achieving students used the power of digital platforms fully, exploring additional features to enhance their comprehension and collaboration. Although the abundance of resources occasionally made it difficult for low-achieving students to stay focused, the visual and flexible nature of the tools helped them to learn at their own pace.

After implementing seamless learning, my own teaching approach naturally became more student-centred (Howe & Watson 2021: 2) and less direct (Pozo Torrado & Alacid 2022: 22). Accordingly, I now place a greater emphasis on individualised support and feedback. Sustaining students’ interest and encouraging critical thinking instead of relying solely on technology continue to present difficulties that occasionally call for intervention. The flexibility of seamless learning, which enables students to participate in activities anytime, anywhere is the main benefit of this teaching-learning mode. This flexibility helps students to better manage their time and reduce their stress levels, while juggling their personal and academic obligations.

5.3.3 Sub-question three: What are the advantages and disadvantages of integrating the SLED framework into the Year 9 LGR-22 music curriculum, and how can these aspects be addressed effectively?

Figure 5-3 illustrates the approach used to answer this sub-question. The answers identify the advantages and disadvantages, using the conclusion heatmaps from chapter 4 through the lens of the core, positive, practical, human and design concepts. Possible solutions to the challenges identified in these categories are derived from chapter 2.

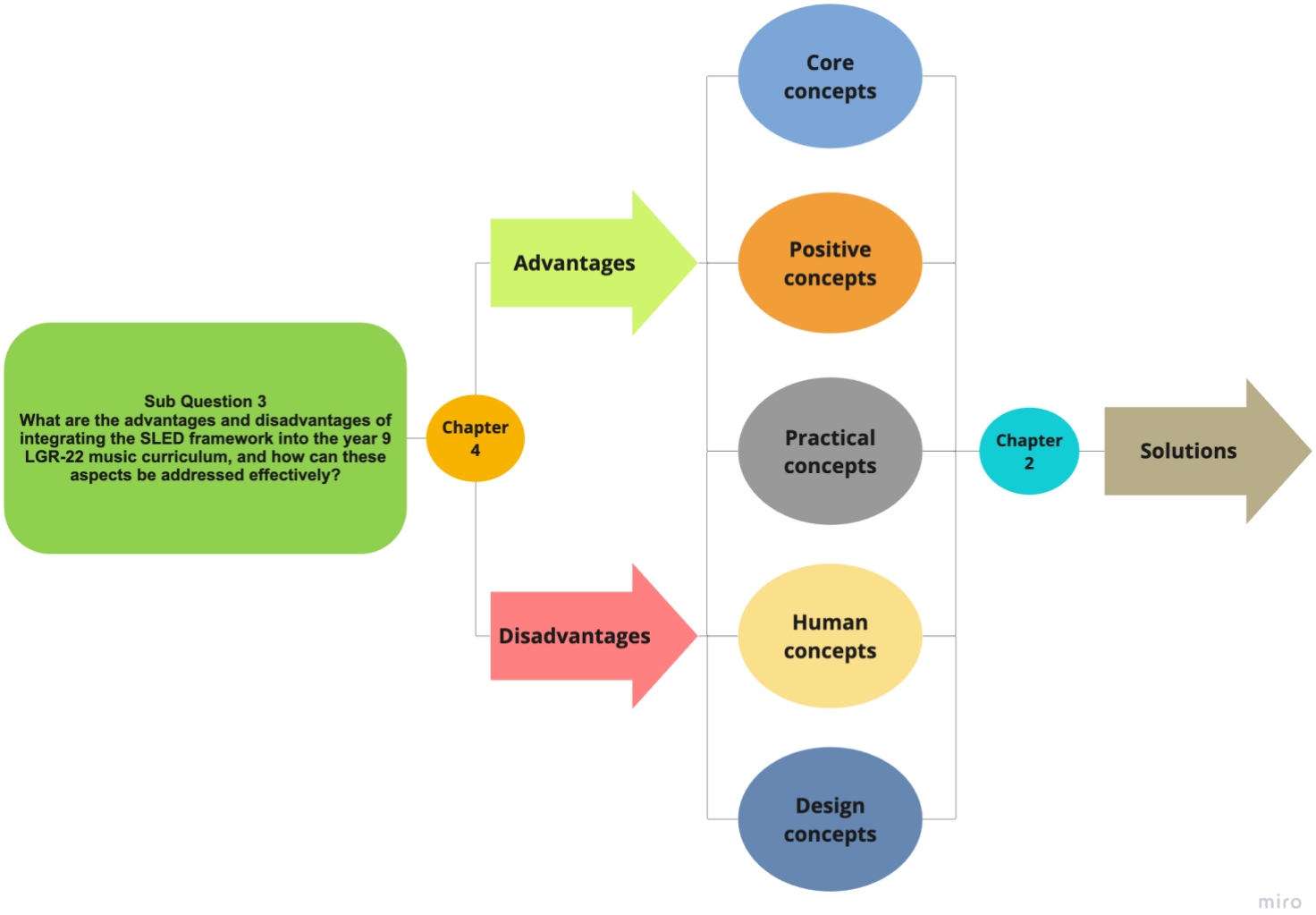


Figure 5-3: Sections aligning with answering sub-question 3

5.3.3.1 Core concepts

The heatmap of core concepts (section 4.4.1.11) highlights the advantage of integrating the SLED framework, as it promotes **innovation and flexibility** (sections 4.4.1.2, 4.4.1.5, 4.4.1.10) by facilitating strong engagement with digital tools and apps, allowing students to explore music theory, performance, history and composition at their own pace. In addition, the high levels of collaboration (sections 4.2.13.2, 4.3.7.2, 4.4.1.7, 4.4.1.8, 4.4.1.9) and positive feedback on group work demonstrate the framework's ability to foster **networking and collaboration**, creating an interactive learning environment in which students can effectively share ideas and work together on projects, thereby enhancing their overall learning experience.

A disadvantage of integrating the SLED framework is the need for **expert engagement**. This could result in inconsistent opportunities (sections 4.2.6.2, 4.4.1.4) for students to interact with experts when, despite thorough preparation and planning, the expert is forced to cancel their visit. This could also lead to strained school resources if adequate support is not available. In addition, **student readiness** poses another challenge, as some low-achieving students may struggle to adapt to a **self-directed learning** approach, potentially leading to a less-effective learning experience for them.

Schools can resolve the issues related to expert engagement by investing **adequate funding and resources** to ensure that many expert engagements can be planned throughout the year, so that if one expert cancels that there will still be others to stand in for them. By breaking up assignments into doable segments and offering extra surgery for feedback, teachers can provide low-achieving students with scaffolded learning. Both student preparedness and self-directed learning are aided by this.

5.3.3.2 Positive concepts

The SLED framework can successfully prepare students for **real-world scenarios** (section 4.4.2.7) and promote **student-centred learning** (section 4.4.2.2), as demonstrated by the heatmap of positive notions (section 4.4.2.11). It is evident from the data analysis that the students' **personalised learning** (sections 4.4.2.1, 4.4.2.3) experiences adhered to the framework's guiding principle of tailoring instruction to the needs of the students. Moreover, the students were able to receive quick feedback,

which made the learning more fun (sections 4.2.8.2, 4.4.2.8). The framework's emphasis on **practical experience** (section 4.4.2.6) and applicability to **real-world situations** (sections 4.4.2.7) was further supported by the students' apparent sense of readiness. Furthermore, the framework facilitated learning from **anywhere, anytime** (section 4.4.2.9) and **remote collaboration** (section 4.4.2.10), underscoring its role in promoting interaction, networking and timely support in the learning process.

The integration of the SLED framework has the potential disadvantage of making students more **dependable on digital resources**, which might hinder their progress in critical thinking and hands-on problem-solving skills. Although **remote learning** and the ability to study from anywhere helps students in various ways, it can be argued that students without regular access to technology may not have the **same learning opportunity**, which could possibly lead to **inequality** in engagement and participation. These problems underscore the importance of balancing technology and critical thinking exercises and providing fair access to digital resources.

A balanced approach – or, as the Swedes would say, a 'Lagom'[33] approach – would aim to prevent over-reliance on digital resources by integrating **technology with hands-on tasks and critical thinking exercises**. Regular assessments can serve to guarantee an ideal balance between digital use and skills development; therefore, schools should offer **fair access** to devices and the internet in order to resolve access differences.

5.3.3.3 Practical concepts

According to the practical concepts heatmap (section 4.4.3.13), integrating the SLED framework has benefits for both the efficiency of **using technology for learning** (sections 4.4.3.8, 4.4.3.12) and the **use of devices for knowledge acquisition** (section 4.4.3.2). With digital tools supporting both theoretical and practical knowledge, students also found that the **availability of apps and platforms** (section 4.4.3.9) improved their learning experiences. These advantageous features show that the SLED framework successfully fosters a richer, more dynamic learning environment

[33] Lagom, pronounced 'lah-gom', is a unique Swedish term meaning 'just right', 'enough', 'adequate', 'as good/as much as it should be': https://www.dinordbok.no/sv/definitioner/svenska/?q=lagom.

when the appropriate technology resources in conjunction with good technological support structures (sections 4.4.3.10, 4.4.3.11) are available.

One disadvantage is the **funding and cost** element, which is especially problematic considering the cost of software and hardware. It might be prohibitively expensive for schools that are not fortunate enough and have **limited funding** to get past these financial barriers. In addition, the heatmap highlights **technological difficulties** such as issues with **internet/wi-fi** and **handheld devices**, which can significantly reduce the effectiveness of the SLED framework, particularly in schools with limited resources and infrastructure.

The issue of funding and costs related to software hardware and infrastructure can be resolved by schools through **tech-company partnerships** or **educational grant** applications to defer the costs. **Financing initiatives** from governments and local authorities may also be available to improve the digital learning environments in schools with limited resources. Schools could also prioritise **bring-your-own-device (BYOD) policies** which encourage students to use their own devices and provide resources to those who do not have access to them. Collaborating with internet-providers for **free or reduced-cost access** could help to close gaps in order to resolve **technological issues** such as unreliable wi-fi or handheld devices. In order to ensure that the SLED framework is still effective even in settings with limited resources, schools should also implement **offline learning tools**. These would allow students to work without having constant internet access.

5.3.3.4 Human concepts

The heatmap for human concepts (section 4.4.4.11) indicates the benefits of using the SLED approach. It is promising to see students becoming better at **time management** (section 4.4.4.3). Moreover, positive feedback about the students' having a **positive attitudes to learning** (sections 4.4.4.9, 4.4.4.10) suggests that this framework encourages a mindset focused on growth and helps to keep students driven. The **helpfulness of teacher instruction** (section 4.4.4.4) also emphasises the value of **learning new skills** (sections 4.4.4.1, 4.4.4.2) in the classroom. These advantages highlight how the SLED framework cultivates **differences in norms and convictions**

(sections 4.4.4.5, 4.4.4.6, 4.4.4.7), perseverance, adaptability and equality (section 4.4.4.8).

One of the main disadvantages of integrating the SLED framework is the substantial **time** investment needed for **teacher training**. In order to promote a seamless learning environment effectively, schools must provide resources to ensure that teachers have the assistance they require. Furthermore, the issue of **inequality of access** is made worse by deficiencies in **student support services** and **technology**. Possible **differences in learning outcomes** and increased difficulty for certain students in maintaining **resource equality** with their peers might **complicate** the framework's efforts to establish a **supportive learning environment**.

In this regard, schools could provide opportunities for **professional development** that focus on specific skills and digital technologies relevant to integrating the SLED framework in order to reduce the substantial time and cost involved in teacher training. Collaborating with education technology businesses and obtaining **government funds** might help to **reduce the strain** by providing resources and finance for technology and training initiatives, such as loaned equipment, to serve those students in need. Improving wi-fi coverage in underserved areas could deal with the issue of technology access through the use of distribution mechanisms. **Providing support services** for students, such as **learning advice and assistance**, benefits students who experience barriers to resource access.

5.3.3.5 Design concepts

The design concept heatmap (section 4.4.5.10) illustrates the advantages of using the SLED framework by highlighting its support, for adapting curricula and incorporating different **alternative assessment approaches** (section 4.4.5.2) that enable students to **apply their knowledge** (section 4.4.5.1) in practical ways. Positive feedback on the various assessment approaches and the **value of formative assessments** (section 4.4.5.3) indicates that the students found it beneficial in their use of digital portfolios, peer evaluation feedback and project-based learning, which offered a comprehensive view of their progress. Moreover, positive responses regarding the **effectiveness of lesson plans** (sections 4.4.5.4, 4.4.5.5) and the opportunities to **personalise their learning** suggest that the SLED framework facilitated a **student-centred learning**

(section 4.4.5.9) environment, that is, one in which the students could interact with the music curriculum in a relevant contemporary way that ultimately enhanced their overall enjoyment (section 4.4.5.6) and advocated their own learning (section 4.4.5.8).

However, implementing the SLED framework into the music curriculum was **time-consuming**, especially because the curriculum itself is already packed with a great deal of content. It was also challenging to cover all the necessary materials and content due to the **additional focus** on using digital tools and creating responsible alternative assessment approaches. Furthermore, problems with the **feasibility** of these approaches could arise for teachers who are **not accustomed** to using all of the digital tools and who might therefore find it difficult to implement them. Such challenges could make the framework **less effective** and put strain on inexperienced teachers and students.

However, teachers could integrate the SLED framework more gradually by implementing digital tools and assessments in a **phased integration** approach which helps to mitigate the time-consuming aspect of the process. **Collaborative planning** could simplify the curriculum to prevent content overload and external **professional development** should train teachers to use digital tools with confidence. An additional way to facilitate the transition could be through **peer mentoring** between more experienced and novice or less experienced teachers. Furthermore, **blended learning approaches** help to strike a balance between traditional and alternative approaches to ensure that both are covered effectively without overwhelming students or teachers.

5.3.4 Main question: How can the Year 9 LGR-22 music curriculum be adapted by applying a seamless learning approach using the SLED framework?

Each of the sub-questions made a contribution to answering the main research question. In summary, it can be stated that by providing clear benefits that exceeded the disadvantages, the modification of the curriculum demonstrated how the seamless learning approach could be implemented. Both the theoretical and the practical components of the curriculum were taken into consideration while integrating the SLED framework concepts in order to implement the modifications. The use of technology, the blending of traditional and alternative teaching approaches, and the promotion of personalised and self-directed learning were among the major changes made to each

unit. These initiatives yielded several advantages, such as increased student engagement, flexible learning and practical applications. But the restrictions on access to technology, funding and time are acknowledged as being some disadvantages.

A flexible, student-centred curriculum was created using the SLED framework as a guide and the modifications made to it improved the educational process as a whole. By encouraging creativity, teamwork and critical thinking, this adaptation advanced the long-term objective of preparing students for future academic and professional endeavours.

5.4 RECOMMENDATIONS

Implementing **seamless learning** requires providing and guaranteeing students with equitable access to both digital and physical learning tools, ensuring that the transitions between classroom-based and digital experiences are fluid. For these reasons, teachers who transition to seamless learning must receive support and undergo ongoing professional development in order to successfully implement these changes. When adjusting a curriculum to implement a seamless learning approach it is important to start by mapping each unit using the five concepts of the **SLED framework** (see Addendum P).

Following this, the teacher should create an assessment task sheet and an overview that includes the GRASP assessment starters (refer to Addendum J) for each unit. To prevent over-dependency on technology, a balanced approach with real-world applications and critical thinking should be outlined in academic policy. For a more thorough understanding of the music course, the teacher could describe the curriculum on Google Suite (Google sites) (see Addendum N). Furthermore, all pertinent teaching and learning materials should be uploaded by the teacher using an LMS such as Google Classroom so that students can access them at any time and from any location (see Addendum K). Lastly, excerpts from the lesson slideshow[34] and classroom seating chart[35] can also be of value.

[34] See Addendum L.
[35] See Addendum M.

The first step towards a **self-directed learning** experience could be to encourage students to set their own goals, monitor their progress and focus on self-identified knowledge gaps, potentially improving their encoding and retention. This approach fosters the development of critical skills such as problem-solving. Each unit should have goal-setting discussions and introduction sessions if they are to foster self-improvement. In addition, each unit should conclude with a reflective exercise. Finally, teachers should adopt a coaching role, guiding students to assess their understanding, identifying resources and approaches that best suit their individual learning preferences in order to promote active engagement in the learning process.

Incorporating seamless learning based on a self-directed learning approach enhances students' ability to adapt to changing educational settings, in the process facilitating smoother transitions between online and in-person learning environments. The integration of technology and real-world experiences into the educational process, coupled with the effective cultivation of critical-thinking and problem-solving skills, provides a solid foundation for students to become lifelong learners. Ultimately, this approach equips teachers with the resources to guide and empower students with the skills necessary for living in a diverse and interconnected world.

5.5 LIMITATIONS

While this study provides valuable insights into the application of a seamless learning approach in the Year 9 LGR-22 music curriculum using the SLED framework, a few limitations should be mentioned. The study was conducted with a relatively small sample size at a single school, which limits the generalisability of the findings. This is because the experiences and perceptions of these students may not fully represent those of students in other schools or educational contexts. The integration of digital tools and resources was a key component of the seamless learning approach. However, variations in students' access to technology, such as differences in the quality of devices and internet connectivity, may have influenced their experiences and the effectiveness of the approach. As became clear during this study, this digital divide could create disparities in learning experiences among students. The study focused primarily on student engagement and learning outcomes without an in-depth analysis of other important factors such as student well-being, motivation and emotional development. These additional factors are crucial to a holistic understanding of the

impact of the seamless learning approach and should therefore be included in future studies.

5.6 FURTHER STUDY

To build on the findings of this study, further research could explore the application of the seamless learning approach in other subjects such as science, mathematics, civics English, Swedish and creative subjects such as Crafts and Art. To deal with the issue of digital disparities, research may also look at how different levels of technological accessibility have an impact on the effectiveness of seamless learning in a range of locations and socio-economic contexts.

Further studies could also explore the perspectives of parents and teachers on the integration of seamless learning, enhanced assessment approaches and the creation of a fundamental AI policy for ethical and practical use in educational settings. Finally, investigating successful teacher professional development programmes could be essential to ensuring that the SLED framework and the seamless learning approach are successfully adopted and implemented in a variety of educational settings.

5.7 CONCLUSION

This research showed that by applying a seamless learning approach in the Year 9 music curriculum using the SLED framework significantly enhanced student engagement and learning outcomes in the music class. Although there were a few challenges, they were outweighed by the benefits. The study discovered that seamless learning grounded in a self-directed learning approach can successfully support the unique factors and considerations of each student, leading to a more personalised learning experience. The research emphasised how seamless learning could lead to a flexible and student-centred approach to music education.

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ADDENDA

Please note that each addendum can be viewed by clicking on the link

ADDENDUM A - RESEARCH STUDY INFORMATION LEAFLET

ADDENDUM B - GENERAL ASSENT FORM (STUDENTS)

ADDENDUM C - CONSENT FORM (PARENTS)

ADDENDUM D - INSTITUTIONAL PERMISSION LETTER

ADDENDUM E - ETHICAL CLEARANCE APPROVAL

ADDENDUM F - CONFIDENTIALITY AGREEMENT FROM INTERVIEWER

ADDENDUM G - QUESTIONNAIRE 1: END-OF-LESSON REFLECTION

ADDENDUM H - QUESTIONNAIRE 2: END-OF-UNITS REFLECTION

ADDENDUM I - INTERVIEW QUESTIONS

ADDENDUM J - Y9 MUSIC ASSESSMENT OUTLINE

ADDENDUM K - GOOGLE CLASSROOM (CODE: NUHXY57)

ADDENDUM L - EXCERPT FROM LESSON SLIDESHOW

ADDENDUM M - CLASSROOM SEATING CHART

ADDENDUM N - Y9 MUSIC PROGRAMME WEBSITE

ADDENDUM O - MAPPING OF DATA USED TO ANSWER THE RESEARCH QUESTIONS

ADDENDUM P - BLANK UNIT MAPPING TEMPLATE