Critical success factors in cello training – a comparative study

by
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DECLARATION

I, Anzél Gerber, the undersigned, hereby declare that this dissertation, submitted in partial fulfilment for the degree PhD Music (Performance Practice), is my own original work.

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ABSTRACT

The research focused on the identification and ranking of critical success factors that contribute most significantly towards the training of a cello student.

The empirical study was based on a sample of cello teachers in four countries selected for the study, namely Germany, Russia, the United Kingdom and the United States of America.

A literature study, identifying a broad category of factors that could contribute towards successful cello training, formed the basis of the questionnaire. These critical success factors included the quality of the teacher, acquired skills, the talent and giftedness of the student, support rendered to the student, and the curriculum. Each of these factors comprised five sub factors. The respondents were required to rank these factors in order of importance. In the final analysis, they were requested to rank the five main factors.

A statistical process of ranking (forced ranking) and Kruskal-Wallis was applied to rank and analyse the responses of the cello teachers in the survey. The critical success factors that contribute the most significantly towards successful cello training were identified and compared.

PREFACE

This study is in partial fulfilment for the degree PhD Music Performance at Goldsmiths College, University of London. The practical examination requires a public recital of approximately 90 minutes. Since the comparative study was conducted in four countries, namely Germany, Russia, the United Kingdom and the United States of America, it was decided to structure the recital to include works by composers of the four above-mentioned countries. The programme[1] will include the following works:

1.	L. van Beethoven	Sonata for cello and piano in C major, Op.102 no.1
2.	A. Rubinstein	Sonata for cello and piano in D major, Op.18
3.	B. Britten	Sonata for cello and piano in C major, Op.65
4.	G. Crumb	Sonata for solo violoncello

Apart from the fact that the composers originate from the four countries, various historic periods of cello technique development are reflected in the chosen repertoire. These works form part of the core cello repertoire in the international arena, and is often prescribed for international cello competitions. [2]

It is interesting to note that the composers were influenced by contemporary cellists. It is known that Romberg and Beethoven as well as Rostropovich and Britten performed together and that these composers incorporated the virtuoso and expressive techniques displayed by the cellists, in their compositions.

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1. A live recording of the examination recital can be found in Annexure D on a CD in the back cover.

2. The sonatas by Beethoven, Britten and Crumb appears in the repertoire lists of several international cello competitions, such as the International Tchaikovsky Competition and Unisa International Strings Competition.

The four composers above were prominent figures, both on national and international level.

Beethoven: The prominence and independence given to the cello part in his sonatas was unprecedented. In the sonata Op. 102, no. 1, this independence, as also the freedom in the formal structure and musical idea, set new trends for the next generation of composers.

Rubinstein: In his Sonata, Op. 18, the melodious, expressive qualities of the cello, are incorporated in the true romantic idiom. This sonata can be considered to be one of the first cello sonatas of the Russian romantic school. Rubinstein was also influence by an epoch when cello playing soared to new hights in Russia. He played a key role in the establishment of professional music education in Russia, and appointed prominent performing artists to teach at the Imperial Conservatory of which he was a founder.

Britten: Inspired by the technical and expressive powers of cellist Mstislav Rostropovich, Britten composed the Sonata Op. 65 as the first of a series of works for Rostropovich. The sonata reflects a strong influence of works by Shostakovich. (The two composers shared a deep mutual respect.) As a prominent composer and performer, Britten performed with world-renowned artists, while his compositions reflect the technical virtuosity, rhythmic complexity and sound effects of the mid-twentieth century.

Crumb: The solo cello sonata by Crumb reflects a compositional style of the 20th century, where new potentials are investigated by expanding the traditional technique. Crumb is still active as one of the foremost American composers.

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Contents

Page

CHAPTER 2
CELLO TRAINING IN GERMANY, RUSSIA, THE UK AND THE USA

Page

CHAPTER 3
RESEARCH METHODOLOGY

CHAPTER 4
STATISTICAL ANALYSIS

Page

CHAPTER 5
FINDINGS AND RECOMMENDATIONS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

ANNEXURES*

Annexure A: Appendix 1: Cello syllabus of the Association of German Music Schools
Appendix 2: Cello syllabus of the Central Music School Moscow, Russia
Appendix 3: Cello syllabus of the Associated Board of the Royal Schools of Music, UK
Appendix 4: Cello syllabus of the American String Teachers Association, USA

Annexure B: Appendix 1: German questionnaire
Appendix 2: Russian questionnaire
Appendix 3: UK questionnaire
Appendix 4: USA questionnaire

Annexure C: Statistical data
Appendix 1: Cross Tabling
Appendix 2: Friedman Tests
Appendix 3: Kruskal-Wallis

Annexure D: Live recording of performance recital in partial fulfillment for the degree PhD Music (Performance Practice) on 12 June 2008

* To be found on CD in back cover.

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

1.1 BACKGROUND TO THE RESEARCH PROBLEM

Through the years, the pressure on teachers to produce results in the form of student achievements has inspired researchers to find best practices, techniques, syllabi, pedagogical knowledge, talent management programmes, and so on, to assist in this quest to optimise the effort that goes into the training process. Effective training can be defined in terms of the relationship between teacher behavior and student learning (Nuthal 2004; Yates 2005). In an effort to optimize training, music institutions have developed curricula that are used as guidelines for teachers. To assess whether a student is making sufficient progress during the training process, regular examinations or assessments are conducted. The requirements for the different levels of assessment are outlined in the form of a syllabus, which has a significant impact upon the training process. Factors that influence the effectiveness of cello training will be investigated. The study will be of a comparative nature, involving four countries, namely Germany, Russia, the United Kingdom (UK) and the United States of America (USA).

The reasons for choosing these specific four countries to include in the study are as follows:

(1) **Germany**. Cello training primarily developed in Germany and is still extremely influential in Europe. The researcher was exposed to several master classes as well as academic discussions on cello training held at several Cello Festivals in Kronberg, which opened the window to conduct research in Germany.

(2) **Russia**. Being trained by Russian cello teachers at the Moscow State Conservatory and educated in a Western culture, afforded the researcher a unique opportunity to acquire perspectives on training in both environments. In addition, the researcher was trained by a Russian professor in Spain for three years, which provided some insight into Russian training in a European environment.

(3) **The UK**. The researcher's initial cello training was in South Africa where the Royal Schools of Music examinations are employed as a form of assessment. Having sat all the cello examinations (from grade 1 to FRSM), and teaching cello students who enroll for ABRSM examinations, the researcher developed an understanding of the British cello training system. In addition, the choice of this country was influenced by the fact that this study was conducted at a British-based university.

(4) **The USA**. The researcher enjoyed cello training for several months in the USA, where she developed an understanding of the training system there. She chose the USA on the strength of the fact that it is an influential force in the world of cello training and has a significant impact upon cultural development worldwide.

The significance of this study is grounded in the following:

- It is the first known study to investigate critical success factors[1] that contribute to cello training. The information obtained from current cello teachers in the different countries will be harnessed through statistical analysis to identify these critical success factors.

1. Critical success factors refer to essential attributes (factors) that contribute most significantly to successful cello training.

- It should provide guidelines to utilise best practices that could contribute to the existing body of knowledge for the training of future cello students.
- By comparing cello training in the four countries, standards for cello teaching can be identified and strengthened.
- The statistical process of forced ranking provides a basis for the scientific deductions to be made.

1.2 THE RESEARCH DESIGN

1.2.1 The literature review

A literature review, to cover the field of factors that contribute to cello training, will be conducted. The following sources will be consulted:

- refereed academic journals, academic journals and professional journals
- books
- newspapers
- conference proceedings
- reports
- dissertations and theses
- the Internet as a source pertaining to bibliographic databases, search engines, meta-search engines, full-text databases and electronic journals
- CD-Rom databases, which include bibliographic databases and full-text databases

1.2.2 The research problem

The research problem is to identify the critical success factors that contribute most significantly towards training the cello student optimally. The study will be limited to measurable factors considered critical for cello training. The information will be gathered by means of a questionnaire to be completed by a convenience sample of current cello teachers in the four countries selected for the study.

1.2.3 The research question

The research question will focus on the critical success factors that are most important for cello training. These factors will be ranked in order of significance.

1.2.4 The research methodology

The research methodology will be an empirical study based on a survey in a convenience sample of cello teachers in the four countries selected. A questionnaire will be compiled on the basis of a literature study identifying a broad category of factors that could contribute to successful cello training. A statistical process of ranking (forced ranking & Kruskal-Wallis) will rank and analyse the responses of the cello teachers in the survey to determine which factors, in their opinion, contribute the most significantly to successful cello training.

1.3 FACTORS THAT IMPACT UPON THE EFFECTIVENESS OF CELLO TRAINING: A LITERATURE REVIEW

1.3.1 Introduction

In an endeavour to train a student optimally to enable him or her to achieve performance excellence, researchers are continually conducting research to better understand the complexity of the factors that contribute to this multifaceted process. Scholars in psychology, education, biology and related disciplines have conducted extensive research in the last few decades to find answers to the essential question of whether "nature" (innate aptitudes) or "nurture" (the environment) contributes to exceptional ability. One may therefore infer that innate aptitudes and the nurturing thereof are key components of the talent development process through training.

A major component of training involves the learning process in which teachers teach and students learn. The quality of teaching transmitted to the student thus has a direct bearing on the learning process and development of his or her talent. Teachers use curricula as guides to enhance their students' learning process. The aim of the learning process is to empower students to achieve performance excellence through the systematic development and acquisition of skills. The students' skills and knowledge are then assessed through examinations to ensure that the expected requirements for a certain level in the training process are met. In addition, the nurturing of talent involves a considerable amount of support in various forms.

In this chapter, a literature review will be undertaken to uncover and explore factors and subfactors that impact upon the effectiveness of cello training. However, cello training forms part of the strings and overall music training, and therefore should be seen as part of a holistic music education. In the quest to identify the main or key success factor for cello training, a somewhat broad vision

had to be adopted in scrutinising the literature to ensure that a grouping of all possible elements or factors would correspond with the key success factors. Five broad categories, or critical success factors, crystallised through a thorough literature study which will be covered in sections 1.3.2 to 1.3.6 of this chapter. They include the following:

(1) the quality of the teacher
(2) acquired skills
(3) talent and giftedness
(4) the support given to the student
(5) the curriculum

1.3.2 The quality of the teacher

Pressure on teachers to produce results in the form of student achievements has inspired teachers and researchers alike, to find best practices, techniques, syllabi, pedagogical knowledge, and so forth, to optimise the outcome of the teaching process. Since effective teaching can be defined in terms of the relationship between teacher behaviour and student learning, extensive research has been conducted to investigate this relationship (Nuthal 2004; Berliner 1994, 2004; Borko & Livingston 1989; Hogan, Rabinovitz & Craven 2003; Sternberg & Horvath 1995; Wang, Haertel & Walberg 1993; Yates 2005).

It has become apparent that teachers need to acquire a multitude of skills to teach effectively. Yates (2005:685) identified the following teacher attributes:

TABLE 1-1 Findings from teacher expertise research: qualities experts possess

1.	Curriculum knowledge	• Extensive pedagogical knowledge (e.g. multiple ways to teach the same content). • Planning appears cursory and brief, but actually involves chunking many tasks, activities, and draws upon a rich improvisational repertoire. • Continually communicating goals, and using highly focused, task-related, goal-driven feedback.
2.	Experts have complex stimulus control methods	• Scores of routines actively taught; classes are remarkably constant and predictable; the management system is strongly defended. • There is a subtle but complex system of cuing going on using the face, eyes, hands, voice, and body; automaticity means these teachers are often unaware of such gestures, but their students learn to "read" the cues and respond quickly and appropriately.
3.	Ability to explain	• Clarity in speech coupled with excellent use of mental modeling principles. • Remarkably complete explanations executed quickly then students move into active practice under strong guidance. • Acute use of student feedback to gauge information flow; the experts have characteristic patterns of eye gaze in which they actively sample for certain types of information.
4.	Advanced information processing skills	• Laboratory studies disclose experts' superior skills in the areas of memory and encoding of classroom events that are relevant to instruction, but poorer memory of irrelevant factors (such as students' clothing); attention is thus highly selective. • Experts have developed schemata enabling them to read classroom life visually in great depth.

Source: Yates (2005:685)

Similar qualities were found to be characteristic of effective teachers in a recent research study by Jeremy Polk. He (2006:23) identified 10 basic characteristics of effective teachers, namely:

(1) good prior academic performance
(2) communication skills
(3) creativity
(4) professionalism
(5) pedagogical knowledge
(6) thorough and appropriate student evaluation and assessment
(7) self-development or lifelong learning
(8) personality
(9) talent or content area knowledge
(10) the ability to model concepts in their content area

Polk (2006) indicates that improvements in music education do not exist in a vacuum and have been utilised in other settings. The author selected four of the 10 presented traits for a more in-depth review, namely professional development, communication, teacher's ability or modelling and personality. In this study, attention is also paid to the teacher's attitude, which should cover the critical success factors of the teacher's quality.

Attention will now be focused upon the research conducted that reflects the quality of the cello teacher. Light will be shed upon factors such as the following:

- the teacher's education
- the teacher's experience
- the teacher's personality
- the teacher's attitude
- the teacher's teaching ability

1.3.2.1 The teacher's education

Research has shown that students' choice of music school, conservatoire or university is often guided by their desire to study with a particular teacher or "professor" (Presland 2005:237; Burt & Mills 2006:54). Effective prior education plays a major role in teaching. Teachers, especially in the field of music, to a great extent transmit to students not only what they have learnt from their own teachers, but also what they learn through their own performing and teaching experience (Baker 2006; Gorbatova 2006).

Presland (2005:242-243) in her studies of how students perceive their tutors and the impact of their skills and qualifications upon the development of their students, drew some important and interesting conclusions as highlighted below:

Several students regarded that learning with an active performer was an invaluable help and inspiration because these teachers were in touch with the realities of performance pressure.

> Many felt that learning with performer-teachers as opposed to "career" teachers ensured a healthy pragmatism. Professors were able to balance the idealism of their teaching goals with the occasionally harsh realities of the concert platform. A performing profile was seen to give tutors credibility, since their advice on areas such as projection, nerves, fingerings, working with conductors, and so on, was founded on "real" experience. One student remarked that seeing her teacher perform enabled her to "identify" with her more strongly, and students were generally able to see that advice offered in the teaching studio worked for their tutor on the concert platform. Another student said that his tutor's teaching "is his playing" (Presland 2005:242-243).

Studies examining the changing role of the tutor in a young instrumentalist's development, indicated that at a younger age, musicians seek encouragement, friendliness and warmth from their teacher. As the student matures, he or she progressively values specialist knowledge and career advice (Presland 2005, Howe & Sloboda 1998, Mills & Smith 2003).

Presland (2005) pertains that, apart from the performing profiles of professors, students considered their teacher's participation as examiners or jury members as important, because these experiences ensure that they stay abreast of performance levels in the competitive arena. Students also perceived that their teacher's interaction in the professional world could create opportunities and that they can benefit from their contacts.

Yates and Chandler (1991) have emphasised that teachers play an inevitable role as active transmitters of essential bodies of knowledge and skill.

1.3.2.2 The teacher's experience

Jane Davidson (2004) has recognised the role of the music teacher to be perceived as quite demanding if one considers the level of performance proficiency demanded of many skills to be developed, ranging from aural/oral, aesthetic, expressive and motor domains, all of which converge in the act of performance. By applying a variety of teaching tools about technical and expressive matters over an extended period of practical learning through the teaching of different students with different talent levels, a teacher can develop his or her own skills to become a more effective teacher. "As a practical art, teaching must be recognised as a process that calls for intuition, creativity, improvisation and expressiveness – a process that leaves room for departures from what is implied by rules, formulas and algorithms" (Delamont 1995:15, in Humphreys & Hyland 2002).

The teacher should know multiple ways to promote key goals. Yates (2005:687) supports this view by stating the following:

> In the Vygotskian sense, teaching skill implies knowing both how to erect scaffolds to support student learning and, equally importantly, how to remove scaffolds gently. In behavioural theory, instruction ought to be clear, directive, and user-friendly, but then it must be faded and gently abolished as responsibility is shifted to the student. Knowing how to achieve this demands a very high level of professional skill. It should come as no surprise to discover that the research basis of psychology indicates that expertise hinges upon between five and 10 years of successful experience, and this specification is believed to apply also to classroom teaching (Berliner 1986, 2004).

In dealing with talented students in particular, the teacher's main role is to help them find their own musical voice. It is the teacher's task to shape the student's taste and understanding. Berman (2000) cautions against the teacher who may be tempted to present himself or herself as the only keeper of ultimate truth bearing in mind the consumerist approach of recent aspiring musicians to enjoy as many lessons from as many prominent teachers as possible within the shortest period of time. They may approach specialists to improve their scales, octave technique, general musical ideas, and so on. The ideal, however, is to ascribe to the teacher's "Weltanschaung" (outlook or approach on life) or his or her general musical and aesthetical principles. Ritterman (2002) reflected on the teacher's understanding and experience in the insights that disciplines such as aestetics, analysis, musicology (including ethnomusicology) and psychology can bring to unleash the latent vitality of the student. The teacher should understand the student as well as the music he or she plays.

Teachers should take pride in their own performance as teachers and in their nurturing of their students' performance skills. "True professionalism depends on a continued commitment to hold up knowledge, from wherever it comes, to public, collaborative scrutiny. It also depends on the commitment to create and maintain those spaces within professional life … where critical discourse can flourish. For it is only through this form of discourse that professional knowledge can be freed from its tendency to deteriorate either into subjectivism or into technicism" (Furlong 2000:27).

The teacher therefore "needs to encourage the student to develop as many conscious and reflective strategies for learning, listening and performing as possible" (Miklaszewski, in Davidson 2004:34).

Berman (2000:198) aptly concludes that the teacher should act as a mirror for the student, so that he or she can comprehend what should be attended to and what to listen for. What the Russian stage director, Vladimir Nemirovich-Danchenko, said about the stage director who has to die in the actor, is equally true to the teacher of a music instrument. The teacher's teaching ability should culminate in the performance of the student.

In summary, Cheng & Durrant (2007:194) acknowledge that although extensive research has been conducted on the development of effective instrumental teaching and learning, consensus has not been reached regarding the universal characteristics of an effective instrumental teacher. However, researchers agree that "teaching aims which emphasise fostering pupils' learning, facilitating a learning environment and promoting independent learning, contribute greatly to effective instrumental teaching".

1.3.2.3 The teacher's personality

Personality is the avenue through which teachers can interact. The process of teaching and learning is operationalised by personality. The many personality tests available allow a classification of different personality types (Myers-Briggs Type Indicator, Kolbe, etc.). Individual behaviours such as ambition, intelligence, sense of humour, teacher intensity or enthusiasm can also be derived. Researchers (Murray, Rushton & Paunonen 1990; Yarbrough & Madson 1998; Teachout 2001; Henry & Rohwer 2004) have determined a relationship between personality and effective teaching, as well as between the intensity component of personality and effective teaching. Personality may serve as a rudimentary predictor of teaching effectiveness.

Where teachers are aware of or know their own personality types, a valuable instrument could be to adapt their way of instruction to their personal strengths and weaknesses. It is also essential for a teacher to be aware of the different personalities of his or her students for effective teaching. It is interesting to note that recent studies (Madsen 2003) suggest that teachers who know their subject and manage their classrooms, teach with more energy and enthusiasm and express other positive behaviour such as maintenance of eye contact, use of voice, gestures and expressions. Information delivery through good oral communication skills enhances effective student learning.

The level of communication skills of each teacher is difficult to define concretely because they comprise verbal skills, demonstrating skills, social skills, body language, and so forth. Although most teachers have received some basic communicative training in their teacher programmes, their individual personalities still dominate the process of effective teaching. In Madsen's study (2003) above, students ranked the enthusiastic teacher higher even when the content was inaccurate, suggesting a great effect on the attention levels and perception of the students.

Various researchers have identified significant differences between the personalities of different types of instrumentalists (Kemp 1996; Martin 1976; Bell & Cresswell 1984; Woody 1999).

Although research supports and contradicts numerous possible personality characteristics for musicians, Woody (1999) is of the opinion that it has yielded little, if any unassailable empirical support for believing that there are personality characteristics unique to musicians.

1.3.2.4 The teacher's attitude

Research has shown that the teacher's attitude has a significant impact upon student performance (Woody 2000; Anderson 1999; Hart & Young 2003; Khazanov 2006). Behaviour can be seen as an indicator of attitude. Soft skills, which refer to behavioural traits or character traits, include integrity, respect and collegiality.

Integrity[2] involves acting in a way that is honest and trustworthy. This is of vital importance to build trust between the tutor and student. Through *trust*, a climate can be created in which open sharing of ideas can take place, while maintaining respect. The student will also be more confident in sharing his or her musical ideas or feelings. It is also essential for the tutor to maintain a high degree of confidentiality. Where there is a breach of confidentiality, for example, where a tutor discusses a student's development or personal issues with another student, this situation could result in mistrust, which could seriously harm the student on a personal and developmental level.

2. Integrity means applying ethical behaviour, taking personal responsibility, and being honest and fair. It also includes having respect for diverse viewpoints, perspectives, cultures and values and maintaining open and honest interpersonal interactions (Hart & Young 2003:42).

The sharing of information and open communication should be a high priority. Information should not be withheld to maintain a position of power. Where conflict occurs, it should not be made a public issue.

Respect includes the vital aspect of feedback. It includes flexibility and the ability to compromise and consider and evaluate possibilities and solutions before taking action.

Collegiality[3] refers to the ability to be a team player in which group efforts and collaboration are encouraged. Opinions, thoughts and ideas should be shared in meetings and group discussions and respondence to written correspondence and enquiries should be done in a timely manner (Hart & Young:2003).

To summarise, Hart and Young (2003:44-45) propose the following additional essential soft skills for music teachers:

- adaptability
- character
- data collection (help students develop sound self-discipline, positive attitude and study habits)
- communication skills
- personality (good people skills are a necessity)
- public relations (build relationships within the community and the local media)

1.3.2.5 The teacher's teaching ability

Although the content of what is taught by the teacher is of paramount importance, "its delivery must be effective or else the information and its quality cannot be consumed. It is this informational conveyance through an agent, such

3. Briefly, the term "collegiality" means being responsive to the individuals with whom the teacher works.

as the teacher, that guarantees that the superb content is communicated to the students. … Communication is at the heart of a quality classroom environment" (Polk 2006:24-25). A good teacher should have a deep respect for lifelong learning. He or she should keep abreast of ever-changing methods, ideas and content knowledge in his or her field.

Teachers should be able to analyse and reflect on their teaching. They should continuously evaluate how their teaching has contributed towards progress and achieving their goals in order to refine and improve their instruction. The teacher's ability to understand the content, as well as how to present the material, is the key to mastering the curriculum. A teacher should have substantial knowledge about teaching and how students learn and develop, in order to present the material in a manner that optimally enhances the student's comprehension. A teacher's knowledge thus needs to surpass knowledge limited to his or her instrument (Darling-Hammond 1999:221-245).

In summary, the quality of the teacher plays a critical role in the shaping of the cello student. In building on the characteristics or traits of an effective teacher as identified by Polk (2006) in his article, critical subfactors that support the quality of the teacher, namely his or her education, personality, experience, attitude and ability to teach, were discussed above.

The second main critical success factor in cello training, namely the skills acquired through training, will subsequently be scrutinised.

1.3.3 Acquired skills

According to Janos Starker, certain prerequisites are needed to become a great artist. "The first ingredient is absolute mastery of the instrument from a technical point of view. Then comes musical understanding" (Campbell 2004:155). Gabrielsson (1999:502) also asserts that excellence in musical performance

comprises two major components: “a thorough understanding of the musical structure and meaning, and complete mastery of all technical aspects necessary for flawless execution. These require a mental representation of the music, a plan for transforming the representation into sound, and adequate practice”. Boyle (1992: 247-265) supports this statement and defines “musical ability” as a general term to describe the level of musical skill and understanding an individual has achieved at any given time. He postulates that the ability displayed will be a joint result of aptitude and learning. In this instance, aptitude will refer to the potential or capacity to acquire musical skills that will impact upon what could be achieved through learning experiences and activities.

These learning activities are captured by teaching technique for the right hand and the left hand, while musical understanding can be enhanced through aural training, sight-reading and music theory. These elements will be discussed in more detail in the sections below.

1.3.3.1 Technique

The word “technique” derives from the Greek word *techne*, which means “art” (Berman 2000:24). This term, however, is used in a limited way today, referring to “discovering and developing the physical means for bringing into existence a piece of music” (Pleeth 1982:2). Since the musical idea must be communicated through the physical action of performing, technique can be considered a medium through which musical ideas can be communicated.

In a conversation with Tim Janof (1997:online), cellist, Ralph Kirshbaum, stated that “if you are a prisoner of the limitations of your technique, you aren’t really free to enunciate what you want to say musically”. Hence over the ages, cellists have explored ways to achieve technical freedom to serve the musical idea.

During the 19th century, works for the cello were mostly composed by cellists who often tried to adapt the demands of the pieces to their own individual technical abilities. Travelling violin virtuosos who entertained audiences with their impressive performing skills, had a significant influence on cellists who, in turn, emulated the violin technique and discovered vast technical possibilities on the cello. This resulted in compositions from the smaller salon pieces to the concerto genre (Ryachev 2003:1). Composers who were not cellists themselves, were inspired by the virtuoso and expressive playing of cellists and, in turn, composed new works that incorporated these technical skills. Cellists/composers, including Jean Louis Duport, Bernhard Romberg, Friedrich Grützmacher and later, David Popper, also composed etudes and technical exercises which originated from the performance repertoire which demanded a certain technical skill. Exercises were created with a view to improving and perfecting one (or more) specific technical problem. These technical exercises and etudes are also relevant and in frequent use globally to this day. Potter (1995:41) emphasizes that etudes/studies should form an indispensable part of a student's technical and musical development and progress. He suggests that the curriculum should include (1) abstract exercises and studies (scales, arpeggios, finger and bow development exercises); (2) etude study; and (3) performance repertoire (pieces, sonatas, concertos, etc.).

Pleeth (1982:2-3), however, cautions that "it is in the pursuit of achieving technical mastery of the cello that students and teachers often lose their perspective of this means (technical skills) towards serving an end (musical idea). Often students practice "technique" as an end in itself which creates a seperateness between the physical means and the music". He continues: "…technique *per se* cannot exist apart from the music it is meant to serve".

In the pursuit of performance excellence, the mastering of the technical demands of the instrument is paramount. As early as the 18th century, cello methods were described, among others, by Corette (c. 1741), Cupis (1772), J.L. Duport,

Baudiot, Vaslin, Gunn, Lindley, De Swert, Romberg and Dotzauer (Walden 1998:80-98). During the 20th century, influential methods or books discussing issues regarding cello technique were also published. These include the following (with reference to the four countries involved in this study):

In Germany:

- Hugo Becker and D. Rynar, 1929. *Mechanik under Ästhetik des Violoncellspiels.* Wien (Reprint 1971)
- Gerhard Mantel, 1999. *Cello Űben* (second print). Mainz: Schott Musik International

In Russia:

- Roman Sapozhnikov, 1967. *Osnovў metodiki obucheniya igre na violoncheli* [Principal methods of instruction for cello playing]. Moscow: Moscow Muzyka

In the UK:

- William Pleeth, 1982. *Cello*. Yehudi Menuhin Music Guides, Mcdonald and Co.: London & Sydney
- Christopher Bunting, 1982. *Essay on the Craft of Cello-Playing*. Volumes 1 and 2. Cambridge: Cambridge University Press

In the USA:

- Janos Starker, 1965. *An Organized Method of String Playing*. New York and Hamburg: Peer International Corporation

Cello technique will be scrutinised in the section below. For practical purposes, it will be divided into the right hand and left hand respectively.

(a) The right hand (bowing technique)

The bowing technique and tone production in cello playing were profoundly influenced by Tourte's design of the concave stick, during the 1770s. In contrast to the Baroque bow with its outward curve, the concave stick, which is used today, has a stronger hair tension, and by nature, springs away from the string, which enabled performers to play spiccato, but also to sustain long melodic phrases that were becoming increasingly popular for cellists. It has long been realised that the cello's timbre possesses qualities similar to that of the human voice. These "singing" qualities and expressive powers of the cello created a rich domain of possibilities for composers and performers alike. It is in the pursuit of enhancing these very qualities that performers have experimented with different bowing techniques.

Suslova and Boyarskaya (1991:223-224) mention the following aspects of the bowing technique that need to be developed:

- cantilena (the "singing" quality for long melodic phrases)
- tonal colours/dynamics
- various types of bowing for articulation and phrasing
- string crossings

(i) Cantilena

Cantilena refers to the singing tone quality that is required in melodic lines, usually encompassing fairly long phrase structures. Since the cello is often compared to a human voice, it is imperative that cellists develop their technical skills to create a singing tone quality while playing long phrases with a seemingly unending bow. Smooth bow changes are paramount to create a continuous line.

(ii) Tonal colours

Tonal colours refer to the "ingredients" of the sound, which may vary according to the bow's speed, pressure, the angle of the hair to the string as well as the position thereof between the fingerboard and the bridge. The ability to create and control a variety of tonal colours is paramount when musical artistry is concerned. American cellist, Bernard Greenhouse, emphasised the importance of this: "My priority is to have an enormous range of tonal colours. You can't be fully expressive without having a wide palette of colours available … Like a painter who mixes his colors on his palette, we mix ours with the bow" (interviewed by Tim Janof 2004:online).

Colouring in sound, however can also be influenced by vibrato. When authors (or cellists) refer to "colour" in sound, the combination of vibrato and bowing is often implicated, as cellist Ralph Kirshbaum mentioned during an interview (interviewed by Tim Janof 2004:online):

> Contemporary music requires that one be able to make huge changes in sound and character in a split second. You must be able to leap around the cello at a very rapid pace, quickly change coloration with vibrato and bowing, and vary left and right hand articulation instantaneously. One's reflexes have to be very sharp, and like anything, the more you refine it, the more you are a master of a wide spectrum of technical issues, and hence the freer you are. This leads us to the only important consideration – the musical statement that you're trying to make.

(iii) Various types of bowing for articulation and phrasing

Although the right and left hands both participate in creating emotional expression, the responsibility in creating the appropriate style or character in a musical work rests mainly with the right hand. Phrasing and articulation are influential components when style is concerned.

According to Friberg and Battel (2002:209), “Articulation strongly affects motional and emotional character.” The German musicologist, Hermann Keller, stated in 1925 that articulation is the primary means of expression for the melody. The book was revised by Keller and published in 1965, entitled *Phrasierung und articulation (Phrasing and articulation* - English translation 1965). Keller (1965:4) distinguished between articulation and phrasing:

> [T]he words “phrasing” and “articulation” have basically different meanings: phrasing is much like the subdivision of musical thought (phrases) and to set them off from one another; it thus has the same function as punctuation marks in language. (…) The function of musical *articulation*, on the other hand, is the binding together or the separation of individual notes; it leaves the intellectual content of a melody line inviolable, but it determines its expression (See also Chew 2006; Randel 2003, for a discussion on articulation and phrasing.)

Several bowing techniques have been developed to create the desired articulation. Some of the most important include legato, détaché, martelé, sautillé, ricochet, louré/portato and staccato. Bowing techniques used for special effects, include tremolo, sul ponticello, sul tasto and col legno. Apart from bowing, several ways of plucking the strings (pizzicato), can be incorporated for special effects (Randel 2003). A rich source for mastering these bowing techniques can be found in etudes that were specifically composed to develop each type of bowing.

Renewed interest in articulation and phrasing, and appropriate bowing techniques reverberated through the Early Music Movement, especially during the second half of the 20th century. Contemporary cellists are influenced by research conducted in this field, as well as the direction towards a “historically informed performance”. Since articulation and phrasing through bow control play a primary part in capturing and portraying the musical style, it is the performer’s

responsibility to inform himself or herself about issues regarding musical style in order to make well-informed decisions when considering bowing techniques for articulation and phrasing.

(iv) String crossings

This aspect of bow control should be well refined to achieve smooth crossings between the strings. The performer should be well aware of the variety of angles between the strings, in order to be able to utilise the best possible angles for string crossings. A thorough comprehension of the angles that exist between and around strings also plays a vital role in creating tonal colour.

Although a wealth of information is available on bowing techniques, Pleeth (1982: 54-55) concluded that "(t)he textbook can only explain the basics. … It cannot convey a physical sensation that is linked to a mood or feeling; and that, ultimately, is what bowing is all about. The world of bow usage is an unending world of change; it is a whole art in itself. But ultimately it is the musical art that is going to make you search out the technical means – strokes you will not be able to find in any textbook".

(b) The left hand

Since the very creation of the cello, cellists have realised the importance of placing the left hand on the neck. According to Walden (1998:99-101), two opposing methods of left-hand placing were used for much of the 18th and 19th centuries, namely the oblique and perpendicular hand position. Romberg was in favour of the former whereas Gunn preferred the latter. Later, cellists such as Dotzauer and Lindley advocated the perpendicular position.

Fingering techniques were initially strongly influenced by violin and viola da gamba techniques, since it was customary for musicians before the mid-18th

century, to play more than one instrument. Corrette, Lanzetti, Baumgartner, Tilliére and Cupis were among the first who wrote methods in which fingerings were described. Numerous tutors appeared during the first decade of the 19th century when diatonic fingering was systemised. The fingerboard was divided into four major positions, which were subdivided into fractions of semitones (Walden 1998:106-115).

As the tessitura of the solo works increased, the thumb position was introduced, and became a popular virtuoso technique during the 1730s. Romberg, Duport and Boccherini contributed significantly towards the establishment of virtuoso techniques. However, it was the lyrical characteristics of the cello that became increasingly popular during the 19th century. Since vibrato plays such a vital role in musical expression, it has to be cultivated to the highest possible level. Etudes, composed with a view to developing technical skills required by the repertoire, can assist in mastering the several technical aspects. Strength, flexibility and agility play a significant role in mastering the two main objectives of the left hand, namely pure intonation and an appropriate vibrato. The latter two objectives will now be examined.

(i) Intonation

Stefan Hersh (2002:online) is one of many authors to agree that intonation is a vexing problem for string players, and that the quality and consistency of intonation plays an important role in professionalism. The *Penguin companion to classical music* (Griffiths 2004) defines intonation as follows: "Quality of a performer's tuning. This is a subjective measure: what is expressive inflection to one listener may be poor intonation for another." The concept of pure intonation and the problems achieving it, should be discussed in the light of the system of equal temperament. "With equal temperament, by adjusting every interval to the same degree in the scale, two problems of tuning chords are dealt with via compromise: octave displacement, and the effect of the qualities of different intervals of the triad in different keys. In the equal-tempered system, music

sounds relatively in tune (or out of tune) to the same degree in every key" (Hersh 2002:online).

Hersh (2002:online) goes on to say that performers of nonfixed-pitch instruments employ intonation, which is based on the harmonic, melodic and instrumental context of the music being performed. He states the following in this regard:

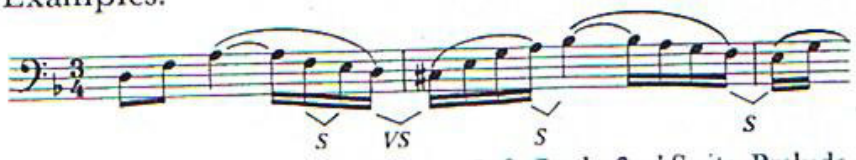
> To understand harmonic and melodic context as it relates to tuning, one can experiment with any string instrument. Cello reveals the issues most acutely because the relationship of intervals in the lower range is broader and the pitch issues are more clearly audible. If you play an F natural on the D string of the cello against the open A string, your ear will naturally perceive the basis of an F major triad. This will cause you to place the F on the high side, in order to leave the third of the chord, in this case the open A string, sounding sweet and low, where the overtone series line up and "ring" in a major chord. That same F rendered against the open G string and perceived as a seventh in a G7 chord will sound hopelessly sharp. A lower placement of F will be necessary to arrive at a lined up set of overtones in this context, and achieve the ringing sound of the lowered seventh in the G7 chord. The same F, as the third degree in a melodic passage in D flat major, will once again sound sweeter on the high side, as long as it doesn't have to resonate against the D-flat major triad in the same register. The reality that the third degree of the scale sounds more satisfying higher in a melodic context, and sweeter lower in a harmonic context is a problem with which all non fixed-pitch instrumentalists must contend.

The cellist, Paul Tortelier, also acknowledged the influence of the harmonic context, as well as ear training, on intonation. "An ear that has been assisted by the knowledge of harmony will be better equipped to distinguish between an A as a leading note to B-flat and an A mediant of F minor" (Tortelier 1975:56).

Tortelier (1975:57) explained as follows:

> We all know that an absolute intonation does not exist. What matters is that satisfactory equilibrium be found in the relativity and the attractiveness of sounds. The best way to attain this is to be able to distinguish as clearly as possible the minute determining differences between the three kinds of semitones, which characterise the intervals.
>
> (1) the diatonic semitone, between the leading note and the tonic, the smallest of the three, which will be annotated VS (very small) in the following examples and exercises
>
> (2) the other diatonic semitone (4 comas) which will be annotated by S (small)
>
> (3) the chromatic semitone (5 comas) which will be annotated by L (large)

Examples:



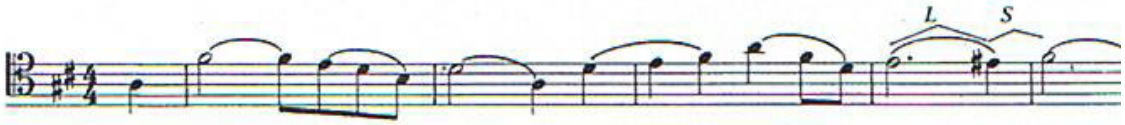
J. S. Bach, *2nd Suite.* Prelude

Haydn *Concerto in D Major.* 1st Movement

Beethoven *Sonata op. 69.* 1st Movement.

Schumann *Concerto in A minor.* 1st Movement.

Schumann *Concerto in A minor.* Finale.



Dvorak *Concerto in B minor.* 1st Movement.

Richard Strauss *Don Quixote.*

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Source: Tortelier (1975:57-58)

Fisher (2004:520) recommends that in fast passages, sharps should be played higher and flats lower. However, he cautions against the use of this in slow passages, since in a slow tempo, this kind of intonation may sound out of tune. When utilised in a fast tempo “it adds energy and colour”.

Apart from the influences that the harmonic and melodic contents may have on intonation, other factors that may cause tuning problems are octave displacement and the temperament of the piano. Octave displacement occurs, for example, when a note is played in the upper-most octave on the piano, and the same note is played in the lowest octave – “the notes will sound too close together when played separately, and too far apart when played together” (Hersh 2002:online).

Chords that are built on a wide tessitura are particularly problematic. A string player may also sound out of tune if his or her intonation deviates from the piano’s temperament. The problem may be exacerbated when the piano is not well tuned.

String quartet playing poses special tuning challenges for the players. Hersh (2002:online), argues that modern instrumental training generally does not stress an understanding of temperament, octave displacement and harmonic and melodic contexts for tuning – hence many string players are ill equipped for sorting out tuning issues.

A technical element with which string players often battle in intonation is shifting. Shifting between different registers on the cello is an integral part of the left-hand technique. The feel for distance and timing the correct amount of tension and release, and the angle and balance of the arm and hand, are key factors to be considered in shifting. The speed of the shift should always serve the musical idea. “Expressive variety in shifting is very much a matter of understanding the

sentiment of the music and allowing the hand the freedom to move in relation to it" (Pleeth 1982:32).

(ii) Vibrato

Vibrato can be regarded as the most essential tool in the string performer's technique when expression is concerned. Since emotional expression is multi-faceted, the performer should be able to verify the speed and width of the vibrato in order to create the desired emotional expression. The speed, width and directional intent of the vibrato, are factors that have been researched since the 1930s (see Geringer & Allen 2004).

In this regard, cellist, Gary Hoffman, mentioned in an interview with Tim Janof (2004:online), that the type and amount of vibrato should be suited to the needs of the musical passage. "You need to be able to stop and start vibrato at will and be able to alter its speed, width and angle, depending on what colour you are looking for on a particular note. … Ultimately one should be able to do whatever the musical demands, and not be forced to do something else because of technical limitations."

Cellist, Truls Mørk, suggests that the "melodic vibrato" should be used to highlight certain important notes in a melody. This can be done by incorporating different speeds or intensities of vibrato. Although certain cello schools strive to achieve an evenness and consistency of vibrato for each note, Mørk found that an even vibrato takes the life out of music (Janof 2004:online).

The register in which the cellist plays also influences the vibrato, especially with regard to its width. In upper registers, a narrower vibrato should be used to ensure that pitch fluctuation is not excessive, whereas in the lower registers, a wider amplitude may be more appropriate.

Although the right hand and left hand were discussed separately for practical reasons, it is imperative to develop a fine balance between the hands to achieve the required amount of coordination and independence.

In conclusion, the statement by Boris Berman (2000:24) that “the technique of every good performer is an inseparable part of his artistic personality”, perfectly supplements what Wilhelm Furtwängler stated, namely that “standardized technique creates in return standardized art” (Furtwängler 1953:55).

1.3.3.2 Aural development

The ear is the musician’s principal resource. Since music is auditive by nature, *listening* forms the basis of all musical activities. Research has shown that listening skills have a direct bearing on music perception and performance. Thus by improving the musician’s listening skills, his or her performance can be enhanced. For this very reason, aural development (ear training) is regarded as one of the most important considerations in the training of musicians (Oskina & Parnes 2003).

The acclaimed piano pedagogue, Boris Berman (2000:3), discussing sound quality, mentioned that “you cannot refine your touch without refining your ear”. He refers to two kinds of “musical ears” – the subjective ear and the objective ear.

The subjective ear refers to the player’s image of the kind of sound he or she would like to produce – thus the more specific the image, the better the results. The “objective ear” refers to the musician’s ability to monitor the sound he or she is actually procuring (Berman 2000:4). Thus, the player forms an auditory image of the sound he or she would like to produce. Researchers such as Brodsky and

Henik (1997) have identified musical imagery as a special case of auditory imagery.

> … (M)usicians rely on musical imagery and richness of qualia to inspire and guide performances, just as much (if not more) than its actual external sounds. It is believed that musicians create music by 'hearing-it-out' as opposed to 'picking-it-out' on an instrument and that musicians do not merely see the score – they hear it in their 'mind's ear' (Brodsky & Henik 1997:10).

This type of listening is also referred to as *inner-hearing*. Inner-hearing can be regarded as a "unique subtype of musical imagery", also referred to as "notational audition" or "mental score" (Brodsky & Henik 1997:170). According to Oskina and Parnes (2003:7), inner hearing occurs when music is perceived internally – that is, when music scores are read, memorised music is perceived/sounded internally, or when music is created (e.g. during composition).

According to Karpinski (2000:221): "The skills involved in 'hearing within oneself', in creating this 'living musical image' or 'imaginary performance' through score study, are all *aural* skills".

Oskina and Parnes (2003:11-12) contend that through inner-hearing, the listener can do the following:

- differentiate between separate/individual musical sounds or pitches, consonance and dissonance, monophonic or polyphonic textures
- identify the musical structure, that is, its form, metro-rhythmic organisation, tuning and tonal orientation, texture, number of voices, tempo and dynamic features

- differentiate between different elements in the sound, tonality, timbres of musical instruments or voices, as well as individual performance characteristics

The development of these abilities is an integral part of aural development programmes. The latter generally strive to improve attentiveness, concentration, musical memory[4], the ability to perceive musical structures in both a microscopic (perception of building blocks) and macroscopic way (perception of formal characteristics), and the ability to evaluate aural impressions (e.g. interpretative comparisons, self-critique and so forth) (Herbst 1993:36).

Code (2002:online) simplified the above and identified the following four main goals to be achieved through aural development/comprehension:

(1) to understand what one hears (reflected in exercises such as dictation)
(2) to hear what one sees (with the emphasis on sight-reading, sight-singing and inner-hearing)
(3) to reconcile sight and sound (to detect and correct discrepancies between written music and music one hears)
(4) to play what one means to (to execute accurately what is in one's head)

String players have to develop the ability to differentiate between dimute inflections in pitch and tonal colour. The level at which these ingredients of sound are controlled through attentive and tireless listening, has a direct bearing on the performer's professionalism.

4. Oskina and Parnes (2003:20) discuss the link between inner-hearing and musical memory in their book, *Muzykalny Slukh*. According to them, musical memory and inner-hearing are closely intertwined. Although memory is supported by inner-hearing, it is impossible to perceive inner-hearing without remembering pitch-related information. They contend that aural development in fact involves enhancing the ability to remember pitches and the process of training to expand that memory.

It is therefore paramount that aural skills should be developed to the highest possible level.

1.3.3.3 Sight reading

According to Thompson and Lehmann (2004:143), the term "sight-reading" in its most common usage, refers to the practice of playing a piece of music directly from the score on first encounter or after brief rehearsal. Sight-reading ability plays a vital role when new works are being rehearsed. The student's ability to sight-read influences the learning tempo, since someone with good sight-reading skills learns a new work much faster than one lacking these skills. When a student has all the "notes under his fingers", the teacher can proceed to work in detail, much sooner than when the student battles to play the correct notes. Examining bodies often include sight-reading tests in their syllabi so that these skills can be assessed. Sight-reading ability is paramount in the professional world. Sight-reading ability and professionalism often go hand in hand, especially for pianists accompanying other instrumentalists or vocalists, orchestra musicians, ensemble players, those involved in recording sessions, and so on. In these cases, new works are frequently performed with little time for rehearsal between performances.

A sequence of events takes place when music is sight-read, namely (1) perceiving notation, (2) processing it, and finally (3) executing the resulting motor programme (Thompson & Lehmann 2004:146). Each of these three events will now be briefly discussed.

(a) Perceiving notation

Research has shown that this is an intricate process involving low-level perception routines as well as higher-level cognitive functioning. Reading ahead while sight-reading is a crucial skill to master. Thompson and Lehmann (2004:147)

note that “skilled sight-readers are not just reading the music ahead of them note by note, but *interpreting* aspects of the musical structure first and changing their perception routine accordingly”. Eye movement also plays a key role.

(b) The cognitive processing of visual information

According to Thompson and Lehman (2004), eye movements that allow for a more efficient encoding of note sequences lead in turn to better memory for presented note sequences, as well as a longer eye-hand span. Longer lasting memory facilitates the encoding of a motor programme. Pattern recognition is closely related to memory.

Over time, notes that occur frequently within a given style, are stored in the memory, not as sets of individual notes, but rather as entities. Familiar patterns such as scales or fragments thereof, as well as arpeggios or chords can be recognised immediately and the performer can then play the pattern without further looking or thinking.[5]

Experienced sight-readers can intuitively anticipate or predict what might be coming up next, based on knowledge of the style being performed.

(c) Executing the resulting motor programme

Timing of actions is paramount in music performance. Before the actual execution phase, cognitive “maps” of the actions required, are made. Fingering patterns come into play here and can influence motor programmes. Sloboda, Clarke, Parncutt & Raekallio (1998) demonstrated that expert sight-readers select the most efficient fingering patterns, allowing them to play faster and more fluently.

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5. Zentz (1992) is of the opinion that scales should not be played from memory exclusively, but should also be practised from notation to promote later visual recognition.

According to Lehmann and McArthur (2002), the sight-reader needs to develop good intuitions about the musical grammar – frequent and infrequent patterns and how it feels to play them. Supplementary to this learning process, music listening "provides stylistic and idiomatic templates against which the musical score can be compared" (Lehmann & McArthur 2002:148). Research has shown that expert sight readers have had extensive experience with sight-reading tasks and that they have acquired a large knowledge base to draw from.[6]

"In the course of their development as sight readers, they have come to know large amounts of patterns (visual, kinesthetic, aural), have solved countless musical problems (reading, fingering, ensemble coordination), and have developed the ability to manage all situational demands of performing" (Lehmann & McArthur 2002:148).

Kopiez and Lee (2006) explained sight reading achievement as the result of specific combinations of different categories of skills that change with the demands of a task.

The authors conclude that educators should focus more attention on sight-reading pedagogy and the continuous development of training methods to enable students to narrow the gap between their level of sight-reading and rehearsed performance.

6. Thompson and Lehmann (2004:153) agree that better sight-readers on the piano tend to have accumulated many hours as accompanists, but that the effects of experience accompanying and repertoire size, have been shown to be statistically independent. As the accompaniments gradually become more demanding as the pianist progresses, sight-reading skills improve, as do general pianistic skills.

1.3.3.4 Music theory

The development of notation has profoundly affected Western art music over the last 500 years. Compositions by composers who lived centuries ago can be performed today because of notation. According to Barrett (2005:121), music notation "provides a means to conserve, communicate and conceive musical meaning".

"An understanding of how written symbols relate to the elements of music, and having the skill to translate them into sounds is vitally important for performers" (Scaife 2007:12). Music is often referred to as a language. In the same way as people are being educated to be literate, musicians are trained to be music-literate. The latter is developed through music theory education.

The *Harvard dictionary of music* (Randel 2003) describes music theory as follows:

> A branch of music scholarship that studies the materials and structure of music. Music theory deals with the properties of single sounds – pitch, duration, timbre – dynamics, tuning and temperament – as well as those of collections of sounds, intervals, consonance and dissonance, scales, modes, melody, counterpoint, harmony, rhythm, themes, meter, form, texture, analysis. The term also refers specifically to the rudiments of music – ear training, solfége, general musicianship and so on.

It is through collections of sound (mentioned in the definition of theory) in particular, that musical meaning is reflected/transmitted. Collections of sounds are pre-eminent when dealing with harmony. When a chord is being formed, dissonance and consonance within it, result in tension or release in the music. An understanding of harmonic tension and release is essential, since the harmonic structure directs the phrase forwards or backwards. The harmonic tension thus influences the way a performer "shapes" a phrase.

Harmonic tension can also influence tonal colouring. The performer can enhance the harmonic effect by enhancing essential notes through slight rubato, appropriate tonal colouring and vibrato. Cellists often play the harmonic line, especially in orchestral or ensemble work. It is essential to know how to direct the phrases through the bass line, and how to support the upper voices or melodic line.

Early writings, such as those of John Gunn in 1795, support the idea that cellists require a sound understanding of harmony in order to accompany well. Method books, such as that of the Paris Conservatory in 1804, confirm the importance of harmonic knowledge for the cellist (Pleeth 1982:254). The cello emerged as a solo instrument during the 18th and 19th centuries. Since harmonic tension and release can strongly influence melodic phrase construction and tonal colouring, an understanding of harmony can also enhance the performance of a soloist.

According to Scaife (2007:13): “Learning the theoretical aspects of any activity will have an effect on the practical aspects. Integrating theoretical aspects of music into a [practical] lesson enables the pupil to build a coherent picture of music. Theory is often separated and unduly isolated from other aspects of the lesson”. Music theory is often taught by a teacher other than the instrumental (cello) teacher. A reason for this situation is that the latter specialises in cello teaching and whishes to optimise the available lesson time to nurture the student’s performance skills. It is, however, paramount that attention is focused on nurturing the student’s understanding of theoretical concepts during the practical lesson, especially with regard to rhythm, melody, harmony and stylistic features. The practical teacher should be well aware of what is being taught in

the music theory classroom[7] in order to guide the student to a deeper understanding, not only of music theory, but also the possibilities of communication through music, both in theory and practice.

Experimental research has indicated that when performers perform a work and analyse it, the musical perception can be changed and the performance enhanced (Vaughan 2002:262; Mawer 2003:273-74; Bent & Pople 2006).

Evidence of the way in which a performer can incorporate an analytical approach in performance is provided in the example of Mstislav Rostropovich's approach when he recorded the six Suites for Solo Cello by JS Bach for EMI in 1995. In the booklet accompanying the recordings, Rostropovich mentioned how the way in which the suites develop structurally gave him insight, which had a positive impact upon his performance (Rostropovich 1995:9).

Although each musical work has its own individual form there are common structural components that can often be predicted. This makes it possible to identify certain formal structures or compositional layouts, despite their versatility and expediency (Sposobin 2002:9). Koopman (2005:93) concludes the following: "Although musical form is the substance of the musical work, expression and representation are embodied in form."

Form analysis interlinks with music history. These are often incorporated into one subject, as in Russia. Music history pedagogy changed substantially during the last century on account of the impact of the Early Music Movement.

7. Since the "theory teacher" often teaches in groups in which students play various instruments at different levels, it is more taxing for the theory teacher to link the theory to each student's practical experience. Theory teachers can successfully incorporate the various practical instrumental playing abilities of students into the learning process of theory which can be beneficial for all. However, music theory is often taught with the piano as core instrument for the very reason that melody and harmony can be played simultaneously on one instrument. Vocal and orchestral scores can also be played on the piano. In Russia, all music students are expected to learn the piano from an early age, regardless of the "major" instrument. These students are also expected to play exercises during aural training, as well as chordal progressions for harmony, on the piano.

Substantial research was done in this field, which gave rise to new approaches to music performance.

The main concern is to produce a “historically informed” performance. Le Huray (1990:4) concluded that in order to make informed decisions about the performance of a work, “every avenue of enquiry must be explored in search for the fullest possible picture of the original, a picture that will more define the range of choices that are open to the performer. … Not every question will find a ready answer, but until every potential source of information has been checked, the player will be in no position to assess the strengths and weaknesses of modern techniques and interpretive approaches.”

The “fullest possible picture” includes an investigation into matters such as what the original manuscript reveals (or conceals), historical and social conditions at the time, the composer’s personal circumstances, what instruments were used and how they differ in playing technique and sound concept, acoustical changes, and so on.

Topics of study relating to performance practice include ornamentation, improvisation, tuning and temperament, the changing character of musical instruments, the size and composition of ensembles, tempo, articulation, dynamics and other performance marks, the nature of sound production and performance styles.

Music history therefore embraces a rich domain of related studies, such as ethnomusicology and sociology. Since music notation is fundamentally incomplete, it is essential for the performer to have an understanding of the performance practice of past centuries in order to “fill in the gaps”.

“And finally, once we have understood the music of Monteverdi, Bach and Mozart, we will have to find our way back to the music of our own time, the music

which speaks our language, embodies our culture and moves us forward …" (Harnoncourt 1988:13).

1.3.4 Talent and giftedness

Scholars in psychology, education, biology and related disciplines conducted extensive research in the last decades to find answers to the question of to what extent "nature" (innate aptitudes) or "nurture" (the environment) contributes to exceptional ability. In order to gain a better understanding of the multitude of complex ideas surrounding the source of exceptional ability, Gagné (2003, 2004) illucidates the two concepts around which gifted education clusters, namely "giftedness" and "talent".

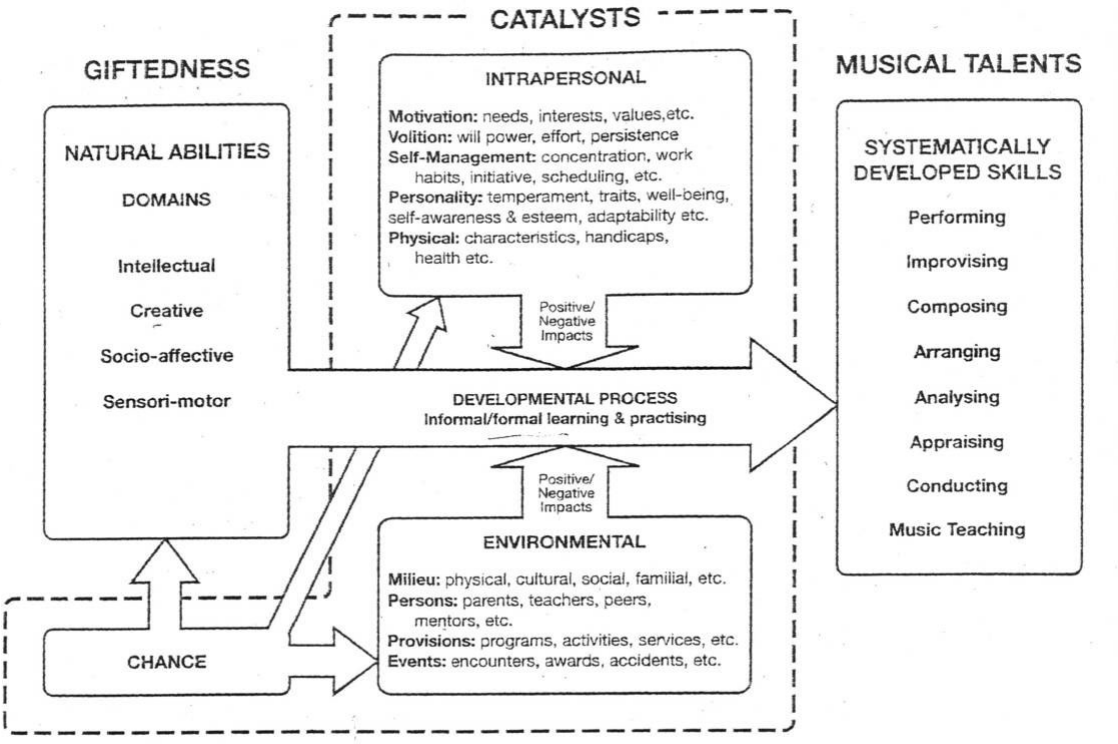
A perusal of the literature discussing giftedness and talent, points to a range of competing definitions. Some scholars use these terms as synonyms (Marland 1972), interchangeably (Csikszentmihalyi & Robinson 1986), or describe talent as a subcategory of giftedness (Feldhuzen 1986; Haensly, Reynolds & Nash 1986).

Gagné (2004:120) differentiates the two concepts as follows:

> *Giftedness* designates the possession and use of untrained and spontaneously expressed natural abilities (known as outstanding aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10 per cent of age peers.
>
> *Talent* designates the outstanding mastery of systematically developed abilities (or skills) and knowledge in at least one field of human activity to a degree that places an individual at least among the top 10 percent of age peers who are or have been active in that field or fields.

In figure 1-1 below, the above definitions have been incorporated into Gagné's Differentiated Model of Giftedness and Talent.

FIGURE 1-1 Differentiated Model of Giftedness and Talent in Music



Source:. McPherson 2006:241 – adapted from Gagné (2003)

McPherson (2006:249) adapted Gagné's model to include eight distinct types of musical talent: performing, improvising, composing, arranging, analysing, appraising, conducting and teaching.

Gagné (1993, 2003) identifies four basic domains of natural gifts (or high aptitudes), each involving its own distinctly different types of innate abilities:

(1) *intellectual*: potentials required for learning to read, speak and understand concepts; dimensions include the potential for fluid reasoning, being able to think abstractly, memory, a sense of observation and metacognition
(2) *creative*: potentials related to being able to think divergently when solving problems and to produce work that is representative of such thinking; dimensions include aspects such as inventiveness, imagination, originality and retrieval fluency.
(3) *socioaffective*: social and affective abilities used when communicating with others; dimensions include perceptiveness, tact, leadership and persuasion
(4) *sensorimotor*: potentials that influence sensory (visual, auditory, sense of smell and touch) and motor (strength, endurance, reflexes, coordination) development that may give children an advantage with their learning

These four domains interlink with other research conducted in the field of gifted education. Harris and Crozier (2003:86) listed some general characteristics and conditions observed (in various proportions) in highly gifted children.

- These children will show evidence of a vivid imagination and creative sense.
- They may demonstrate an above-average intellectual capacity (although this need not be outstandingly high).
- They often have the ability to focus on one task for a considerable time and there may be a degree of obsessive behaviour.
- They may show high levels of motivation, determination, self-discipline and commitment.
- They may display great reserves of energy.

From the above, talent and giftedness will be discussed under the following subfactors:

- the student's intellectual capacity
- the student's aptitude for the cello
- the student's artistic performance abilities
- self-management
- creativity

1.3.4.1 The student's intellectual capacity

According to Radocy and Boyle (2003:391), intelligence "is an important influence on musical ability". Scholars such as Sergeant and Thatcher (1974) indicated that highly gifted musicians appear to be highly intelligent.

Research conducted by Ruthsatz and Detterman (2003) on a child prodigy musician, indicated extremely high scores on tests of musical ability and intelligence which also revealed an extraordinary memory measured within his cognitive profile. According to Clark (2008:56), "gifted individuals are those who have developed high levels of intelligence and, therefore, operate or perform, or show promise of operating or performing, at high levels in any of the areas of human ability … These abilities are usually identified by general intellectual aptitude, specific academic aptitude, creative or productive thinking, leadership ability, and/or ability in the visual and performing arts". Clark (2008) indicates that gifted individuals show more advanced and accelerated development (compared to peers of a similar age). Gottfredson (1997) also emphasises the strong link between natural abilities and learning pace. IQ tests have been introduced to test intelligence abilities and aptitudes. Some scholars, such as Carrol (1997: 93) indicate that IQ tests are a clear representation of ability by representing "the degree to which and the rate at which people are able to learn".

However, other authors such as Hettinger and Carr (2003) and Clark (2008) disagree, arguing that since these abilities are multifarious, IQ score can no longer be seen as a valid or reliable description of a person's capacity or potential. Clark (2008:217) indicates that IQ contributes only 20 percent to the factors responsible for success in life.

Research conducted by Sloboda, Hermelin and O'Conner (1985) produced some interesting outcomes. An autistic person who displayed bizarre behaviours and had minimal verbal intelligence, played the piano and had a phenomenal ability to memorise music. His memorisation skills were compared to those of a professional pianist, which he outscored by far, when tonal music was presented. Miller (1989) also described the appearance of profound musical abilities accompanying profound intellectual deficits. According to Rodocy and Boyle (2003:393), this phenomenon can be better understood when intelligence is conceived "as a set of loosely related skills or as a collection of multiple intelligences". Gardener (1993, 1999) developed and refined a theory of multiple intelligences comprising eight components, including "musical intelligence" as one component.

These components, referred to as "intelligences" included the following: verbal/linguistic; logical/mathematical; visual/spatial; musical/rhythmic; bodily/ kinesthetic; interpersonal; intrapersonal; and naturalistic.

Hallam (2006:104) applied Gardner's multiple intelligences to music, in the table below:

TABLE 1-2 Gardner's multiple intelligences applied to music

Ways that the intelligences might be utilized in music	
Logical-mathematical	Analysis, performance, and sight-reading of rhythms, analysis of the structure of music, composition
Spatial	Reading of notation, identifying and understanding the structure of music
Bodily-kinaesthetic	Technical skills, movement involved in the communication of interpretation
Intrapersonal	Understanding emotions, drawing on internal emotional resources for developing interpretation, self-knowledge of strengths and weaknesses, metacognition, control of anxiety
Interpersonal	Communication with an audience, teaching, working with other musicians
Linguistic	Reading music, critical analysis of music and performance, understanding the historical and cultural contexts of music
Naturalist	Probably not influential in music performance although the understanding of natural materials is important in the making of instruments and their maintenance
Spiritualist/existential	This may contribute towards the "emotional" and "aesthetic" aspects of performance

Source: Hallam in McPherson (2006:104)

Gardner (1999:33-34) suggests that intelligences are potentials that will or will not be activated, depending on a particular culture's values, the opportunities available in that culture and personal decisions made by one or more individuals, their families, teachers and others.

Hallam (2006:103) postulates that emergent conceptual categories against Gardner's multiple intelligences, suggest that most end states (being able to play, sing, compose or improvise) and activities can be accounted for by the operation

of other intelligences apart from music, and concludes that “the end states of musical intelligence draw on combinations of several intelligences as do all complex activities”.

1.3.4.2 The student’s aptitude for the cello

Music performance, especially at a professional level, requires extremely refined motor skills. These skills can be acquired over many years of extensive training and practice. Although musicians rely primarily on a highly developed integration of auditory-motor capacity, somatosensory feedback constitutes another basis of high-level performance. Control and feedback of muscle and tendon tension, joint positions, enabling continuous monitoring of finger and hand position in the frames of body and instrument, is of great importance (Altenmüller & Gruhn 2002:69).

The development of sensorimotor skills in string performers is paramount, since exceptionally fine coordination and balance are required for performance at a high level. Intonation, tone quality and tonal expression are affected by the level of development of the performer’s motor skills in combination with his or her aural ability (see also Sanders, 2004).

Motor skills refer to arm, hand and finger dexterity. Most tests of motor dexterity are highly dependent on speed. In 1979 Gilbert designed a test to assess motoric music skill. Tests in this area tend to be characterised by specificity. In spite of prolonged interest, the measurement of artistic ability lags behind the testing of other ability functions. One of the reasons is that the functions to be measured are intrinsically complex. The basic sensory skills of tonal memory, sense of pitch, recognition of rhythms are all factors that should be considered.

Although it cannot be claimed that physical requirements for an optimal body and hand size for a cellist are of critical importance, there is enough research evidence to support certain benefits regarding specific traits for a cellist. In this regard, reference is made to finger pads, muscle strength combined with flexibility, a wide handspan and finger length. Mental characteristics revolve around temperament and personality. These traits may impact significantly on the choice of the music instrument.

Aptitude tests cover a wide range of tests to determine a student's ability to embark upon training to master a string instrument. According to Hallam (2006:94-96), historically, the measurement of musical ability (or musicality) was focused on a range of aural perceptual skills internally perceived by the individual. These tests parallelled the types of testing used to measure intelligence. Carl Strumpf developed the first test of musical ability in 1883, suggesting a number of simple tests music teachers could undertake to select pupils. According to Seashore, Lewis and Saetveit (1960), musical ability was a set of loosely related basic sensory discrimination skills that had a genetic basis. He believed that, instead of combining subtest score to acquire a single measure of musical ability, a profile should be obtained that could be divided into a number of clearly defined characteristics that were not related to each other. These characteristics were pitch, loudness, rhythm, timbre, time and tonal memory.[8]

In contrast to Seashore's conception, Wing believed in a general ability to perceive and appreciate music, rather than a profile, which resulted in *The Wing standardized tests of musical intelligence*, published in 1961. These included seven elements – three involving ear acuity, and four assessing appreciation of music (see also Radocy & Boyle 2003:414-416). Gordon developed a series of tests assessing "audiation" – the ability to give meaning to what is heard. These

8. Bently (1966) tested pitch discrimination, tonal memory, chord analysis and rhythmic memory combining it into a single score, as manifested in his publication, *Measure of musical abilities*.

tests cover age ranges from preschool to adulthood. Audie, a test for three- to four-year-old children (Gordon 1989b), the Primary Measures of Musical Audiation for children between the ages of four and eight (PMMA, Gordon 1979); the Intermediate Measures of Musical Audiation for children from five to 11 (IMMA, Gordon 1982); the Music Aptitude Profile for Children and Adults (11 years and older) (Gordon 1965); and the Advanced Measures of Musical Audiation, which is used for entrance into higher education music courses (AMMA, Gordon 1989a).

More recent tests incorporate computer-based systems (see Vispoel & Coffman 1992; Vispoel 1993.) However, McPherson and Williamon (McPherson 2006:251) conclude that there is no infallible score on any music aptitude test and that the responsibility lies with the teacher to make a subjective evaluation.

1.3.4.3 Artistic performance abilities

Apart from the fact that performing musicians require an extremely high level of technical skill and musical understanding, performance communication skills or artistic "charisma" play an essential role in "capturing" the listener (Razhnikov: 2004).

According to Subotnik and Jarvin (2005:350): "The most interesting artists are those who control audiences' engagement in anticipation of the unexpected based on creative *risk taking*. Charisma also emerges as a key to success at the highest levels of artistry".

Subotnik and Jarvin (2005) also suggest that there are two kinds of charisma: one that is centred on the artist and the other on the music. The first kind occurs when artists draw people to them "because their presence is larger than life",

whereas the second kind arises from the power of the artists' performance (Subotnik & Jarvin 2005:350).

Charisma, is therefore essential for performers performing as soloists or in small ensembles. Orchestra members who are not leaders of sections, need not possess charisma, since attention should not be attracted to the individual in such a way that it contradicts the aim of the orchestra or ensemble to perform as a close-knit unity.

When performance is being assessed, this "charisma" is regarded as the differentiating factor for success at the highest level of artistry. Jury members at competitions or auditions often look for "that extra spark" or charisma. However, Subotnik and Jarvin (2005:345) conclude that charisma cannot be taught.

1.3.4.4 Self-management

Self-management refers to the ability of the individual to exercise control over activities that are goal directed. According to Gagné (2004:126), self-management appears to be one of the most typical characteristics of a multitalented individual. Initiative, efficient time management, autonomy, concentration and good work habits, are behavioural traits.

These behavior traits can also be observed in successful musicians. McPherson and Williamon (McPherson 2006:244) state that "no amount of natural aptitude will guarantee success without opportunities for intense, systematic learning and practice". Research has shown that there is a close connection between the amount and quality of practice, and overall achievement for musicians (see Ericsson, Krampe & Tesch-Römer 1993; Sloboda & Davidson 1996; Sloboda, Davidson, Howe & Moore 1996; O'Neill 1997; Howe, Davidson & Sloboda 1998). Scholars such as Ericsson *et al.* (1993) and Winner (1996) argued that a

minimum of 10 years of dedicated practice is required to become an expert in any field, and that this process can be much longer in the field of music (see Krampe & Ericsson 1996; Krampe 1997). Chaffin and Lemieux (2004:20-21) estimated that more than 10 000 hours of practice are required before a performer is ready to begin a professional career. Research on practice resulted in a series of papers (Ericsson 1997; Ericsson *et al* 1993; Krampe 1997; Lehmann 1997a, 1997b; Lehmann & Ericcson 1993, 1996, 1997, 1998a, 1998b) relating to *deliberate practice*. According to Gabrielsson (2003:241), deliberate practice means "carefully structured activities in order to improve performance and presupposes high motivation and extended effort, full attention during practice (which limits the length of practice sessions and necessitates time for recovery), explicit instructions and individualized supervision by a teacher; knowledge of results, favourable environmental conditions; and parental or other support".

Self-management also involves control over one's rational and emotional mind. Goleman (1995) suggests in his popular book, *Emotional intelligence*, that there are two fundamentally different ways of knowing that interact to construct our mental life, namely the rational mind and the emotional mind. According to Clark (2008:126) the emotional mind expresses itself in behaviour such as the ability to

- motivate oneself and persist in the face of frustrations
- control impulses and delay gratification
- regulate one's moods and keep distress from overwhelming the ability to think
- empathise with others
- hope

Motivation types identified by Davidson (2002:95), include the following:

- extrinsic (when tasks are performed because of some external reward potential such as passing an examination)
- social (a wish to please or fit in with others)
- achievement (for enhancement of the ego, to do better than others)
- intrinsic (interest in the activity itself, engagement for simple personal enjoyment)

Intrinsic motivation closely interlinks with research conducted by Clark (2008). According to Clark (2008:128), "a child's perceived control can be located internally (as when the child makes a choice on the basis of his or her own interest) or externally (as when the child makes a choice on the basis of the reward given for making that choice)". Gifted children often demonstrate an internal locus of control at a younger age than the average peer, and often do things for the pleasure of it. Clark (2008:12) contends that excitement about learning new information and great satisfaction from discovering solutions to problems, are other characteristics of children with an internal locus of control.

This perception of responsibility for and control over one's life has been recognised as the single most important condition for success, achievement and a sense of well-being. Success in later life directly correlates with the extent to which the individual has developed an internal locus of control (Bar-Tal, Kfir, Bar-Zohar & Chen 1980; Dweck, Davidson, Nelson & Enna 1978). "An example of the intrinsic locus of control is intrinsic motivation" (Clark 2008:130). When motivation is intrinsic, one acts according to one's own personal beliefs, moral convictions and beliefs. According to Amabile (1989) and Gottfried and Gottfried (1996), intrinsically motivated students accept challenges willingly, are curious, are persistent with difficult tasks, remain committed to a task, are critical of their effort or are satisfied with it regardless of the opinions of others, and demonstrate

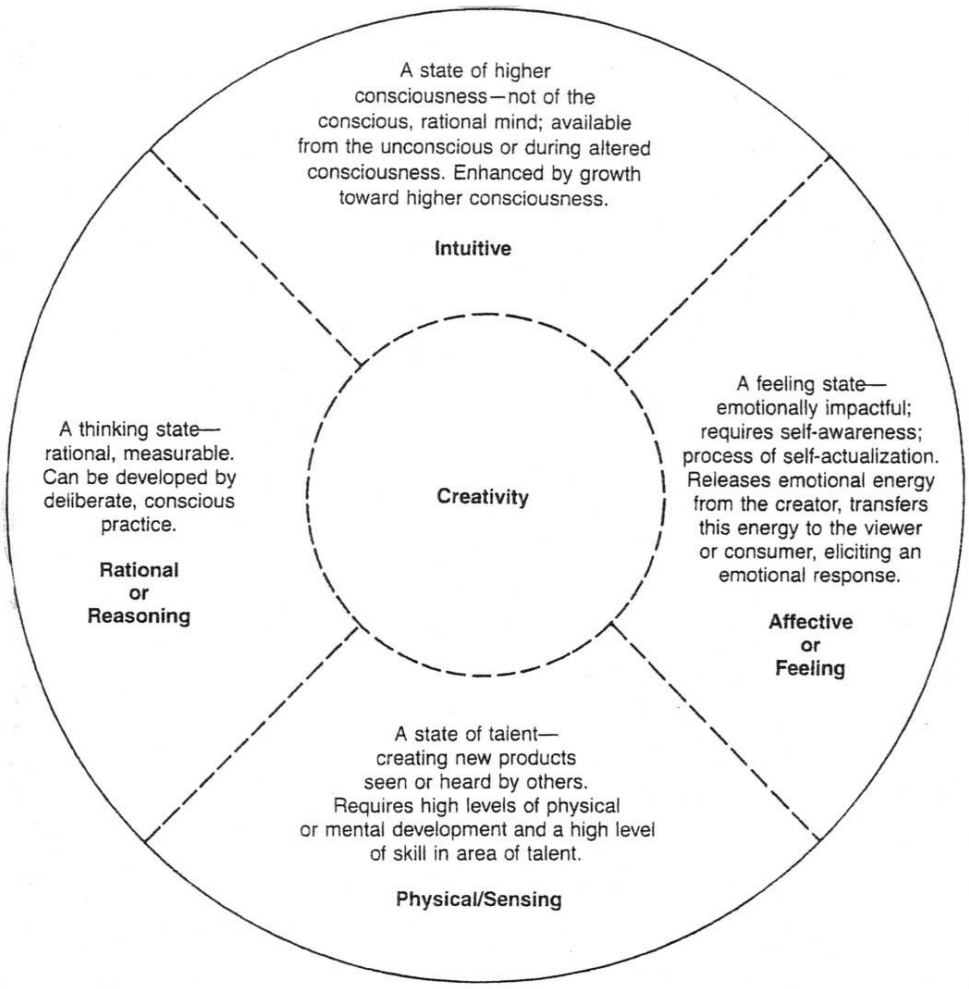
a lower level of academic anxiety (see also Bogoyavlenskaya & Shadrikov 2000). According to Amabile (1983, 1990), intrinsic task motivation is a basic ingredient of creative work. Since music performance is a creative act, intrinsic motivation plays a vital role in self-management and the outcome of performance.

1.3.4.5 Creativity

Creativity can be described as "the synthesis of enriched rational and spatial thought, heightened physical sensing and movement, sensitive emotional and social affect, and high intuitive consciousness" (Clark 2008:158). The author is of the opinion that creativity will be reduced if any of these functions are restricted, and that if creativity is viewed holistically, it may express the uniqueness of a person through ideas, insights, processes, acts and/or products. Clark (2000) points out that researchers have described different phenomena or different types of creativity, which are in fact parts of a larger whole.

In figure 1-2 below, the creativity cycle is portrayed as a process of integrated thinking and being.

FIGURE 1-2 Creativity circle



Source: Clark 2008:159

If the holistic model of creativity is mapped with musical creativity, the following characteristics can be identified:

- *Intuitive.* Performers can intuitively make the music come "alive" through the manner of execution. Phrases and rhythmic patterns are executed in a spontaneous way, sounding "natural". Musical intuition plays a significant role in the evaluation of music performance.

- *Affective/feeling.* Music can communicate "affects" or emotional feelings. According to Juslin (2005:86), Johnson-Laird suggested that the communicator constructs an internal representation of some aspect of the world, such as an emotional state, which is then intentionally carried out by some symbolic behaviour that conveys the content of that representation. Extensive research on emotion and emotion in music has been conducted by Gabrielsson (2001), Juslin (2001, 2003), Juslin and Sloboda (2001), Timmers and Ashley (2004), Nawrot (2003), Juslin and Laukka (2004), Lindström, Juslin, Bresin and Williamon (2003).

- *Physical/sensing.* Working creatively with musical sound, technical facility and a thorough understanding of the impact of one's physical movements upon the creation of colour and texture in sound, is paramount. Physical sensation primarily impacts upon the multifaceted dimensions of sound production. Clark (2008:179) explains that "there is a need for creative students to develop a mastery of their field, which will then allow them to move beyond the known".

- *Rational/reasoning.* Musicians reason rationally about music, when, for example, matters related to musical meaning or technical problem solving require deliberate conscious thought.

In the persuit of measuring creativity, tests such as the Torrance Test of Creative Thinking (TTCT) (Torrance 1966), the Remote Associates Tests (RAT) (Mednick & Mednick 1967), or the Group Inventory for Finding Creative Talent (GIFT) (Rimm 1976) can be used. Clark (2008) suggests that creativity tests should be used in combination with other data when giftedness is being assessed, since there is disagreement in the field regarding the reliability and validity, especially the predictive validity, of creativity tests. However, adopting a holistic view

cannot explain creativity and “the mystery and wonder of how the human being creates still exist” (Clark 2008:159).

Russian researchers and psychologists advocate that creativity should play a central role in the individual’s development, especially in the development of the gifted (Leitis 2000; Scheblanova 1998).

However, Van Tassel-Baska (2005:362) indicates that recent studies have demonstrated that creativity itself is domain-specific (Simonton 1999; Amabile 1996; Piirto 2004).

Clark (2008:177) summarises the components needed for creativity to flourish in the following: intrinsic motivation, domain-relevant skills (skills in a specific field acquired through formal education and experience) and creativity-related skills (ways of thinking and working that is more conducive to creativity).

Finally, Runco (2005: 295) suggests that “all expressions of giftedness share the potential for creative work … creative potential is one of the most critical commonalities among the various domains of giftedness”.

1.3.5 Support given to the student

According to Olszewski-Kubilius, Grant and Seibert (1994:21) “the optimal development of exceptional ability in any domain requires the special coordination of resources and an involvement of many individuals for it to be developed to a high degree.” Several resources are required to expand the student’s knowledge base and understanding of the profession.

In the process of teaching and developing a student's talent, there is a support system that includes a number of subfactors, which will be discussed individually in this section. They include

- parental support
- teacher support
- financial support
- psychological support
- peer support

1.3.5.1 Parental support

Davidson (Rink 2002:96) emphasises the critical role of parents or guardians in developing the skills and attitudes of their children in the teaching process. Studies by Brokaw (1983), Kelly and Sutton-Smith (1987), Ericsson et al. (1993) and Davidson et al. (1996) provide evidence to support the above statement that musical achievement is linked to high levels of parental involvement. In the study of Davidson et al. (1996), it was found that the highest achieving children receive the most support from their parents up to the age of 11 years. Thereafter, intrinsic motives drive children to practise regularly by themselves. Davidson et al. (1996:399) conclude that the most musically able children have the highest levels of parental support.

During the Conference of the Scottish Network for Able Pupils in February 2001, students were asked to note down their responses to two questions: Could they describe experiences which might have happened to themselves or others they knew, which either predicated their engagement in music, or which prevented it? Three responses, listed below, dominated on the positive side (Stollery & McPhee 2002:93):

- motivation through praise and enhancement of self-esteem
- parental encouragement and support in various forms
- inspiration from a gifted teacher or role model (to be discussed in section 1.3.5.2)

The motivation to persist in instrumental training is inextricably linked to the social and cultural environment. Research (Sloboda & Davidson, 1996; McPherson & Davidson, 2002) indicated that the time spent practising by a child is related to the amount of support and encouragement the parents are willing and able to provide.

Parental support focuses on two dimensions of the parent-child relationship, namely parental practices and parental styles. According to Spera (2005), parental practices refer to specific behaviours used by parents to socialise their children such as helping with practice or by attending concerts. Parental styles refer to the emotional climate in which parents raise their children and act to moderate the relationship between parenting practices and the achievements of their children. Time management for practice can be cultivated by learning to plan and prioritise the use of available time.

However, it is also true that no amount of support is likely to make a child without motivation or an intrinsic interest in music, engage in a long-term effort, which is required to obtain musical competence.

1.3.5.2 The teacher's support

The teacher forms part of the network of support for the student. The task of motivating students is a significant part of the task of the instrumental music educator. Asmus (1995) has reported that motivation may explain approximately 20 percent of the variance in music achievement and related behaviours.

Time commitments and expectations for their programme for students to perform for school and community functions form part of the teacher's commitments. Performance-oriented programmes need to be well planned, as well as the provision of quality instruction, rehearsals, listening and valuation. This should also include sufficient time for the study of scores, as well as research to provide a student with a systematic exploration into a designated list of repertoire (Gillis 2006:57-60). The time commitment from the teacher should include equal amounts of researching and rehearsing of the music. Time should also be devoted to the mental preparation of the student especially in the case of solo performance.

Magil (2006:297-298) points out that Dorothy Delay was an exceptional violin teacher because of her uncanny knack of getting into her students' heads. She made a practice of using heuristic teaching to compel her students to solve problems by themselves. In addition, she gave firm emotional support to her students and ensured that they grew as persons and not just as artists.

Clark (2008:467) identified areas of knowledge and understanding in which teachers have to be knowledgeable, especially when dealing with gifted learners. These areas include the following:

- the nature and nurture of high levels of intelligence in all of its aspects
- the cognitive, social, and emotional characteristics, needs and problems encountered with gifted students as a result of their atypical development
- environments in which gifted learners are able to feel safe to use their strengths, explore their personal and interpersonal development, risk new areas of thought and action, find and accept challenges and express their uniqueness and create such environments

- flexible individualised, differentiated curricula appropriate to meeting the unique needs of gifted learners and the ability to create and implement such a curriculum
- creativity, in all of its aspects, and the ability to nurture it
- how to encourage in gifted learners a sense of social awareness of and commitment to humanity and to their environment, as well as a respect for the worth and dignity of others
- how to relate positively to colleagues and parents of gifted learners, conduct informational meetings and advocate for gifted education

Developing such knowledge and understanding requires an uncommon amount of ability to

- empathise and inspire
- tolerate ambiguity and be open, flexible and innovative
- share enthusiasm, a love of learning and a joy of living
- be authentic and humane as a deep personal commitment
- be alert, knowledgeable and informed
- value intelligence, intuition, diversity and uniqueness in oneself and others
- value change, growth, and self-actualisation for oneself and others

In conclusion Kemp (1996:254) makes the following significant valid comment:

> Currently, research appears to be poised at a point at which it may, perhaps wrongly, conclude that parental and teacher influence is the strongest factor in ensuring that pupils engage in extensive hours of practice, and thereby develop the desired levels of talent. This may need to be challenged by other research that suggests that, although parental and teacher influence may allow a pupil to achieve certain degrees of success, it may not ensure success at the highest levels.

> The essential difference might lie in the degree to which parental and teacher support ceases to be facilitative and becomes unduly manipulative.

In the final analysis, however, the quality of the nurturing environment is critical, and the onus for this is firmly on the parents and teachers.

1.3.5.3 Financial support

The fact that the training of a cellist is a lengthy programme, in most cases, on average more than 15 years before reaching the stage where the student can be regarded as professional, adds to the fact that from a financial point of view, the training is expensive. In the normal professional field, the total period of focused study is far shorter. The study of a cellist starts at an early stage in childhood and extends to post graduation, in many instances.

Costs incurred during this study period include tuition fees for individual lessons on a weekly or more frequent basis, purchasing or renting a musical instrument, transport costs to the lessons, sheet music, fees for accompanists, maintenance of the instrument, and so forth.

It is especially in the case of the gifted or exceptionally talented students where these costs can become astronomical. Naturally, they will be directed to highly skilled teachers with corresponding higher tuition fees. It is interesting to note that the number of students served in gifted and talented programmes has grown substantially in the last few decades (Kang-Moon 2006).
From the above it can be concluded that a lack of financial support can have a detrimental effect on a student's development.

1.3.5.4 Psychological support

Music schools, conservatories and universities have realised the benefits of involving psychologists in the selection process of prospective students. Children are tested for musical aptitude and their physique and personality are taken into account when decisions are made about their choice of instrument. With the proliferation of formalised music training, especially in the former Communist East, it was soon evident that musically gifted children were in need of psychological guidance. Hence, psychologists cooperated with music school teachers to meet the needs of each individual.

Apart from assisting in the recruitment process, these psychologists work in collaboration with the instrumental teacher in an attempt to find the most appropriate method of instruction to enhance the student's learning process.

Kepinska-Welbel (1996:264-265) indicates that teachers should adapt their approach to the student's individual needs by getting to know the student's personality make-up, motives, aims and interests. Psychologists working in collaboration with the instrumental teacher, can contribute significantly to provide the teacher with more in-depth information on the student's psychological profile.

However, the work of the psychologist is not limited to children at the music school. Research has indicated that the family environment plays a vital role in the successful development of a child, especially during earlier levels of instruction (discussed in section 1.3.5.1). Sadly, parental ambitions frequently interfere with children's attitude towards the music school and their own achievements. Hence, psychologists at music schools also have to counsel parents (Kepinska-Welbel:1996). In music education systems, where private tuition takes place, the teacher has to intervene if parental ambition may interfere with the student's development. This task needs to be handled with care so that conflict between the teacher and parents will not be detrimental to the student's

development. The music psychologist can play a key role in minimising conflict between the teacher and parents.

As the student matures, his or her own aims, values and ideas become more important. A significant phase in the young musician's life is when he or she makes the decision to become a professional musician. Students often need substantial psychological support to ensure that the transition from secondary school to a tertiary institution, as well as the role of student to that of active professional, is fluent.

Although this study focuses on cello training at pre-tertiary level, it is interesting to note that psychological support rendered to students upon enrollment at tertiary level receive priority. Newly enrolled students at tertiary institutions such as the Chopin Academy in Warsaw, are tested not only for their musical ability, but also for intelligence, personality, neuroticism and anxiety. The psychologist then collaborates with the teachers to render the necessary support to the student.

Kepinska-Welbel (1996:266) identified eight categories of problems most frequently encountered in students studying music:

(1) problems with learning
(2) problems with artistic development and professional identification
(3) problems with adaptation and interpersonal conflicts
(4) stage fright
(5) depression, anxiety, breakdown and stress
(6) family problems
(7) overload and burnout
(8) symptoms of psychotic behaviour

High achievers, such as winners of competitions and students with excellent grades, frequently approach psychologists for assistance and often show reluctance to become professional musicians (Kepinska-Welbel 1999).

Psychological support for the more gifted student becomes complex because the personality traits most common among gifted individuals require a higher level of skill to deal with. These personality traits, as outlined by Silverman (Clark 2008:128) include emotional complexity in the form of "sensitivity, perfectionism, intensity and introversion". Of these, sensitivity seems to be one of the earliest and most central traits. Sensitivity may include feelings that are easily hurt, a strong response to criticism, compassion for others, and even strong physical reactions to light, noise, texture and foods.

Unrealistic goals that can flow from perfection and high expectations by the student can result in frustration and feelings of incompetence.

The main objective of therapeutic work is to help the student develop a more realistic self-image (usually by boosting self-esteem), to become more competent, not only musically but in all spheres of life, and to cope with difficult situations (Kepinska-Welbel 1996:266-267). This can be achieved by including three types of musical achievement motivation (Kepinska-Welbel 1999:268):

(1) *short-term motivation*, which applies to the duration, quality and opportunities to practice, the ability to concentrate on a given activity and a practice strategy
(2) *medium-term motivation*, which is focused on more distant goals, such as preparing a piece, acquaintance with the literature and completing a year at college
(3) *long-term motivation*, which is focused on imagined or envisaged roles as a professional musician, dreams of winning contents, identification and the accomplishment of artistic ideals

Instrumental teachers also have a great deal of responsibility in instilling the vital ingredient of self-belief in their students (Presland 2005). According to Parncutt and McPherson (2002:39), motivation should be an integral part of all teaching and learning.

Kepinska-Welbel (1996:269) concludes as follows:

> If the student is to study music efficiently, he or she must achieve harmony in the functioning of all three levels of motivation and a deeper awareness of the need to set goals and assignments independently and actively and not to be steered from without. Teaching students … to be professionally competent requires that they learn not only to be technically efficient, to memorise their repertoire, and to accumulate musical experience, but also to plan and steer their own professional development, to be constantly ready to undertake musical assignments, to be prepared to practice and find satisfaction when they do as planned.

1.3.5.5 Peer support

Students can benefit from peer support in different ways. In an endeavour to harness this powerful resource, schools as well as tertiary institutions implement systems of peer assessment. The Department of Music at the University of Ulster implemented such a system of peer assessment of performance in its BMus course. It experienced that students "developed skills in critical listening, research, evaluation, questioning, negotiation, oral presentation, communication and report writing … furthermore students gained in confidence and became more aware of their strengths" (Presland 2005:246). Although the application of peer assessment would not be so effective at an advanced level of training, it could be beneficial at the lower levels, especially when administered on a more informal basis. The more advanced student with highly advanced playing skills

would obviously need assessment by highly skilled, experienced musicians with a standing that is acknowledged in the music field.

Informal discussions with peers in an informal, unthreatening environment proved to be a healthy forum for articulating their ideas with other students on issues such as nerves, practice and concert performances. In a study by Kingsbury (1988:5), investigating the importance of the peer environment to students, he concluded that "their feelings of self-confidence and worth were manifested in a complex weave of intensely ambiguous friendly-competitive social relationships". They treasured the opportunity to perform to familiar faces, to receive peer feedback and to see their teacher in a more informal, social situation. In the chamber music situation, peer feedback of the members through collaboration, advice and feedback proves to be extremely beneficial in most cases.

In this section, the issue of the different sources of support to the student was discussed. Although it cannot be claimed that the subfactors discussed are the only ones that can contribute to the support system of a music student, and as such be categorised under the exact headings as discussed above, the literature indicates that support of the music student and its significant contribution to the development of such a student, is extremely important. Motivation is an overriding objective.

1.3.6 The curriculum

According to Wiles (1999:4), the concept of curriculum can be defined in several ways. The author notes that curriculum was traditionally perceived as information passed from one generation to the next in the form of organised knowledge. This kind of curriculum could comprise essential subjects or involve the mastery of a collection of books. During the early 20th century, the social changes impacted upon the basic curriculum which was then delivered to the

general (not elite) population. The concept of curriculum was subsequently defined as an intention rather than a subject. The diversity of learners during the middle years of the 20th century directed the focus of the curriculum towards what was experienced by the student. However, it was during the last three decades of the 20th century that curriculum planners defined curriculum according to the product or outcomes. "By identifying the outcomes in advance, curriculum planners could work backwards to set the conditions necessary to achieve their goals" (Wiles 1999:4).

In this section, the merits or outlines of the curricula applied in the four countries covered in the study will not be discussed. The cello syllabi will, however, be discussed in Chapter 2.

The broad impact of the curriculum on cello training will be discussed briefly under the following headings:

- content of the curriculum
- combination of curricula
- regular examinations
- structured curriculum
- unstructured curriculum

1.3.6.1 Content of the curriculum

The content of the curriculum has a significant impact upon the developmental process of the student as well as on the teacher's lesson planning and tuition method.

Scholars have indicated that the content of a curriculum can be influenced by a number of factors, depending on the function of the curriculum, the context within which it is used, the type of students, the teachers who will use the curriculum, as well as the type of assessment to be used. Hence, different types of curricula are drawn up, including the objectives-based curriculum, the literature-based curriculum, the skills-based curriculum, the knowledge-based curriculum and the grade-age-related curriculum (Conway 2002:56). Each of these curricula will be briefly discussed below.

(a) Objectives-based curriculum

This model involves a four-phase process, namely:

(1) developing objectives
(2) sequencing those objectives (often referred to as “scope and sequence”)
(3) designing activities to meet the objectives (lesson plans)
(4) designing evaluation tools to assure that learning takes place (tests)

This model has been pervasive in curricula design, but has also been criticised for its linear design by scholars arguing that “real teaching does not occur in such a clear-cut line” (Conway 2002:56).

(b) Literature-based curriculum

In this model, instruction is designed around particular musical literature. Reynolds (2000:31) contends that “repertoire selection has a major impact on what students will and will not learn, and it should help their musical understanding and appreciation”.

(c) Skills-based curriculum

This model includes skills, such as the actual skills required to play an instrument (technical skills) at a certain level, aural skills, sight-reading skills, ensemble-playing skills, memory skills and improvisation. During assessment of these skills, not only the technical abilities of the student are demonstrated, but also his or her musical understanding. The latter is closely intertwined with the knowledge-based curriculum.

(d) Knowledge-based curriculum

These curricula focus on the knowledge base, including knowledge of music theory, history and musical terms. Care should be taken to balance knowledge with skills.

(e) Grade-age-related curriculum

When grade and age are coupled in a curriculum, this may be problematic for students developing at a faster or slower pace than their peers. Most examining bodies design grade-related curricula, to bypass this problem. Students can then develop at their own speed and enter for examinations when they are ready for assessment at a certain level. When curricula are coupled with grade and age, it is necessary to afford gifted students an opportunity to demonstrate their abilities in such a way that the curriculum and assessment process does not hamper their development.

(f) Standards-based curricula

According to Wells (1997), curricula can be based on the national standards prescribed by the government or governing bodies for music education. The standards provide a focus point for curriculum design as well as a common set of goals and concepts.

The music examination bodies and syllabi used for the training of cellists, usually incorporate several of the above-mentioned curricula. The cellist's practical skills and musical understanding are assessed through repertoire pieces, technical exercises and etudes, scales and arpeggios, sight-reading, aural skills, and in some cases, improvisation and memory skills. Theoretical knowledge is usually assessed separately by means of writing music theory, harmony or music history and formal analysis examinations.

In some instances, the students entering for the practical cello examination are required to pass a theoretical examination, prior to entry. Passing the theoretical examinations is also a requirement for passing the overall grade at music schools.

As indicated earlier, the content of the curriculum has a critical impact, not only on the student, but also on the teacher in particular. Teachers, especially those with limited experience, structure their lesson plan and tuition methods around the required outcomes or assessment methods. Since teachers are often pressurised into delivering results through students obtaining high marks during examination or test assessment, they tend to structure and scaffold their lessons to match the desired outcome when the student is assessed. The impact of different types of curricula on the teacher's teaching methods and the student's development will be discussed in the sections below.

1.3.6.2 Combination of curricula

A combination of curricula can be encountered with teachers teaching in a free music education system where compliance with a certain syllabus is not required. Students may be entered for examinations through a local and/or international

examining body (ie the Associated Board of the Royal Schools of Music).[9] Private teachers are often in a position to use a combination of curricula and methods, depending on their own musical education and experience. For example, a Russian cello teacher in Germany may apply the Russian method of the Children's Music School, although the students will play examinations required by the Association for German Music Schools (Verband deutcher Musikschulen).

Teachers can also incorporate repertoire or technical exercises from a variety of syllabi to meet the student's individual needs or general development as a musician. For most examinations, a limited number of scales, technical exercises and repertoire pieces are required. Harris and Crozier (2003:112) caution that when teachers only work through the required repertoire, etc., with their students, without supporting it with additional technical exercises and repertoire pieces, this may result in musical malnutrition and poor development of the student.

1.3.6.3 Regular examinations

In a structured music education system such as a music school, college or conservatory, regular assessment in the form of examinations or tests is common. Generally two sessions of assessment take place per annum. The advantages and disadvantages of such a system will be briefly discussed below.

9. Some students wish to obtain a national, and international qualification from an examining body. Leading music institutes often require applicants to pass a certain examination before they are considered for an audition.

(a) Advantages

Regular assessment ensures that students practise consistently to meet the requirements to proceed to the next level. As part of the assessment, students have the opportunity to perform. Although the experience of the performance under examination circumstances (usually conducted in a classroom with one or more adjudicators) is somewhat different from a public concert, the student can gain positive experience for performance in general. Another advantage of regular assessment is that teachers (especially those with limited experience) can monitor their teaching methods through the outcomes of examination results. Not only can the results mirror a possible lack in the student's development, alerting the teacher to attend to certain problems, but also confirms when a student's development is moving in the right direction.

(b) Disadvantages

Assessment through regular examinations also has its disadvantages. Gifted students progressing faster than their peers, may be hampered in their development if the music education system does not provide adequate flexibility in assessment. Deliberate preparation to meet strict examination requirements in a level-age-based curriculum system where assessment takes place only at designated times during the academic year, may impede those students who develop more rapidly, if the lower examination has to be passed before they are allowed to continue to the next level. Another disadvantage of regular examinations is that teachers are often under pressure to help the students to meet the requirements for the next level, causing them to focus more on what will be assessed instead of what is necessary for a balanced development as musician. Etudes and technical exercises are often neglected, especially if these are not required during examination assessment. When students are expected to do examinations frequently, the time between these examinations is often not adequate to solve technical problems. Since new repertoire pieces have to be performed, teachers and students are often unable to adequately focus on

technical issues. The focus shifts to rounding off the repertoire, while the technicalities are sometimes brushed over.

In summary, those implementing assessment systems should ensure that provision is made for students developing at a faster rate than their peers, as well as for students who need to be assessed at less regular periods. The latter often occurs when students change from one teacher to another, causing a student to change his or her technique. Adequate time should then be allowed to focus on technical issues without additional pressure to perform certain repertoire pieces.

1.3.6.4 Structured curriculum

When the term “structured programme” is used, one should beare in mind that such a programme requires that a certain level must be passed through assessment, before the student is allowed to proceed to the next level. Against this background, the advantages and disadvantages of such a programme will now be discussed.

(a) Advantages

- When a student progresses through a structured programme, passing through scaffolded levels by way of examination, this can provide the teacher and student with concrete evidence of progress from one level to the next. It can also provide teachers with a certain amount of security that certain skills have been developed and basic steps in the development have been attended to, before the student can proceed to the next level. When a student passes through a scaffolded structured programme, this enhances his or her chances of identifying any “gaps” in his or her development and to

ensure that essential steps are not skipped with regard to knowledge and skill that could result in an incomplete musician in the future.

- When a student changes to another teacher, it is easier for the new teacher to assess the student's development when he or she has passed through a structured curriculum. The new teacher can obtain a better grasp of the student's past training, and to make more informed decisions about the planning process of the student's development in the future.

(b) Disadvantages

- In a structured system where students have to pass a certain level before proceeding to the next, this regulation can be detrimental for students who make rapid progress and then need to wait until they are assessed before they are allowed to proceed to the next level. The student's progress can then be obstructed, especially when assessment can only take place at designated times and not necessarily when the student is ready at an earlier stage.

- Teachers working in a structured programme can also be inhibited, especially when the programme is linked to the school curriculum, which corresponds with the student's grade and age level. Since a certain curriculum must be followed during the academic year, the teacher's freedom to develop strategies for each student's individual needs can be hampered, especially in the case of gifted students.

1.3.6.5 Unstructured curriculum

In an unstructured programme, students may enter for examination at any given level, regardless of whether the level prior to the level entered for, has been passed. If a teacher feels that a student's level of skill and knowledge is sufficient to be assessed at a certain level, the student may then enter to be examined. Although the syllabus or curriculum is scaffolded, passing of the prior level is not a prerequisite. The Associated Board of the Royal Schools of Music (ABRSM) and the strings syllabus from the American String Teachers Association (in collaboration with the National School Orchestras Association) follow an unstructured curriculum.

The unstructured curriculum can be advantageous when a student's development is faster (or slower for others)[10] than his or her average peer. Any student, regardless of age, may be entered at any appropriate level for examination up to grade 8 of the ABRSM.[11] Gifted students may thus skip examinations, allowing them to continue their development without having to pass a certain examination before they are allowed to continue to the next level. The freedom that such a curriculum offers can be advantageous for teachers to develop strategies to suit the special needs of each of their students individually. When a student needs time to work on a certain area, say, vibrato, the teacher and student will not be pressurised to prepare for an examination in order to proceed to the next level, as is the case in a structured system.

10. Examining bodies such as the Associated Board of the Royal Schools of Music (ABRSM) make provision for candidates who develop at their own speed. Any level of examination can be taken at any age, thus affording early beginners or late starters (including adults) an opportunity to enter for examinations.

11. For diploma examinations, prerequisite examinations have to be passed before candidates may enter. For grade 6 to 8 practical examinations, candidates are required to pass the grade 5 music theory examination before entering.

1.4 SUMMARY

In this chapter, the literature study has focused on the factors which could significantly contribute towards enhancing cello training. Five critical success factors were identified which include the

- quality of the teacher
- talent and giftedness
- support given to the student
- acquired skills
- curriculum

The impact of each of these factors upon cello training was scrutinized, as well as the supporting sub-factors associated with each of the main critical factors. In the next chapter cello training in the four countries involved in the study, will be discussed, with emphasis on the training systems and assessment requirements for cellists.

1.5 CHAPTER LAYOUT

The study comprises the following chapters:

Chapter 1: Introduction and literature study
Chapter 2: Cello training in Germany, Russia, the UK and the USA
Chapter 3: The research methodology
Chapter 4: Statistical analysis
Chapter 5: Findings and recommendations

CHAPTER 2

CELLO TRAINING IN GERMANY, RUSSIA, THE UK AND THE USA

2.1 INTRODUCTION

This chapter focuses on the training of cello students,[1] in the four countries, based on different curricula as guidelines to prepare these students for tertiary education. Naturally, these curricula would differ in content and levels of evaluation. One would also expect the progress levels throughout the learning process to vary in the different countries (Woody 2000:56-61). Furthermore, it should be borne in mind that owing to cultural heritage, each of the selected countries has its own history of the development of cello training. This in itself is a rich source of uniqueness and imbues cello training in each country with a distinct personality.

The development of the different cello schools in the four countries will be briefly discussed in order to provide background on the current training systems. These systems will be discussed in section 2.3, followed by a comparison of the syllabi used in cello training and assessment.

2.2 HISTORICAL SKETCHES OF THE CELLO SCHOOLS

2.2.1 Germany

The violoncello was introduced to Germany by Italian musicians, but because of the preference for the viola da gamba, the cello was slow to gain acceptance

1. A “student” refers to any young cellist learning to play the cello.

among court musicians. By the mid-18th century, however, the cello was widely accepted, and at several courts, a number of quality violoncello performances were presented (Walden 1998:33-34).

Bernhard Romberg (1767-1841) is considered to be the father of the German cello school. He was one of the most prolific cellists in the latter half of the 18th century, revolutionising the technique and exploring its capabilities in a way that prepared the way for the technical demands of the 19th century. He was the main link between Boccherini and Duport. Servais and Davidov expanded upon Romberg's developments (Campbell 2004:27; Ginzburg 1983). Romberg expanded the expressive and technical resources of the cello in his own compositions, which in turn inspired contemporary composers to incorporate these resources in their compositions. Romberg's cello method of 1839, was accepted and taught at the Paris Conservatory, and published in Paris, Germany, Austria and England. Romberg also visited Russia on six occasions, and through his performances, stimulated a considerable amount of interest in cello playing among Russians. Some of his most outstanding students were Mathieu Wielhorski, Friedrich Kümmer, August Prell and Friedrich Dotzauer (Campbell 2004:30).

Germany was unified in 1871 with a multiplicity of independent governments, which resulted in a varied musical life dominated by court musical establishments such as those of Berlin, Dresden, Munich, Stuttgart, Mannheim and Hamburg. The Dresden court deserves special mention for its tremendous influence on cello playing. Through the work of its founder, J.J. Friedrich Dotzauer (1783-1860) and his followers, cello technique was taken to a higher level, and this had a repercussive effect on generations to follow.

Dotzauer appears to have been one of the first cellists to hold the bow close to the frog, as is the practice today. This was in contrast to the French school at the time, which recommended that the bow should be held a certain distance from

the frog (Campbell 2004:32). Dotzauer was not only an accomplished soloist and the principal cellist of the Dresden court orchestra, but also a reputable teacher. His students, including Friedrich August Kümmer, Karl Schuberth and Karl Dreschler, were exponents of the Dresden School of Cello Playing, which had a profound influence on cello playing both in Germany and abroad.

Kümmer (1797-1879) succeeded Dotzauer in Dresden as principal cellist in 1852. He was renowned for his elegant musical style and natural way of playing. “The systematic and progressive instruction contained [in] his Violoncell-Schule (c 1839) remains an invaluable resource for teachers and shows the musical emphasis which he placed on the teaching of technique” (Wijsman 2005:online). Several of Kümmer's students were prominent cellists in the 19th century, most notably Julius Goltermann (Stephenson 2005). Julius Goltermann (1825-1876), made a significant contribution through his teaching at the conservatory in Prague (De'ak 1980). One of his students, David Popper, who was one of the leading cellists of his time, enriched the cello repertoire through his compositions.

However, the influence of the Dresden school on cello performance in Russia should not be underestimated. Karl Schuberth’s (1811-1863) influence in this regard was significant. Nowadays he is remembered as the teacher of the most prolific Russian cellist of his time, Karl Davidov. The Dresden influence on the Russian cello school continued through the students of Karl Dreschler (1800-1873), including Bernhard Cossmann and Friedrich Wilhelm Grützmacher.

Bernhard Cossmann (1822-1910), who was well acquainted with Brahms and Liszt, taught at the Imperial Conservatory in Russia for four years after accepting the post during a concert tour of Russia in 1866 (Campbell 2004:34). Friedrich Wilhelm Grützmacher (1832-1903), who was admired for his technical mastery and expressive playing, was a sought-after teacher. "Grützmacher's influence dominated the Dresden school in the latter half of the nineteenth century" (Wijsman 2005:online). Influential cellists and teachers, who were strongly

influenced by Grützmacher, included Julius Klengel (1859-1933), Diran Alexanian (1881-1954) and Wilhelm Fitzenhagen (1848-1890) who had a huge impact on the Russian cello school. Fitzenhagen was appointed as professor at the Imperial Conservatory in Moscow and as solo cellist to the Russian Imperial Musical Society. Cellists of a high calibre were produced by Fitzenhagen, such as Anatoly Brandukov, Peter Danielshenko and Ivan Saradshev (Bredenhorst 2005:online).

Julius Klengel who also studied with Grützmacher, and later with Davidov, toured extensively as a soloist and performed in Russia many times with great success. He was in close contact with other eminent contemporary musicians, such as Joachim, Brahms, Rubinstein and Reger. His fruitful years of teaching at the Leipzig Conservatory produced students who achieved worldwide acclaim in the 20th century, most notably Emanuel Feuermann, Guilhermina Suggia, Paul Grümmer, Joachim Stutschewsky, Gregor Piatigorsky and William Pleeth (Campbell 2004:73).

The substantial heritage in the form of etudes, sonatas and concertos from cellist-composers who formed part of the Dresden school, is still used as building blocks in the training of cellists.

Other German cellists who had a significant influence on cello training during the 20th century, include Hugo Becker and Siegfried Palm. Hugo Becker (1864-1941) studied with Alfredo Piatti and Friedrich Grützmacher and had a busy concert schedule which took him, among other places, to Russia and the USA. He played in a trio with Ysaÿe and Busoni and was a sought-after teacher. Among his students were Enrico Mainardi, Beatrice Harrison, Herbert Walenn and Boris Hambourgh (Bredenhorst 2005).

Siegfried Palm (1927-2005) who, after initial cello training with his father, studied with Enrico Mainardi, taught at the Cologne Music College between 1962 and

1977. He taught master classes across Europe, the USA, Canada, New Zealand and Korea and was the President of the European String Teachers' Association. He received several awards for his performing excellence and pedagogical contributions. Many contemporary composers dedicated works to him, such as Blacher, Ligeti, Penderecki, Xenakis and Liebermann (Trenkler 2003:37).

Contemporary German cellists of the 21st century include Maria Kliegel and Julius Berger (Trenkler 2005: 144, 179). Germany's commitment to enhance cello training and performance can be observed through its hosting of the International Cello Festival in Kronberg. Renowned cellists and chamber musicians gather annually to participate in concerts and master classes at the Kronberg Cello Festival. The late Mstislav Rostropovich referred to Kronberg as "the cello capital of the world". The Kronberg Cello Academy was established by Rostropovich to enhance the training and career development of young cellists.

2.2.2 Russia

Duke Carl Ulrich of Hollstein-Gottorp, together with approximately 12 of his private band's musicians, fled to the Russian Imperial court in 1720. These German musicians were well trained, and many Russians received training in instrumental playing from them. The Emperor Peter II took cello lessons from Riedel who was appointed court master of fencing and cello playing in 1727. (Campbell 2004, Wasielewski 2001). Many foreign artists were employed at the court during Empress Anna's reign, among others, the Italian cellists, Gasparo and dall' Oglio. The first Russian cellist to play in the Imperial Band in 1770 was Chorschevsky (Wasielewski 2001). Count Mathieu Wielhorski (1787-1863) was a fervent exponent of the cello. This Polish nobleman whose family settled in Russia after the division of Poland in 1772, received cello lessons from Bernhard Romberg whom he employed for two years at his palace. (Romberg fled to Russia after Napoleon's invasion of Prussia in 1806.)

Through the patronage of the Russian Counts Saltikov, Wielhorski and Prince Golitsin, 19th century Russian musical life, as well as a particular interest in the cello, was stimulated, which in turn laid the foundation for the Russian cello school (Wijsman 2005).

Wielhorski left his Stradivari cello to Karl Davidov (1838-1889), who became the first Russian cellist of great prominence (Campbell 1999a:69). Tchaikovsky regarded Davidov as an exceptional artist and referred to him as “The Czar of Cellists” (Ginzburg 1950; Campbell 2004:50). Davidov received lessons from Heinrich Schmidt, and later from Karl Schuberth. In 1862, Davidov became the first Russian cellist to gain a professorship at the Saint Petersburg Conservatory (Wijsman 2005). The first conservatory in Russia was established by Anton Rubinstein and officially opened its doors in September 1862, although the Russian Music Society sponsored music classes from spring 1860 (Oldani 2007). Davidov’s technical mastery and expressive tone set a new standard for cellists, both in Russia and abroad. According to Campbell (2004:50), “Davidov was one of the first to link playing technique with anatomy and physiology, aspects also explored by Becker and, later, by Feuermann and Casals”. He was renowned for his singing tone quality and purity of intonation, and effected improvements in the technique of playing in thumb positions, later referred to as the ‘Davidov hinge’. Foreign students of Davidov at the Imperial Conservatory included Carl Fuchs, Leo Stern and Hanus Wihan (to whom Dvořák dedicated his cello concerto) (Campbell 2004: 49-50).

One of Davidov's Russian students, Alexander Wierzbilowicz (1850-1911), merits special mention. Through his appointment as cello professor at the conservatory in Saint Petersburg, he passed on the Russian cello school tradition. He became solo cellist to the Czar and cellist of the Saint Petersburg Quartet led by Leopold Auer (Wasielewski 2001, Campbell 2004).

In 1860, musical culture in Russia received a significant boost through the work of Nikolai Rubinstein (Anton's brother) who established a branch of the Russian Music Society in Moscow. Permission to build a second conservatory in Russia was received in December 1865, and the new conservatory in Moscow officially opened in September 1866.

The young Tchaikovsky was one of the first of many generations of eminent musicians to be appointed at the Moscow Conservatory. The renowned cellist, Wilhelm Fitzenhagen (to whom Tchaikovsky dedicated some of his cello compositions, and who significantly altered the composer's Rococo Variations) was appointed as cello professor. Among the students who studied with Wilhelm Fitzenhagen in Moscow, Anatoly Brandukov, Peter Danielshenko and Ivan Saradshev were exceptionally successful. Anatoly Brandukov (1856-1930) toured extensively as a soloist, and was greatly admired by Tchaikovsky, who dedicated his Pezzo Capriccioso to Brandukov (Wasielewski 2001).

The Russian cello school soared to unprecedented hights during the 20th century. Through the work of Simeon Kosolupov (1884-1961) the level of cello training and performance was significantly enhanced. As a former student of Wierzbilowicz in Saint Petersburg, he taught in Kiev before being appointed as professor at the Moscow State Conservtory from 1921 to 1961. Kosolupov emphasised the importance of technical skill in order to enhance the musical idea. He was known to drill the students with etudes, scales and chordal structures, and challenged them to know inside out, not only the cello part of the work they were performing, but also the orchestral or piano part. Among his many outstanding students were Valentin Berlinsky (Borodin Quartet), Svyatoslav Knushevitsky, Mstislav Rostropovich, Natalia Shakhovskaya, and his daughter, Galina Kosolupova (Campbell 2004:189).

However, it was Mstislav Rostropovich (1927-2007) who became one of the most celebrated musicians of all time. His mastery, not only as a cellist, but rather as a complete musician, is acclaimed worldwide. Rostropovich premiered over 70 new compositions of prolific contemporary composers (Campbell 2004:203; Todes 2007:42-43). His influence on the musical world could be observed through his commitment to the International Rostropovich Cello Competition and his patronage and support, which was given to various institutions for the development of young cellists.

Several of Rostropovich's Russian students who studied with him at the Moscow Conservatory have achieved great success in the West. These include David Geringas, the late Boris Pergamenshikov, Natalia Gutman, Karine Georgian and Misha Maisky. These highly successful solo cellists are also elite teachers, passing on their knowledge to the next generation of 21st century cellists.

2.2.3 The United Kingdom

Until the mid-18th century, it was not the cello, but the bass viol that dominated as the bass string instrument in England. The viol was regarded as a suitable instrument to be played by gentlemen, and thus allowed members of the nobility to take their part in a consort of viols (Campbell 2004:22). The cello only superseded the bass viol in English orchestras by 1733, although the players were mainly Italian artists.

One such Italian cellist, Giacobo Basevi Cervetto (1682-1783) went to London in 1728 and was one of the first to promote interest in the cello in England. Although few English cellists of distinction were to be found in the late 18th century, an exception was Bartholomew Johnson (1710-1814), the child prodigy Benjamin Hallet (b.1743) and John Crosdill (1755-1852) (Campbell 2004:22-23).

John Crosdill received his first cello lessons from his father, who was a student of Jean Pierre Duport. In 1776, Crosdill was appointed first cellist of the “Concert of Ancient Music” and later became a member of the Chapel Royal, the King's Band of Music, and Chamber Musician to Queen Charlotte. He soon became the most sought-after cello teacher in the country, and even taught the Prince of Wales (afterwards George IV) and members of the aristocracy who later became professional musicians (Campbell 2004:24).

Walden (1998:29) contends that “the two most visible names for violoncello performance in London during the 1770s and 1780s were those of James Cervetto and John Crosdill". James Cervetto (1747-1837), the son of Giacobo Basevi Cervetto, was born in London. He received his first lessons from his father and made rapid progress. He performed extensively and was highly praised for his expressive playing and beautiful singing tone. His cello compositions show a distinct advance in technique, especially in passage work and in the variety of double stops (Campbell 2004:25).

Violoncello methods published in Britain during the latter part of the 18th and first half of the 19th centuries demonstrate the variety of influences. French performance practices were prevalent, with some German publications and English methods by Crome (1765) and MacDonald (1811) (Walden 1998:27).
The most prolific early English cellist was Robert Lindley (1776-1855) who performed extensively and was the first professor of cello at the Royal Academy of Music when it was founded in 1822 (Walden 1998:26).

The Italian influence on cello training in the United Kingdom continued through the work of Alfredo Piatti (1822-1901). He was regarded as the most influential of the 19th century Italian cellists and played a significant role in London, not only as a performer, but also as a teacher. He held a post at the Royal Academy and also taught privately. Piatti taught many distinguished cellists of the next generation, including the German cellists Hugo Becker and Leo Stern, as well as

the famous British cellist William (W.E.) Whitehouse. Piatti was regarded, not only as the most prolific cellist in England, but also as one of the leading performing artists of his time (Campbell 2004:71).

Another English cellist of note was Edward Howell (1846-1998). Students of both Whitehouse and Howell at the Royal Academy of Music, where they were both active as teachers, formed a strong chain of English teachers in the 20th century (Wijsman 2005). Howell's one student, Herbert Walenn, arranged Romberg's treatise. Walenn founded the London Violoncello School in 1919 and taught several students whose contributions were significant in the 20th century, for example, Zara Nelsova, Boris Hambourgh, Mischel Cherniavsky, Douglas Cameron, Boris Rickelmann and Giovanni Barbirolli, who became famous as the conductor, John Barbirolli (Campbell 2004:78). Two of Whitehouse's students who excelled were Ivor James and Felix Salmond. Ivor James (1882-1963) taught for 34 years at the Royal College and contributed greatly to the art of cello playing in Britain as well is in the field of chamber music. Felix Salmond (1888-1952) who premiered some of Elgar's works, emigrated to the USA where he contributed significantly to the development of cello playing (Campbell 1999(b):78). Douglas Cameron (1902-1972) was an accomplished soloist and excellent teacher, and his teaching method was highly regarded by Tortelier and Feuermann (Campbell 2004:80).

Other accomplished British cellists were May Mukle, Beatrice Harrison, Thelma Reis, Christopher Bunting and Amaryllis Fleming. But it was Jacqueline du Pré (1945-1987) who was the jewel in the crown of the British Cello School. She captured audiences through her vivid and highly expressive playing. Her teacher, William Pleeth (1916-1999), also taught Robert Cohen who was the winner of several international competitions. Contemporary British cellists of note include Alexander Baillie, Colin Carr, Julian Lloyd Webber, Steven Isserlis, Raphael Wallfisch and Natalie Clein.

2.2.4 The United States of America

At the beginning of the 20th century, many musicians sought refuge in the USA as a result of the political turmoil and wars in Europe and Russia. It can be said without any doubt that these musicians, who included talented cellists, had a considerable impact upon the musical life and the enhancement of music in the "new world".

One of these talented musicians was Grigory Piatigorsky (1903-1976), who fled Russia in 1921, and arrived in the USA in 1929, after spending a few years in Germany. He subsequently performed in the most celebrated concert halls in the USA and paired up with two other famous Russian immigrants, Sergei Rachmaninov and Jasha Heifetz. He was appointed as head of the cello department at the Curtis Institute in Philadelphia. In 1962, the Grigory Piatigorsky Prize, awarded annually to a promising young American cellist, was instituted by the Violoncello Society in New York (Fyodorova 2005). Piatigorsky's immense pedagogical influence is evident in his students, many of whom are internationally renowned today. These include Leslie Parnas (winner of the Casals Competition in 1957), Stephen Kates and Ralph Kirshbaum.

Three Hungarian imigreés who had a profound impact on the level of cello training and performance in the USA were Janos Scholz, Gabor Rejto and Janos Starker. They studied with a student of Popper, Adolf Schiffer, in Budapest before emigrating to the USA. Scholz was one of the founder members of the Violoncello Society in New York in 1956, while Rejto held several professorships in the USA (Campbell 2004:152). However, it is Starker who, through his masterful playing and teaching, still has a profound influence on the younger generation. One of his students, Gary Hoffman, was the first American to win the Rostropovich competition in 1986. The same competition was won in 1981, also by a student of Starker's - this time the German cellist, Maria Kliegel. Both

Hoffman and Kliegel are internationally renowned artists today who also teach master classes across the globe.

American teacher, Margaret Rowell who taught at the San Francisco Conservatory and the surrounding area, was in contact with many renowned cellists who visited her home. She learned from the great cellists by studying them and using them as her textbook. They included Casals, Rostropovich, Tortelier, Piatigorsky, Fournier, Nelsova, Greenhouse and Rose (Blum 1992: 1035). Her approach was aimed at achieving physical freedom of movement, which helped many students to achieve success – one of them being Irene Sharp, who also teaches extensively in the USA today.

A prominent teacher in the USA, whose contribution as a teacher should not be underestimated, was Leonard Rose (1918-1984). Two of his students, Lynn Harrell and Yo-Yo Ma, actively contribute to the enhancement of cello performance and training through their master classes and performances across the globe.

Another contemporary American pedagogue is Bernard Greenhouse. He studied with Felix Salmond at the Juilliard School, New York, and continued his studies with leading cellists of the 20th century, such as Emanuel Feuermann, Diran Alexanian and Pablo Casals. He performed extensively as a soloist, and was a founding member of the renowned Beaux Arts Trio (Trenkler 2003:32). Greenhouse continues his influence upon the young generation of cellists through his teaching of master classes. Representatives of the contemporary American cello school are Ofra Harnoy, Matt Haimowitz and Han-Nah Chang.

2.3 CONTEMPORARY MUSIC EDUCATION STRUCTURES

2.3.1 Germany

The Association for German music schools (Verband deutscher Musikschulen, VdM) mainly controls the music education system in Germany. There are approximately 950 music schools in the 16 Ländler of the Federal Republic of Germany, with more than one million children, youngsters and adults[2] benefiting from musical training.

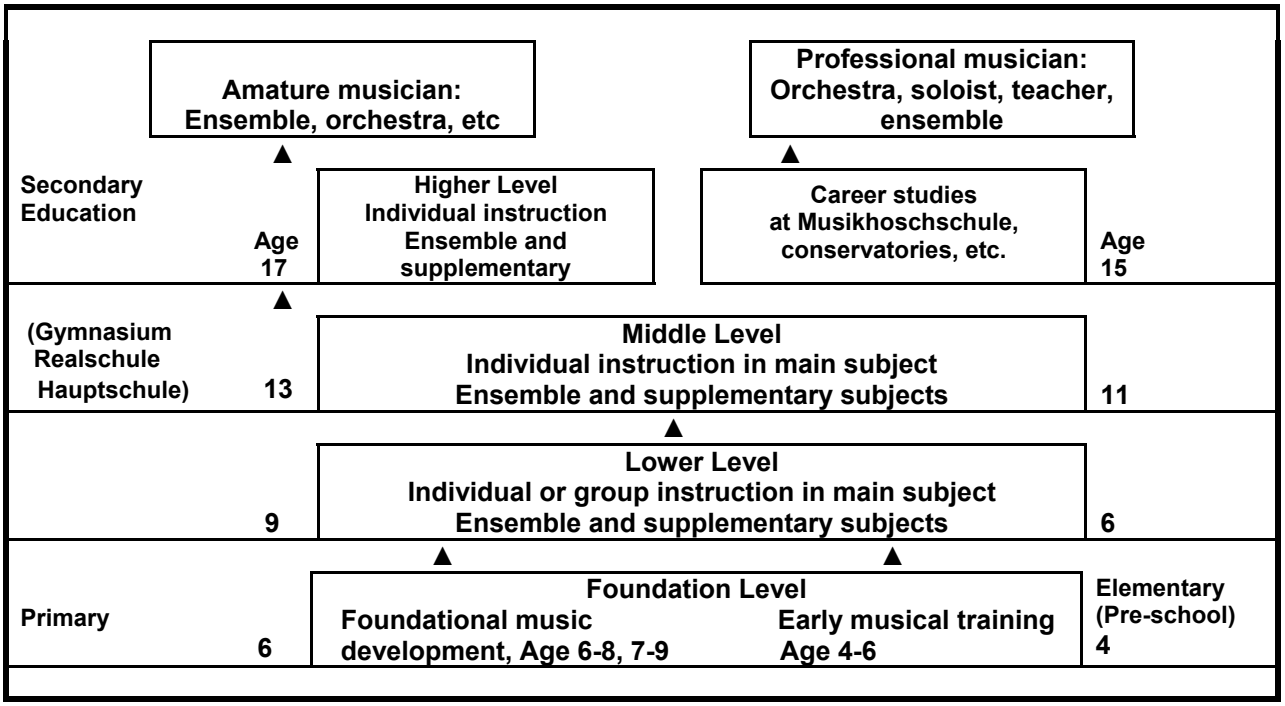
The Music School Education Programme in Germany is structured in four levels, namely:

(1) the foundation level (Grundstufe)
(2) the lower level (Unterstufe)
(3) the middle level (Mittelstufe)
(4) the higher level (Oberstufe/Berufsstudium)

The diagram below depicts the four levels:

2. Adults, who aspire to improve their musical skills, usually for purposes of amature music-making, may also receive training at a music school.

FIGURE 2-1 Structural plan of the German music schools



Source: Translated from the *Lehrplan Violoncello, Verband deutscher Musikschulen* (1997:3)

The Association for German Music Schools (Verband deutscher Musikschulen) approved the above structure in 1969. It is also responsible for the syllabi which provide a framework and learning outcomes for music teachers.

(a) ***The foundation level***. This level serves to engage in and develop an elementary music foundation. The musical abilities of the student should be assessed and the instrumental or vocal training embarked on. The student can be taught for two years (from the ages of 4-6) in the "Musikalische Frűherziehung" (early musical training), or in the "Musikalische Grund-ausbildung" (foundational music development) when the student is six to eight years old.

(b) ***The lower, middle and higher levels***. Each of these levels includes approximately four years. The lower and middle levels can each be subdivided into two parts, consisting of two years each.

- ***The lower level***. This level serves to develop the basic technical and musical skills of the literature involved. The emphasis is on the importance of laying a solid foundation for music theory and aural training
- ***The middle level***. At this level the technique and a number of artistic skills are developed.
- ***The higher level***. At this level particular performing/artistic skills are further developed and enhanced, so that talent can mature in order to prepare the student to participate in amature musical events of a high quality or to prepare the way for a career as a professional musician.

A student's individuality plays a significant role in the selection of learning material. A vital goal of training is to direct the students in such a way that they can work and learn new material independently. Individual performance skills and ensemble playing skills, on the one hand, and aural skills through practical playing and understanding of what has been played, on the other, need to be carefully considered in order to establish coherence between the two. The importance of developing proper internal sound perception and inner hearing is underlined from the outset. Singing is emphasised as an integral part of instrumental instruction (*Lehrplan Violoncello*:1997).

The Association for German music schools (VdM) offers a cello syllabus in which repertoire and etudes are meticulously listed and grouped according to the level of difficulty (4 levels) and time period. Although learning outcomes are provided for each level, the syllabus is vague about the quantity of repertoire pieces, etudes and 'scales and arpeggios' required. The quantity of work to be learnt, as well as the choice and sequence of repertoire, are left to the discretion of the teacher. Assessment can be done once a year, although examinations appear to be mainly required when students progress from one level to the next (for example from Lower level to Middle level, or from Middle level to Higher level).

The duration of the assessments also seems to be rather short (5-10 minutes) according to the music school in the city of Koblenz. (Online: Musikschule der Stadt Koblenz:2005).

However, the Association for German music schools (VdM) works closely with the *Jugend musiziert* competition and encourages performing through regular concerts. The VdM also hosts symposiums and seminars and collaborates with the German Music Council of the European Music Schools Union and the German Music Teachers Associations (FMV).

Although some private musical training does take place, most teachers offer tuition through a music school. Provision is made for exceptionally gifted children to study at the Musikhochschule, by allowing them to take purely artistic courses (performance). (Lohmar & Eckhardt 2007:148-149).

In 2007, the Hochschule für Musik 'Hanns Eisler' and the University of Arts in Berlin, agreed to collaborate with the music school "Carl Philipp Emanuel Bach" in Berlin, to offer quality training for gifted children of 10 years and older. Assessment is required for each semester. Students receive one 90-minute individual lesson a week. Piano is a compulsory subject, as well as aural training and pitch/tonality (Tonsatz) each with a 45-minute lesson a week.

Students are also involved in chamber music activities and are required to play in the orchestra, rehearsing 180 minutes a week (Online: Hochschule für Musik "Hanns Eisler":2007).

2.3.2 Russia

Pedagogy has always been closely related to national and cultural tradition and influenced by politics. This is especially evident in Russia.

An International Conference on *European higher music education: Russia, CIS countries and Europe. Current issues and future prospects* was hosted by the Saint Petersburg Conservatory in 2005. Reforms, in accordance with the principles of the Bologna Declaration were the focus of discussion. Since Russia added its signature to the Bologna.[3] Declaration, visible changes can be noticed. With regard to higher education the Russian public policy for education reflects new social and cultural conditions and state priorities. However, it has been emphasized that the existing Russian system should not be heavily modified as in other countries, since the continuity of the education process from school to college and to university has proved to be very effective.

Although changes in higher education can be noticed, the music school system functions in a similar way in modern Russia as in the time of Communism. Tuition fees are extremely reasonable.

During the Communist regime the music establishment soared to unprecedented heights. A key goal of the USSR was to demonstrate its power to the world at all possible levels. Numerous music schools, colleges, art institutes and conservatories were established. According to Bazikov (2002:107), by 1975, there were 5 234 music schools for children, 231 music colleges, 10 schools for the arts, 20 conservatories and eight institutes for the arts in the USSR. Great emphasis on successful participation in international (and national) music

3. (See *The Bologna Declaration* 2000:online.) The Bologna Declaration is a pledge by 29 countries to reform the structures of their tertiary education systems in a convergent way. Although the Bologna process aims at creating convergence, the fundamental principles of autonomy and diversity are respected. The process originated from the recognition that European higher education systems are faced with common internal and external challenges, while recognising the value of coordinated reforms, compatible systems and common action.

competitions resulted in a music education system that became increasingly specialised. As this study focuses on pre-tertiary education, the music school system will be discussed in more detail.

In the Russian Federation, a child is tested for aptitude at the age of five in order to establish whether he or she should take up a musical instrument, and if so, decisions are made about the choice of a suitable instrument. The child's physique, especially his or her hands, plays a vital role in the decision making.

The authorities also decide whether the child should attend a special music school where music-related subjects form part of the curriculum and taught during school hours at the school, or alternatively, whether music lessons will be taken after school at a music institution or music school, while music is not taught as a school subject. Children attending the latter (normal) schools can spend seven or eight years in such a school, before they need to go to a college (uchilshe) or special music school for the remaining four years of school.

Apart from normal music schools, several special music schools in Russia provide specialist music education for highly gifted children. The most prestigious of these is the "Gnessin Music School" in Moscow, which was founded in 1895 and named after its founders, Professors Yelena and Michael Gnessin.[4] The School does not only attract gifted Russian children, but also foreigners. Children from the age of five may enroll. Rigorous training as well as regular concert performances and assessments form part of the practical training. Music theory, aural training, ensemble and orchestral playing as well as piano lessons (as second instrument) are part of the music education. Students also receive academic education in mathematics and other subjects. High

4. The school was divided into elementary school and secondary school in 1920. "The 'musical institute' was opened in 1944, and in 1946 a complete 10-year primary school program was implemented. In 1992 the name 'Russian Academy of Music' named after the Gnessins' (RAM) was adopted, residing over the four schools: elementary school, 10-year primary school, secondary school (college) and academy with postgraduate courses." (Available: Online – Gnessin Academy: official website.)

standards are set for students, and those who fail to meet expectations, are dismissed.

Other activities include participation in festivals and competitions and performances in Russia and abroad. Many former students from the Gnessin School are renowned musicians in the international arena today. Among the cellists are Natalia Gutman, Natalia Shakhovskaya, Alexander Rudin and Alexander Ivashkin.

2.3.3 The United Kingdom

Cello training in the UK can be provided by choosing one of three options, namely taking lessons at a conservatory (usually through the junior division) or a school that employs a cello teacher, or taking private lessons.

The regulatory authorities in England, Wales and Northern Ireland, as well as the National Qualifications Framework, accredit the examinations of the Associated Board of the Royal Schools of Music (ABRSM). The graded levels are thus acknowledged and employed to set a standard of achievement, which is often used as a criterion for the assessment of students in primary and secondary schools.

According to the British Council's *Guide to UK Education* (2007:45) many independent schools also encourage students to take graded examinations in arts subjects such as music which, while not considered part of the academic curriculum, are valued by higher education institutions and score points on the UCAS[5] tariff.

5. UCAS: Universities and Colleges Admissions Service.

Students who enjoy private music tuition, also find these examinations beneficial to assess their own progress as musician. Trinity College London provides assessments through graded examinations which are acknowledged at schools for music credits.

The National Association of Music Educators (NAME) collaborates closely with government departments such as the Department for Education and Skills (DFES),[6] the Qualifications and Curriculum Authority (QCA), the Training and Development Agency for Schools (TDA) and the Department for Culture, Media and Sport (DCMS) as well as other professional associations such as the Music Education Council (MEC), the Federation of Music Services (FMS) and the Schools Music Association (SMA), the aim being to influence and develop policy and practice in all aspects of music in education.

Music institutions which were formerly primarily associated with musical training at tertiary level, have recently extended their training programmes to include a junior academy which provides musical training for children. An example of such an academy can be found at the Guildhall School of Music and Drama. Children attending local schools can then combine their general education with their musical training at such a junior academy.

Special music schools for gifted learners include, among others, the Yehudi Menuhin School and the Purcell School. At the former, the minimum age of learners is eight years, and only strings and keyboard players are taught. In contrast, all instruments are catered for at the Purcell school, at which the minimum age for learners is nine years. Apart from specialist training in music,

6. The Department for Education and Skills (DFES) was a UK government department between 2001 and 2007 and was responsible for the education system and children's services in England. The Department was split into two by Gordon Brown on 28 June 2007. The Department for Children, Schools and Families, and the Department for Innovation, Universities and Skills, replaced the former Department for Education and Skills (2007:online).

learners receive academic education and have to sit for GCSE and A-level examinations[7].

2.3.4 The United States of America

In the USA, authority for education policy and guidelines is shared by the US Department of Education, state departments of education, and county and local district boards of education. State departments of education create specific curriculum frameworks and guidelines and require assessment of student achievement (in some subjects), based on standards that each state determines. Curriculum authority and implementation rest with individual school districts and their boards (Smith 2003:54).

According to a national survey of arts education in public schools, in 1999 and 2000, music instruction was available in 94 percent of elementary schools, while 72 percent of those employed full-time specialists. Furthermore, 67 percent had dedicated rooms for music instruction. The survey also indicated that 90 percent of secondary schools offer music instruction. In the field of professional development, 72 percent of specialists received training focusing on arts instruction. Other data indicated that 69 to 77 percent of schools sponsored field trips. Only 46 percent of music educators agreed that parents support their efforts to educate their children, while 58 percent felt that they were supported by administration. These results varied from region to region, indicating that the West Coast districts lagged behind in support for music education specialists (Smith 2003:59; Carey, Kleiner, Porch, Farris & Burns 2002).

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7. GCSE: General Certificate of Secondary Education. The first formal academic qualifications which may be taken by schoolchildren in the UK are GCSE examinations. For the final two years of their compulsory education (ages 14 to 16), students work towards GCSE examinations, comprising a mix of compulsory subjects and other chosen subjects (on average eight GCSE subjects in total). GCSE's are awarded in a series of grades from A (highest) to G (lowest).

The Music Educators National Conference (MENC) called for developmental partnerships in tandem with local districts and music professionals. Music teachers associations in the different states, such as the Washington Music Educators Association (state of Washington), have a high school credit programme for applied music study. Through this programme, credit is granted for music study outside the school curricula. Supportive interaction between music teachers and public school music teachers is encouraged.

Goals in repertoire, technique, theory and other areas are set by the teacher and student. (This freedom granted to the student is not usual in most other countries such as Russia.) The teacher can also determine how and when evaluation will be given. Each school decides the unit of credit granted. The standard unit of credit is the same for any elective course. Teachers must be certified by the local Music Teacher's Association and are required to teach 36 weeks of lessons during the school year. The independent teacher, in cooperation with the school music teacher, evaluates the student's work. The teacher completes a report and a letter or pass/fail grade, depending on district policy, which is filed with the school. Proposals for credit from private music study may be accepted or rejected by each school district as it sees fit, since each district has its own set of guidelines and policies.[8]

During the 1990s, a movement towards national education and teacher standards resulted in the Goals 2000: Educate America Act. The aim to establish national competencies in all subjects and for all students across the country is of importance for arts education. Professional and educational arts educational organisations also support the concept of national music and art

8. The American String Teachers Association (ASTA) in collaboration with The National School Orchestra Association has developed a Certificate Programme for Strings. The programme was launched under the direction of Lya Stern in 1997, starting in the Maryland/DC chapter. New Jersey, Virginia, Florida and Hawaii soon followed. This programme is aimed at private studio teachers and their students. The programme consists of eleven progressive levels. Students may enter at any level, may repeat or skip levels and take the examination appropriate to their level, regardless of age. The programme is open to students from preschool to adult. The performance requirements and curriculum for cello can be found in Annexure A of this document.

requirements. The National Consortium of Arts Education Associations, which includes the American Alliance for Theater and Education, the Music Educators National Conference, the National Art Education Association, and the National Dance Association, has formulated standards for student achievement and learning in music, theatre, dance and the visual arts. These standards are presented in grade level clusters: grades K to 4, grades 5 to 8 and grades 9 to 12.

One of the most recent developments is that of learning-centred partnerships. This involves a shared recognition that music specialists, practising musicians, and classroom teachers all have key roles to play and that their respective areas of expertise must be honoured, developed and mobilised on behalf of educational excellence (Smith 2003, Peters 2001).

2.4 REQUIREMENTS FOR RELATED MUSICAL SKILLS

2.4.1 Aural training

Germany

From the outset, the importance of aural training can be observed in the training system. The focus is on singing, especially in the form of choral singing, as well as ensemble playing with a view to developing inner hearing. Aural training is compulsory from Lower level I to Higher level.

Russia

Intensive training on a weekly basis is required. Singing is a vital part of this training. (Children are required to sing when musical aptitude is tested prior to embarking upon musical training). All children are required to play the piano – hence cellists benefit from piano lessons as well. During aural training lessons, children are required to play various exercises on the piano. In order to enhance children's aural skills, ensemble playing and choral singing are also part of the curriculum.

The United Kingdom

Aural assessment is required as part of the practical cello examination. Students enrolled at a music institution, normally enjoy aural training on a regular basis (usually once a week), depending on the course offered. However, students who take private cello lessons often do not receive regular aural training. Teachers who give private lessons frequently do not attend to the prescribed aural training, since they are more preoccupied with the practical performance part of the assessment. In such instances, a teacher specialising in aural training must be approached to provide the necessary training. However, for financial and practical reasons, some students attend a "crash course" on aural training in order to prepare for the aural assessment several weeks before the practical examination. Such an approach, in which aural training is not provided on a more continuous basis, can be detrimental to a cellist's aural development.

The United States of America

Although aural training is recommended, it does not form part of the practical cello assessment, and is not a prerequisite for admission to practical examinations. This critical aspect of training can easily be neglected if the cello teacher does not ensure that the student receives aural training.

2.4.2 Music theory

Germany

Music theory training is received from the beginning. Elementry form analysis is introduced from the Lower level I *(Unterstufe I)* onwards, while harmony is introduced at Middle level I *(Mittelstufe I)* onwards. Instrument knowledge *(Instrumentenkunde)*, music history and improvisation also form part of the course.

Russia

Music theory training is offered from the outset. Form analysis is introduced at an early stage because cellists are required to play larger scale compositions such as sonatas, theme and variations, and concertos from the second year of cello training onwards. During the first year of playing, cellists are introduced to chordal structures with inversions since these structures are part of the requirements for "scales and arpeggios" during assessments or examinations from the fourth year onwards. Music theory and aural training are combined as one subject, resulting in extremely "practical-orientated" music theory training.

The United Kingdom

Although music theory is recommended, cellists can enter for practical ABRSM cello examinations grade 1 to 5, without being required to pass a theory examination prior to entry. However, music theory grade 5 is required prior to entry for the grade 6 to 8 practical examinations. Harmony is introduced in the grade 5 music theory syllabus. (An understanding of this is necessary for the aural assessments which form part of the practical grade 6 to 8 examinations). Children attending music institutions, usually receive music theory on a weekly basis. Those children who enjoy private practical tuition are required to enroll at an institution or take private lessons to ensure that their training in music theory does not lag behind.

The United States of America

Music theory is not obligatory as one of the requirements for cello examinations. Children need to enroll at an institution or take private music lessons with teachers specialising in music theory.

2.5 A COMPARISON OF CELLO EXAMINATION REQUIREMENTS

	GERMANY	RUSSIA	UK	USA
Repertoire pieces	Free choice from repertoire list prescribed for the 4 main levels of difficulcy	Two pieces[1] of which one must be a sonata or concerto (one or two movements). From level 8 (ninth year) 2-3 movements from a suite by J.S. Bach are required in addition to a sonata or concerto.	Three pieces	One piece. From level 8 a concerto movement or substantial piece, one short contrasting piece and one movement from a suite by J.S. Bach.
Etudes	Free choice from Prescribed etude books for the 4 levels	One etude[2]	Not required for ABRSM. One required for Trinity College	One etude
Scales and arpeggios	Not prescribed. Recommended in syllabus	One scale[3] with corresponding arpeggio, inversions and double stops. (Double stop scales are required from Level 5 onwards.)	Prescribed for each grade level. On average 5 Majors and 5 minors with arpeggios etc. (Double stop scales in grade 8.)	Prescribed for each level. Student may choose one scale and its arpeggio from 4 or 5 categories. (Double stop scales from level 5.)
Vibrato	Exercises introduced during Lower level I. Required for Middle level II.	Vibrato from third year of instruction. Required by the fourth year.	Required for grade 5 ABRSM.	Beginning on long notes for level 3. Required level 4.
Sight reading	Not prescribed. Recommended in syllabus from Lower level II Onwards.	Required. Teachers choose extract appropriate for the level.	Required. Published specimen sight reading tests for each graded level.	Required. Outline of level of difficulcy prescribed for each level.

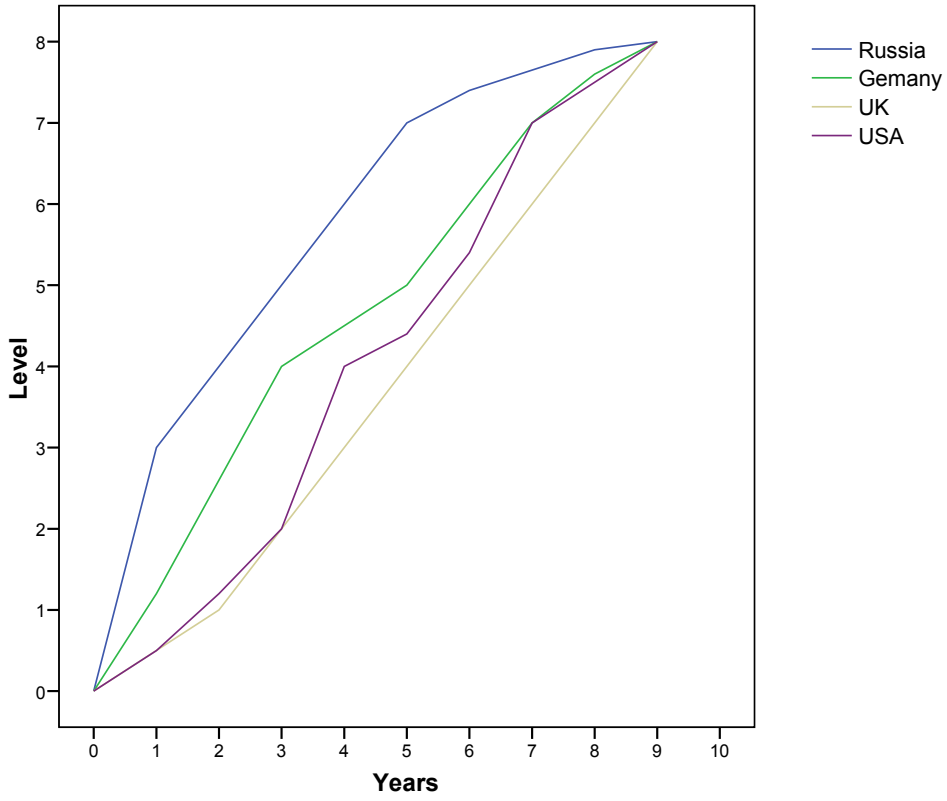
1. Eight to ten pieces from the Preparatory level to Level 3 must be learnt per annum, although only one will be assessed per examination. From Level 4 to Level 9 an average of 5 pieces must be learnt per annum. In addition 2 or 3 more substantial works (sonatas or concertos) must be studied (usually one or two movements), although only one will be performed per assessment.
2. Six to eight etudes must be learnt per annum, although only one is required per assessment.
3. Six to eight major and minor scales with their corresponding arpeggios, inversions and double stops must be learnt, although only one is required for each assessment.

Apart from the variation in requirements for cello examinations, the frequency of assessment varies from country to country. Since most of the assessment in the UK and USA is conducted through an unstructured training programme in which the levels are not age related and certain levels may be skipped, candidates may enter upon the discretion of the teacher. Assessments are thus conducted on request and are not compulsory. In Germany and Russia, however, assessments at the music schools are structured. Students have to pass a certain level at a certain age in order to progress to the next level. The assessment in Germany appears to be much less rigorous than in Russia. In German music schools, students are usually assessed once a year. Compulsory examinations take place when a student progresses from one level to the next (say, from Lower to Middle level). In Russia, cello students are assessed twice a year, and those who fail to meet the required level are dismissed and training discontinued. Cello students also have to do competitive examinations which are conducted approximately every four years of training, whereafter the more talented students are selected to continue with training.

The frequency of tuition also varies considerably in Russia in comparison with the other three countries. Cellists receive two individual lessons a week, each lesson being approximately 45 to 90 minutes. In Germany, the UK and the USA, the norm is to have one individual lesson of approximately 45 to 60 minutes a week. The instruction is highly focused in Russia. Since students receive two lessons per week, teachers are in a position to control and correct errors sooner than in cases where students enjoy only one lesson per week. In addition, the student's learning tempo is usually accelerated because of the pressure to prepare for the following lessons which is normally in two or three days' time. The higher frequency of lessons contributes significantly to the progress of the cello students, as indicated in Figure 2-2.

The progress of students at pre-tertiary level through the various curricula in the four countries is presented in the graph below, in order to reflect any variation that may exist.

FIGURE 2-2 Progress of cello students in four countries



The above graph is based on the repertoire requirements of the given cello syllabi followed in Germany, Russia, the UK and the USA.[9] Repertoire requirements during the first nine years of instruction are indicated.

9. The four syllabi, which can be found in Annexure A, includes the following: (1) *Lehrplan – Violoncello* (cello syllabus) of the Verband deutscher Musikschulen (German Music Schools); (2) Cello syllabus of the *Central Music School*, Moscow, Russia; (3) *ASTA with NSOA Certificate Program for Strings* (American String Teachers Association with the National School Orchestra Association Certificate Program for Strings). Performance requirements and suggested curriculum for cello; (4) The Associated Board of the Royal Schools of Music. Cello syllabus: 2005-2009.

Russia and the USA have a foundation level with a prescribed repertoire to be played after approximately one year of instruction, after which the usual levels/grades follow. The graph is based upon the first nine years of training. Germany also has a foundation level (Grundstufe), although students may spend up to two years at this level. Since the structural plan of the German Music School is divided into five levels (Lower level 1, Lower level 2, Middle level 1, Middle level 2 and Higher level), with a duration of two years for each of the first four levels, a more general view of the level of repertoire requirements provided for these four levels, had to be adopted.

Levels 1 to 8 indicated, are based on the standard of the graded levels of the Associated Board of the Royal Schools of Music, London. Technical requirements such as etudes, scales and arpeggios, were not taken into account, since comparisons need to be made of similar requirements. Etudes are not required for examination assessment by the Royal Schools of Music, and the German Music School Association syllabus does not provide a list with scale requirements at the four levels, although a substantial list of etude books is provided.

In the Russian curriculum, it is significant that the progress during the first four years of tuition is faster than in the other three comparative countries. However, the level reached during eight years of instruction converges dramatically for Russia, Germany the UK and the USA to reach the same level during the ninth year. At the fifth year, there is still a large gap in the level of competence required (see Russia and the UK). From the sixth to the ninth year, the level achieved in Russia slows down from year 6 to year 9. However, the rate of progress in the UK accelerates significantly from year 5 (although 3 levels behind Russia, with a significant difference right from the second to the fifth year).

Looking beyond the ninth year and projecting progress along the existing graph lines of the four different countries, it would be interesting to investigate the outcome and reasons for the differentiation that may evolve. Since this area is outside the ambit and objective of this study, it opens up a new field of research. In addition, an in-depth analysis of the impact and tempo of curriculum deployment of each country's curriculum upon what happens to the career of a specific cello student after reaching level 8, would also provide new perspectives on cello training beyond level 8.

2.6 SUMMARY

In this chapter, cello training in Germany, Russia, the UK and the USA, was discussed. Historical sketches of the four national cello schools as well as the current state of music education structures are provided. Requirements for related musical skills, namely aural training and music theory are discussed, followed by a comparison of cello examination requirements.

With the literature study (chapter 1) and background of the training systems in which cellist are trained in the four countries as a basis, the next phase of the study can be attempted, which is to describe the research methodology applied to arrive at scientific deductions to address the research question.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The literature study in chapter 1 identified factors that impact upon cello training. These broadly include the talent of the student, acquired skills, the quality of the teacher, the support given to the student and the curriculum applied in the training process. In the above-mentioned factors, certain sub-factors were discussed, for example, aural training and theory when acquired skills were considered, and musical creativity and aptitude for the cello under the talent and giftedness of the student. In this chapter, these factors will be subjected to a research process in order to achieve the research objectives identified in chapter 1, namely to determine what factors are considered to be critical success factors for cello training. In order to achieve this objective, the research process will be structured in such a way that the outcome will provide information that could make a significant contribution towards cello training in the future.

The research strategy followed in this study falls within the ambit of the quantitative paradigm. According to Neuman (2003:16) most quantitative data techniques condense data in order to see the big picture, whereas qualitative methods are at best understood as data enhancers. In table 3.1 below, Watkins (2006:7) distinguishes the characteristics of quantitative and qualitative approaches to research in terms of the research focuses.

TABLE 3.1 Distinguishing characteristics of quantitative and qualitative approaches

Research focus	Quantitative (positivistic)	Qualitative (phenomenological)
Purpose of the research	To explain and predict To confirm and validate To test theory	To describe and explain To explore and interpret To build theory
Nature of the research Process	Focused Known variables Established guidelines Static design Context-free Detached view	Holistic Unknown variables Flexible guidelines Emergent design Context-bound Personal view
Method of data collection	Representative, large sample Standardised instruments	Informative, small sample Observations, interviews
Analytical form of reasoning	Deductive analysis	Inductive analysis
Method of communicating Findings	Numbers Statistics, aggregated data Formal voice, scientific style	Words Narratives, individual quotes Personal voice, literary style

Source: Watkins (2006:7). Adapted from Leedy & Ormrod (2001:102)

In this study, the emphasis will be on the effort to quantify the statistical analysis of the critical success factors identified for cello training. A sample of cello teachers in the four countries selected will be required to answer a questionnaire reflecting their opinions on the importance of 30 questions, ranked in order of significance. Forced ranking will be applied to finally identify the contributing factors in order of importance.

From the above table one may infer that this study will focus on known variables (as explored in chapter 1), use a convenience sample analysed by standardised instruments, and analytical reasoning based on deductive analysis and statistics.

In this chapter, specific attention will be focused on the research design, which will include providing details of the design of the questionnaire, the sample, and determining the validity and reliability of the data obtained. This will be followed by a description of the statistical method applied to analyse the data collected in the questionnaire.

3.2 THE RESEARCH DESIGN

According to Yin (1994:20), a research design can be defined as: "... the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions. Colloquially a research design is a logical plan for getting from here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions." This study will comprise a large scale survey falling within the positivistic (quantitative) paradigm to collect a large quantity of data or evidence through the application of questionnaires. It will also be a cross-sectional study that will collect information on variables in different contexts, but at the same time. The data are thus collected only once and over a short period of time before they are analysed and reported.

This study will be based on a case study research approach. It represents an empirical enquiry investigating the phenomenon of critical success factors in cello training in four different countries. Multiple sources of evidence are used (Remenyi, Williams, Money & Swartz 2002:48–58; Hussey & Hussey 1997:59–72; Leedy & Ormrod 2001:149–155).

3.2.1 The questionnaire

Babbie (2004:244) describes a questionnaire as a document that contains questions and other types of items to solicit information appropriate for analysis. Various methods are available for the collection of quantitative data, including interviews, questionnaires, tests/measures and observation (Esterby-Smith, Thorpe & Lowe 1991:116). The questionnaire method was used in this study. The questionnaire is a form containing a set of questions addressed to a number of respondents as a way of gathering information for a survey. Such a questionnaire can be either structured or unstructured. Perkins (2003:2) distinguishes a structured questionnaire as one in which the questions asked, as well as the responses, are completely pre-determined. Respondents may only select an answer from the ones provided. In the unstructured questionnaire, the questions are loosely predetermined and the respondents can reply in their own words and in any way they see fit. In this study, a structured questionnaire was used to gather information to answer questions identified in the problem statement, as well as achieving the goals of the study. In table 3.2 below, the advantages and disadvantages of questions as a method to obtain information are highlighted.

TABLE 3.2 Advantages and disadvantages of questionnaires as a method to obtain information

ADVANTAGES	DISADVANTAGES
Questionnaires are very cost effective when compared to face-to-face interviews. This is especially true for studies involving large sample sizes and large geographic areas.	Many written questionnaires have a low response rate. Response rates vary widely from one questionnaire to another (10%-90%). However, well-designed questionnaires consistently produce high response rates.
Questionnaires are easy to analyse. Data entry and tabulation for nearly all surveys can be easily done with many computer software packages.	A major disadvantage is the inability to probe responses. Questionnaires allow little flexibility to the respondent with respect to response format. By allowing frequent space for comments, the researcher can partially overcome this disadvantage.
Questionnaires are familiar to most people. Nearly everyone has had some experience completing questionnaires and they generally do not make people apprehensive.	The lack of personal contact will have different effects depending on the type of information being requested. A question-naire probing sensitive issues or attitudes may be severely affected.
Questionnaires make it possible to interview a large number of respondents simultaneously, and this speeds up the research process.	Questions are standardised and very often this leads to various people interpreting questions in different ways, thus giving incorrect answers.
Questionnaires permit anonymity. Most people agree that anonymity increases the overall response rate as well as the likelihood that responses are a true reflection of respondents' opinions.	Respondents may answer superficially, especially if the questionnaire takes a long time to complete. The common mistake of asking too many questions should be avoided.
Questionnaires reduce bias. There is uniform question presentation and no middleman bias. The researchers' own opinions will not influence the respon-dent's answers.	It's natural to assume that the person to whom the questionnaire was sent will be the respondent, but in many cases, family members or friends may fill it out, therefore not reflecting honest results.
Questionnaires are less intrusive than telephone or face-to-face surveys. When a respondent receives a questionnaire in the mail, he/she is free to complete it in his/her own time.	Questionnaires are simply not suitable for some people. A written survey to a group of poorly educated people may not work as a result of reading skill problems, and this may lead to inaccurate results.

Source: Trochim (2002:online)

Scrutinising the above disadvantages in table 3.2, it is clear that not all of them are applicable to this study. It is trusted that the response rate will be sufficient to ensure a valid outcome. It is also hoped that the respondents will not take too long to complete the questionnaire since great care was taken to ensure completion in a relatively short space of time.

In the design of the questionnaire, two key principles need to be kept in mind when questions are formulated, namely to avoid confusion and to keep the respondents' perspective in mind. Neuman (2006:278-281) mentions 10 aspects to avoid when compiling survey questions:

(1) jargon, slang and abbreviations
(2) ambiguity, confusion and vagueness
(3) emotional language and prestige bias
(4) double-barrelled questions
(5) leading questions
(6) asking questions that are beyond the capabilities of the respondent
(7) false promises
(8) asking about distant future intentions
(9) double negatives
(10) overlapping or unbalanced response categories

3.2.1.1 The questionnaire format

In the first section of the questionnaire[1], factual biographical details such as age, level of education, length of service, etc., were asked, followed by closed-end questions related to cello training in the second part. It was decided to ask closed-end questions only, to determine the response of the respondent in a pre-determined manner.

1. The questionnaire can be found in annexure B on the CD in the back cover.

Questions relating to cello training were categorised reflecting upon the critical success factors of cello training. Respondents were required to rank the factors and subfactors in order of their judgement from 5 = most important to 1 = least important. In the example below, the factors that influence support given to the student were ranked.[2]

Factor 1 Support given to the student

Teacher's support	5
Financial support	2
Parental support	4
Psychological support	3
Peer support	1

In the above example, the teacher's support was ranked the most important, parental support the second most important, psychological support the third most important, financial support the fourth most important and peer support the least important.

A total number of 30 factors were selected, which covered the five main critical success factors in cello training and also five subfactors in each success factor category. A pilot study was launched involving 10 cello teachers to ensure that the questions were unambiguous and relevant to the study.

3.2.2 The sample

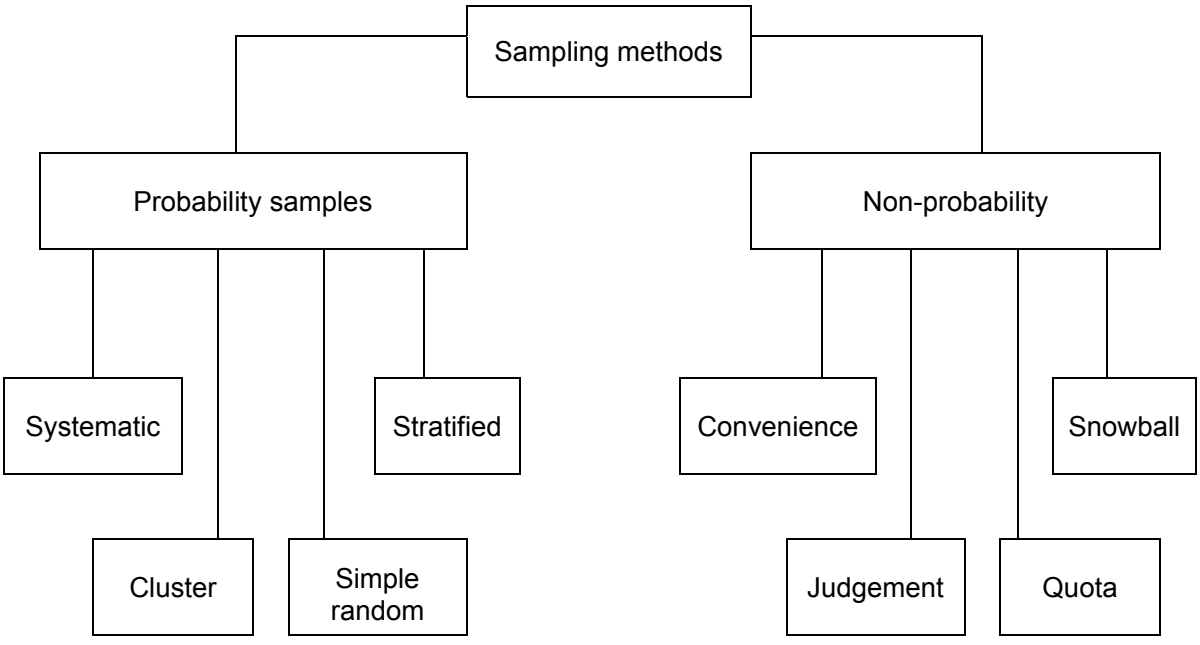
Howard Becker in Neuman (2006:219) states that "sampling is a major problem for any type of research". Not every case of interest should be studied, nor should there be a desire to do so. Every scientific enterprise tries to find out

2. Ranking involves the process of positioning items on an ordinal scale in relation to others. A ranking can be obtained by evaluating each item in the collection in such a way that any two items can be compared to see which should come higher in the ranking. This technique is commonly used in non-parametric statistics. Examples of rankings are FIFA (world soccer rankings) and international music competitions where the finalists are ranked to choose a winner.

something that will apply to everything of a certain kind by studying a few examples, the results of the study being "generalisable". The main objective of researchers, whether qualitative or quantitative, is to obtain a representative sample, or a smaller collection of units from a larger population to produce accurate generalisations about the larger group.

According to McDaniel and Gates (1999:411), the "selection of a sampling method will depend on the objectives of the study, the financial resources available, time limitations and the nature of the problem under investigation". The authors group the major alternative sampling methods under two headings, namely probability sampling methods and non-probability sampling methods, as depicted in Figure 3-1 below.

FIGURE 3-1 Classification of sampling methods



Source: McDaniel & Gates, (1999:416)

From Figure 3.1 above, it is clear that a number of alternative samples can be grouped under each of these headings.

According to Chisnall (2005:103) “probability sampling, also known as random sampling, results in every sampling unit in a finite population having a calculable and non-zero probability of being selected in the sample”. The author holds that probability sampling is statistically sounder, since the standard error of the mean can be calculated and, because of the mechanical selection of those who are to be interviewed, the bias of interviewing only the most easily available respondents is avoided.

On the other end of the scale non-probability samples, refer to “samples that include the selection of specific elements from the population in a non-random manner. Non-randomness occurs when population elements are selected on the basis of convenience” (McDaniel and Gates 2001:413).

The sample population for this research study will be selected by means of non-probability sampling, which will be conducted through convenience sampling. According to Tustin, Ligthelm, Martins and Van Wyk (2005:346) sample members are chosen on the basis of being readily available or accessible, and thus, selection is done on the basis of convenience.

The ideal would have been to distribute the questionnaire randomly to cello teachers selected from a data base of registered cello teachers of the controlling body of the different countries. However, convenience sampling had to be adopted for reasons discussed below.

In the case of Russia, it was not possible to distribute the questionnaire electronically, because a database for cello teachers was not available. Cello teachers in Russia do not belong to a music association that can provide a database. The teachers thus had to be contacted personally and requested to complete the questionnaires. A hands-on approach was adopted, visiting cello

teachers in person, who completed the questionnaires on hard copy. This was done in Moscow and Saint Petersburg.

Thus, the sample population for this research study was conducted by means of convenience sampling.

In order to distribute the questionnaire to cello teachers in the other three countries involved in this study, namely Germany, the UK and the USA, music associations such as the European String Teachers Association (ESTA) in Germany and the UK, as well as the American String Teachers Association (ASTA) were approached. Members belonging to these associations, are protected by privacy invasion laws. A database could thus not be made available directly to the researcher. However, the associations assisted in distributing the questionnaires to their members who completed the questionnaire through a direct Web-link, ensuring that the respondents remained anonymous. In Germany, the questionnaire was also distributed by the Verband deutscher Musikschulen (Association for German Music Schools) in a similar manner.

Table 3.3 below indicates the number of respondents in each country. A total of 313 completed questionnaires were received. An exceptionally favourable response was received by respondents in the USA.

TABLE 3.3 Sample size

Country	Sample size
Russia	53
Germany	60
UK	52
USA	148
N	**313**

Stoker, as indicated by White (2003:78) provides the following guidelines (table 3.4) to determine the size of a sample:

TABLE 3.4 Determining a sample size

Population	Percentage suggested	Number of respondents
20	100	20
30	80	24
50	64	32
100	45	45
200	32	64
500	20	100
1 000	14	140
10 000	4,5	450
100 000	2	2 000
200 000	1	2 000

Source: White (2003:78)

In the final analysis care was taken not to overgeneralise the results of the study to the population that may not be represented by the sample.

3.2.3 Criteria to judge the quality of the research

3.2.3.1 Reliability

Reliability refers to the "ability of a measure to produce consistent results when the same entities are measured under the same conditions" (Field 2005:743). Cronbach's alpha measures reliability. It is a measure of a model or survey's internal consistency and also known as a scale reliability coefficient. Cronbach's alpha is used to assess the reliability of a rating by summarising a group of tests or survey answers that measure some underlying factor. A score is computed

from each item and the overall rating (also referred to as a scale) is defined by the sum of these scores over all the items. A widely accepted value for Cronbach's alpha in the social sciences is 0.70 or higher for a set of items to be considered a scale.

3.2.3.2 Validity

Babbie & Mouton (2004:121) define validity as the degree to which an empirical test adequately reflects the real measure of the concept under consideration. In statistics, a valid measure is one that measures what it is supposed to measure. Validity in research refers to the extent to which the outcome of the study is a function of the programme or approach being tested, rather than the results of other causes not systematically dealt with in the study, and whether, in the real world, the results would apply to similar programmes (Babbie & Mouton, 2001:121)

3.2.4 Forced ranking

Five main factors or dimensions that influence cello training were identified in the literature study and incorporated in the design of the questionnaire. These factors comprise subfactors that also have a definite impact upon the specific factor to which they belong. It is possible to determine the relative weighting or importance of each of these factors or subfactors in relation to the other factors in the comparison through forced ranking. Forced ranking involves the process where respondents are restricted to rank the subfactors in order of importance, as the example on p. 116. This would provide a means to arrive at significant decisions in respect of the order of importance of these factors, as viewed by the respondents of the questionnaire, as well as to detect whether there are significant differences between the perceptions of respondents in the four different countries. This would provide evidence for the drafting of conclusions for cello training in the future.

Forced ranking has its origin in the field of performance appraisal using a relative comparison approach where employees are evaluated in terms of their work performance or achievements, in comparison to their fellow employees (Grote 2005:10). By implementing a forced ranking procedure, the rational is to differentiate whether it is the student's talent, the teacher or any given factor which, in the case of this study, will contribute most significantly towards training the student optimally. The scores obtained in this forced ranking will be purely informational. It will provide the information, which will give a specific rating to the importance or relevant importance of each of the factors that will be considered.

Statistical tests employed to analyse data on the basis of ranks include the Friedman test, the Kruskal-Wallis test and the Mann-Whitney U-test.

3.2.5 The Friedman test

The Friedman test is a nonparametric alternative to the repeated measures analysis of variance. The test can be utilised for evaluating a small sample, if the hypothesis concerns ordinal outcomes, or when the assumptions required for a repeated measured analysis of variance are not met. The only assumptions made by the Friedman test are that the test variables are at least ordinal and that their distributions are reasonably similar.

The Friedman test ranks the scores in each row of the data file independently of every other row (in this case the data were already ranked). For each of the five items, these ranks are summed and then divided by the number of respondents to yield an average rank for each item.

The Friedman chi-square tests the null hypothesis that the ranks of the variables do not differ from their expected value. For a constant sample size,

the higher the value of the chi-square statistic, the larger the difference will be between each rank sum of the variable and its expected value.

In this study, Friedman tests will be performed for each set of questions belonging to the five critical success factors for each of the four countries. This will be done in order to establish if the rankings of the items are “valid”, that is, that 1,2,3,4 and 5 are indeed statistically different from one another.

3.2.6 The Kruskal-Wallis test

When assessing differences between several independent groups, the one-way independent ANOVA is to be used as an appropriate test. However, it has a nonparametric counterpart known as the Kruskal-Wallis (Kruskal & Wallis 1952). In the case of non-normally distributed data, or when some of the assumptions of the ANOVA are violated, this test should be used instead.

The Kruskal-Wallis test (Field 2005:543-545) is based on ranked data. The data are ranked from lowest to highest, ignoring the group to which the score belongs. The lowest score is assigned a rank of 1, the next highest, 2, until all the scores are ranked. When all the scores have been ranked, the scores are collected back into their groups. The ranks for each group are then added up. Field (2005:544) explains that “the sum ranks for each group are denoted by R_i (where i is used to denote the particular group)”. Once the sum of ranks has been calculated for each group, the test statistic, H, is calculated through the following equation:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(N+1)$$

where R = the sum of the ranks for each group

N = the total sample size

n_i = the sample size of a particular group

In effect, the sum of ranks for each group is squared, after which this value is divided by the sample size for that group. These values are then added up, thus dealing with the middle part of the equation. The remaining part of the equation involves calculating various values on the basis of the total sample size. Field (2005:545) postulates that "this test statistic has a special kind of distribution (the chi-square distribution). In this distribution, there is one value for the degrees of freedom, which is one less than the number of groups (k - 1)" which in this case is the four countries, namely Germany, Russia, UK and the USA.

Kruskal-Wallis tests were performed for the different critical success factors to determine if there are differences between Russia, Germany, the UK and the USA in the rankings.

If the asymptotic significance is less than the specified level of significance (in this study 0.05), at least one of the groups differs significantly from the others. In this case, the next step is to conduct suitable tests to determine which groups differ from one another. Mann-Whitney's U-statistic will be reported and interpreted for these *post hoc* tests.

3.2.7 The Mann-Whitney U-test

The Mann-Whitney test is a nonparametric test, measuring differences between two independent samples (e.g. Russia and Germany). It tests whether the

populations from which the two samples are drawn, have the same average value. It is the non-parametric equivalent of the independent t-test (Field 2005:737).

3.2.8 Exploratory data analysis

The first step in the data analysis process will be to summarise the information in tables and graphs to gain an understanding of the sample and the results. The biographical information will be displayed in clustered bar charts, pie charts and stacked bar charts, whereas the information on the critical success factors, will be displayed using spiderwebs and graphs.

3.3 SUMMARY

In this chapter, the steps followed in the research process were explained. The research design was described focusing upon the design of the questionnaire and the sample size. Subsequently, the statistical method to be deployed in analysing the information received through the questionnaires, was discussed. This included forced ranking, the Friedman test and the Kruskal-Wallis test. In addition, *post hoc* tests to assess differences between groups, were discussed. Specifically, the Mann-Whitney U-test will be applied where and if deemed necessary.

The next chapter, chapter 4, will be devoted to the statistical analysis of the data obtained from the questionnaires.

CHAPTER 4

STATISTICAL ANALYSIS

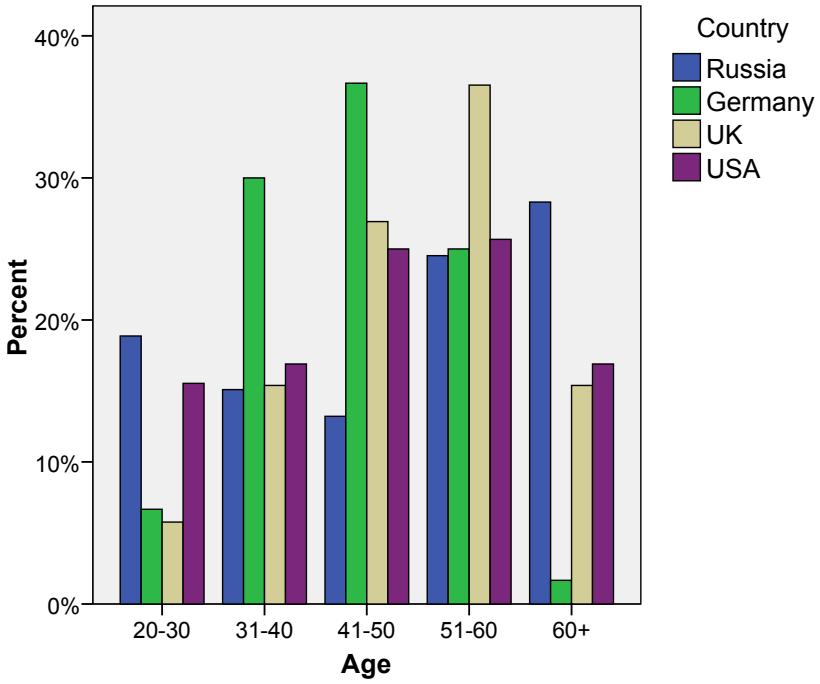
4.1 EXPLORATORY DATA ANALYSIS

The aim of the initial data analysis is to summarise the information in tables and graphs in order to analyse the sample and explain the results. In the first section (4.1.1) the biographical information is summarised in graphs while the critical success factors (CSF) are summarised in tables and spiderweb plots in the second section (4.1.2). Once the average ranks have been calculated, they were ordered from smallest to largest, hence indicating their relative importance from least important to most important, for each country across the CSF. Section 4.2 contains the results of the Friedman tests. These tests were conducted to verify the validity of the rankings from one to five. Kruskal-Wallis tests, with corresponding post hoc Mann-Whitney U tests, are presented in section 4.3. The aim was to establish if the four countries differ from one another with respect to the CSF. The results are summarised in section 4.4.

4.1.1 Biographical information

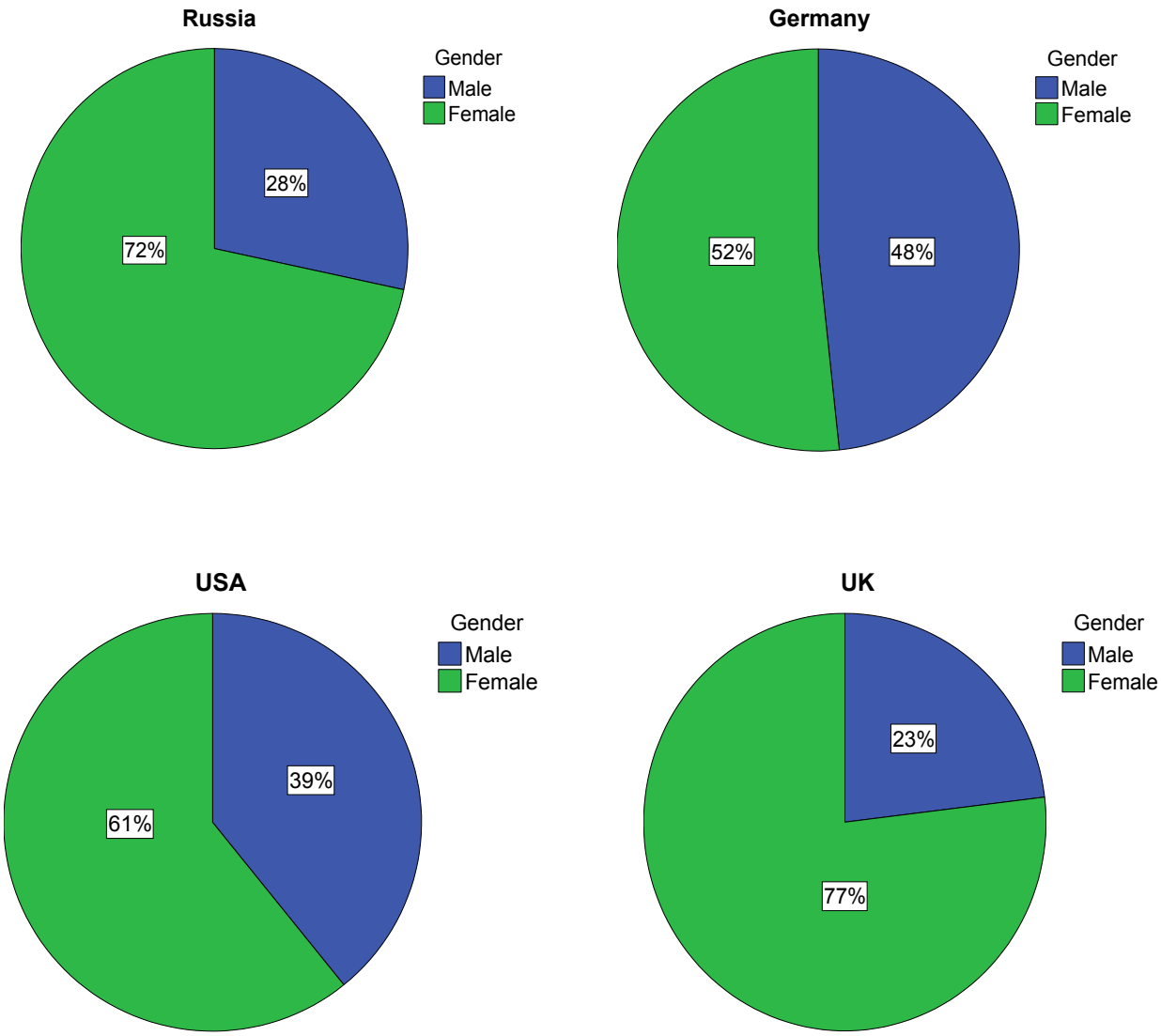
The focus of the study is a comparison between four different countries: Russia, Germany, the UK and the USA. The biographical details are thus summarised and presented in clusters comprising these four countries. The complete set of output is available in annexure C on the CD in the back cover. However, it should be borne in mind that the statistical results are based on a convenience sample. The biographical information displayed in pie charts, bar charts and clustered bar charts cannot be considered to be representative of the total population.

FIGURE 4-1 Clustered bar chart of the five age categories



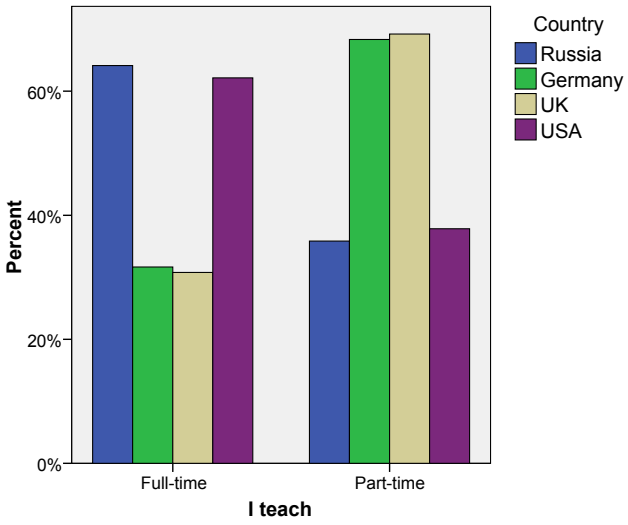
Russia has the highest proportion of young teachers (19%), followed by the USA (16%). The majority of the teachers in Germany are between 30 and 50 years of age (67%) with a further 25 percent in the 51 to 60 age category; only 2 percent of the teachers are older than 60. In Russia, 28 percent of the teachers are older than 60, followed by the USA (17%) and the UK (15%). Teachers in the UK are generally older than in the other three countries. It is interesting to note that Russia also has the highest percentage (28%) of teachers older than 60. This phenomenon correlates strongly with the fact that 42 percent of the respondents have been teaching for more than 30 years.

FIGURE 4-2 Pie charts of gender



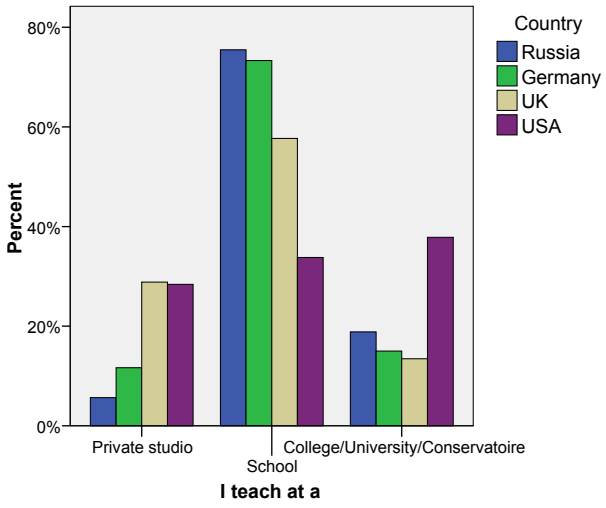
With the exception of Germany, where the gender split is approximately 50-50, the majority of music teachers are female.

FIGURE 4-3 Clustered bar chart of full time versus part-time teaching



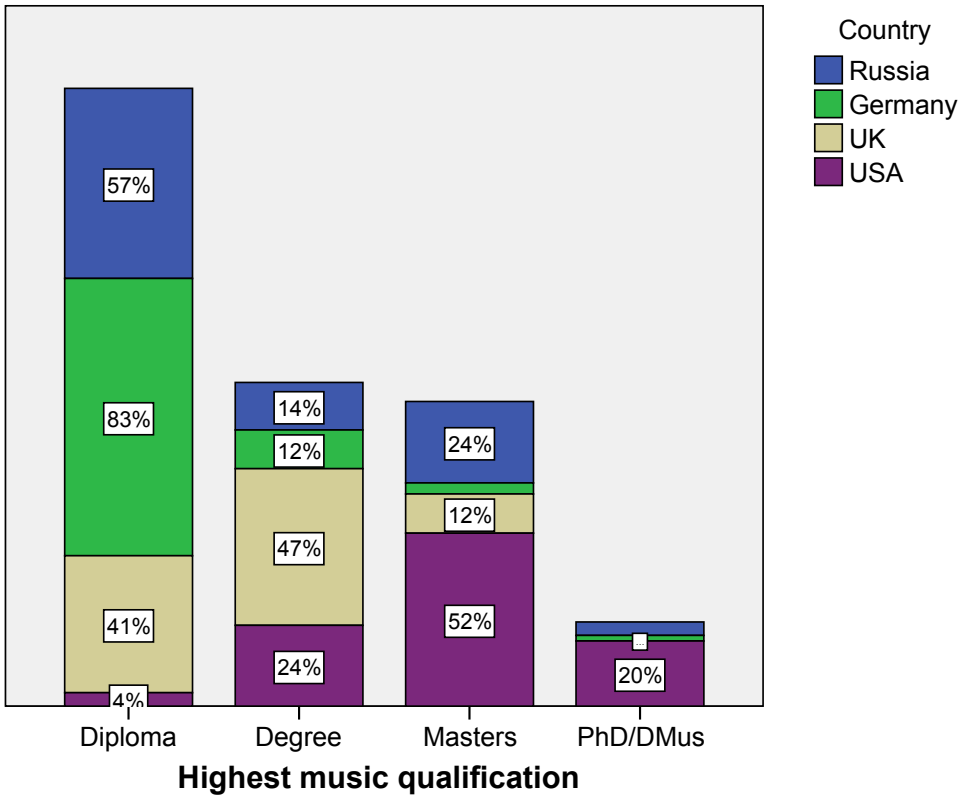
In Russia and the USA, more than 60 percent of the teachers are full-time, while approximately 70 percent of the teachers in the UK and Germany teach on a part-time basis.

FIGURE 4-4 Clustered bar chart of teaching location



The majority of tuition takes place at school (Russia 76%, Germany 73%, the UK 58% and the USA 34%). It is noteworthy that in the UK and USA, almost 30 percent of the teachers have private studios. This phenomenon ties in with the fact that an unstructured curriculum is prevalent in these two countries, and examinations are conducted through examining bodies. Students generally receive private music tuition from a teacher who is not employed by an official institution. The examination and education system thus mainly provide and encourage private music tuition. In Russia and Germany, however, a structured curriculum, which is level and age related, is followed. Students therefore have to pass a certain level examination at a certain age, before they may proceed to the next level. Aspirant cellists thus rarely receive private music tuition. The USA has the highest proportion of teachers at a college, university or conservatoire (38%).

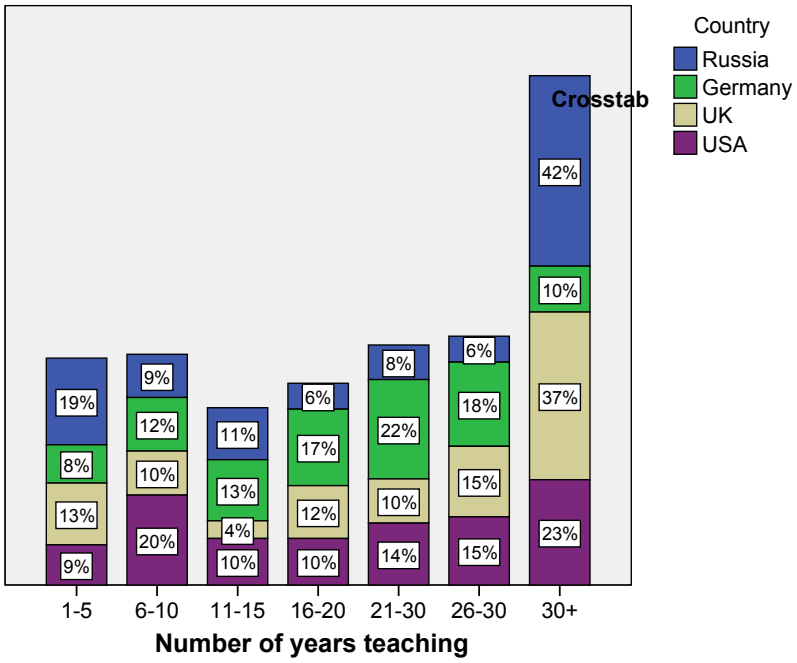
FIGURE 4-5 Stacked bar chart of music qualification



Overall, the teachers in the USA have higher qualifications than those in the other three countries. The 20 percent with a doctorate is in accordance with the high proportion of teachers at a college, university or conservatoire in the USA. Very few music teachers in Germany have a qualification higher than a diploma, while more than half of Russian teachers also have only a diploma. However, one should bear in mind that since 2005 the diploma awarded in Russia is regarded as being equal to a master's degree in the West. Students receive five-year tertiary education in Russia in order to obtain a diploma. In Germany, the diploma is equal to a B.Mus in other Western countries, usually obtained after four years of tertiary education. Since 2005, the B.Mus degree has been awarded in Germany.

A strong database of cello teachers teaching at university and college level in the USA was available to the researcher. This explains the high frequency of master's and doctoral degrees obtained by teachers in the USA, as well as the high proportion of teachers at a college, university or conservatoire (see figure 4.4).

FIGURE 4-6 Stacked bar chart of number of years of teaching cello



More than half the teachers are highly experienced and have been teaching for longer than 20 years – this is the case in all four countries. In Russia and Germany, a large proportion have been teaching for more than 30 years (42% & 37% respectively). Less than a third of the teachers have less than 10 years, experience. It is interesting to note that, although Russia has the highest percentage of teachers who have been working more than 30 years, the subfactor “Teacher’s experience” received the lowest ranking by the Russian respondents, in comparison with the other three countries.

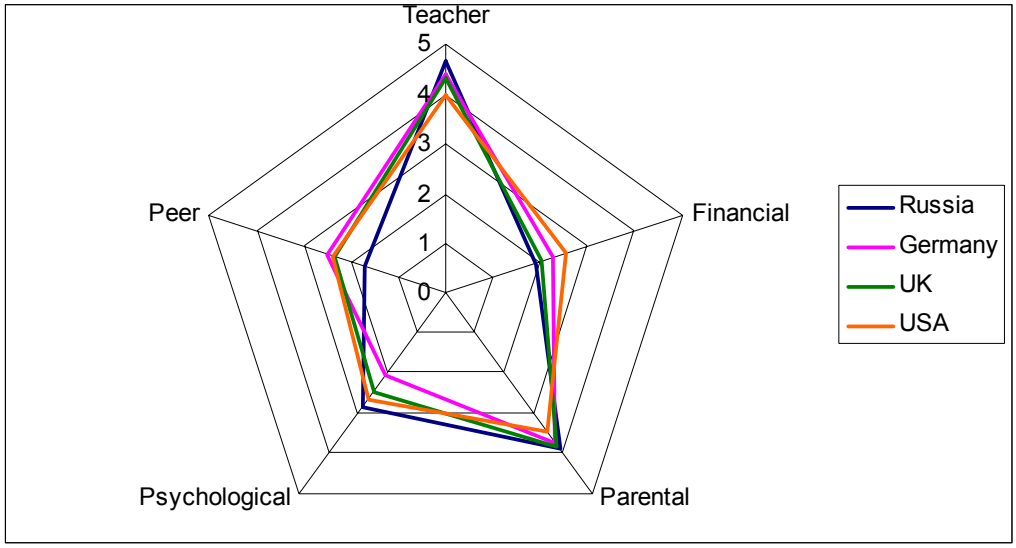
4.1.2 Critical success factors

The ranking of the critical success factors (support given to student; quality of teacher; talent and giftedness of the student; acquired skills; curriculum followed in teaching) by each country was determined by calculating the average rank for each component of the factor. The results are summarised in tables 4.1 to 4.6. The rank orders, indicating the relative importance of the five subfactors for each country are enclosed in brackets after the average ranks in the tables. Spiderweb plots of the average ranks were constructed to facilitate the interpretation of the differences between the four countries for the different critical success factors.

TABLE 4-1 Average rank and rank order of support given to the student

	Mean rank (rank order)			
	Russia	**Germany**	**UK**	**USA**
Teacher's support	4.66 (5)	4.40 (5)	4.33 (5)	3.96 (5)
Financial support	1.89 (2)	2.29 (2)	2.04 (1)	2.54 (2)
Parental support	3.91 (4)	3.74 (4)	3.83 (4)	3.47 (4)
Psychological support	2.83 (3)	2.06 (1)	2.46 (3)	2.66 (3)
Peer support	1.72 (1)	2.51 (3)	2.35 (2)	2.38 (1)

FIGURE 4-7 Spiderweb plot of support given to the student

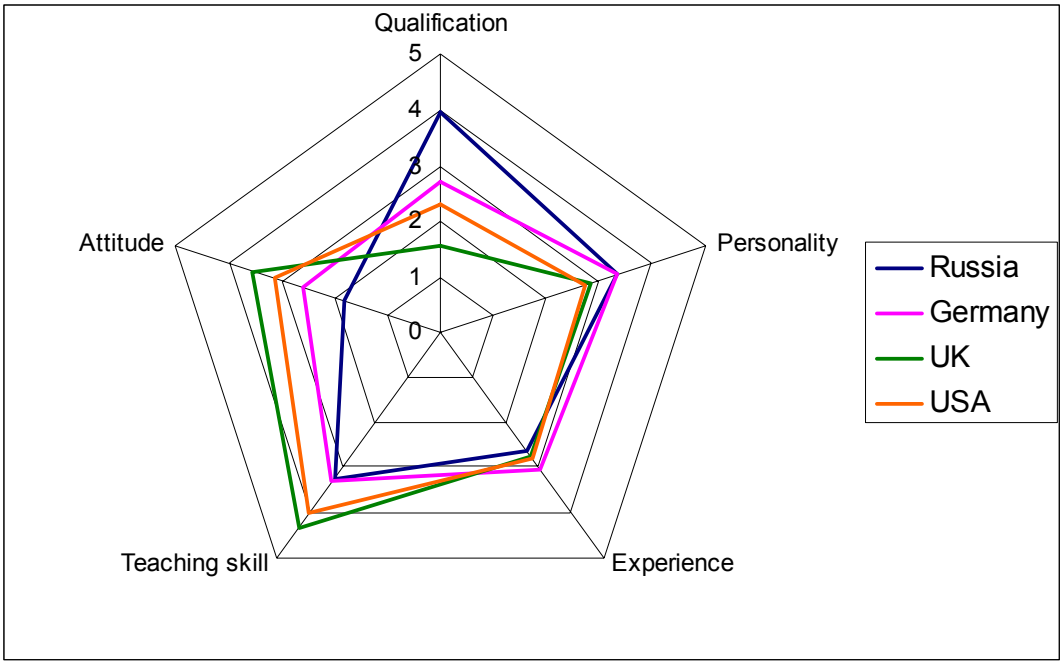


Inspection of the spiderweb plots shows that the four countries gave parental support the same ranking, while there seem to be small differences in their ranking of psychological support, peer support, teacher's support and financial support.

TABLE 4-2 Average rank and rank order of quality of the teacher

	Mean rank			
	Russia	**Germany**	**UK**	**USA**
Teacher's qualification	3.94 (5)	2.71 (2)	1.56 (1)	2.31 (1)
Teacher's personality	3.36 (4)	3.35 (5)	2.85 (3)	2.75 (2)
Teacher's experience	2.62 (2)	3.03 (3)	2.73 (2)	2.79 (3)
Teacher's teaching ability	3.26 (3)	3.30 (4)	4.31 (5)	4.01 (5)
Teacher's attitude	1.81 (1)	2.61 (1)	3.56 (4)	3.14 (4)

FIGURE 4-8 Spiderweb plot of quality of the teacher

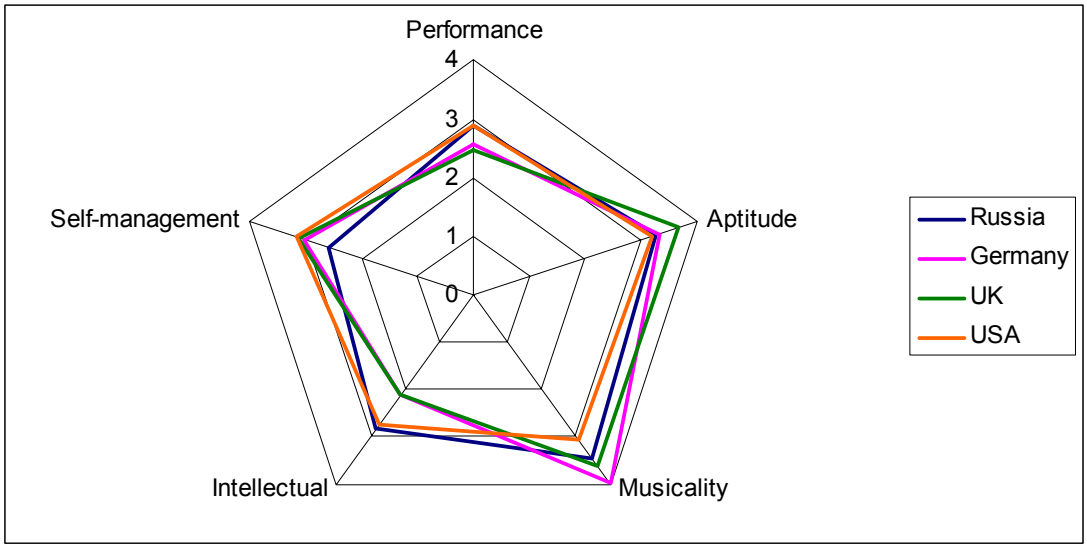


The four countries ranked teaching the skill, attitude, qualification and personality of teachers differently, but were in agreement as far as the teacher's experience is concerned.

TABLE 4-3 Average rank and rank order of talent of the student

	Mean rank			
	Russia	**Germany**	**UK**	**USA**
Artistic performance abilities	2.89 (2.5)	2.55 (2)	2.46 (3)	2.88 (2)
Student's aptitude for the cello	3.26 (4)	3.32 (4)	3.67 (5)	3.21 (5)
Student's musical creativity	3.43 (5)	3.98 (5)	3.62 (4)	3.03 (3)
Student's intellectual capacity	2.81 (1)	2.10 (1)	2.12 (1)	2.72 (1)
Student's self-management	2.89 (2.5)	3.05 (3)	3.13 (2)	3.16 (4)

FIGURE 4-9 Spiderweb plot of talent of the student

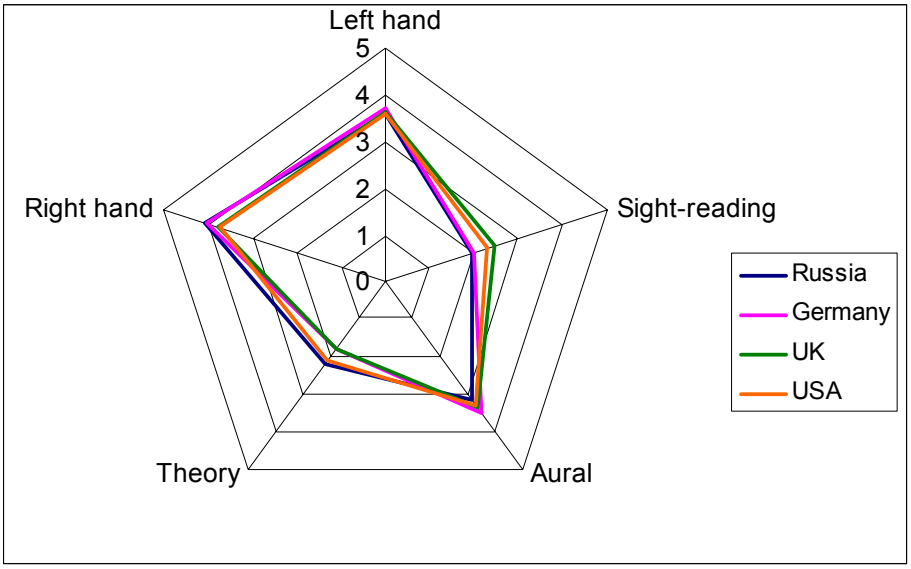


Germany ranked musicality higher than the other three countries, while both Germany and the UK ranked intellectual capacity lower. The other differences in ranking appear to be random.

TABLE 4-4 Average rank and rank order of acquired skills

	Mean rank			
	Russia	**Germany**	**UK**	**USA**
Left-hand technique	3.58 (4)	3.69 (4)	3.62 (4)	3.57 (4)
Sight reading	1.94 (1)	1.97 (2)	2.46 (2)	2.31 (2)
Aural training	3.15 (3)	3.50 (3)	3.35 (3)	3.28 (3)
Music theory	2.23 (2)	1.81 (1)	1.77 (1)	2.09 (1)
Right-hand technique	4.09 (5)	4.04 (5)	3.81 (5)	3.75 (5)

FIGURE 4-10 Spiderweb plot of acquired skills

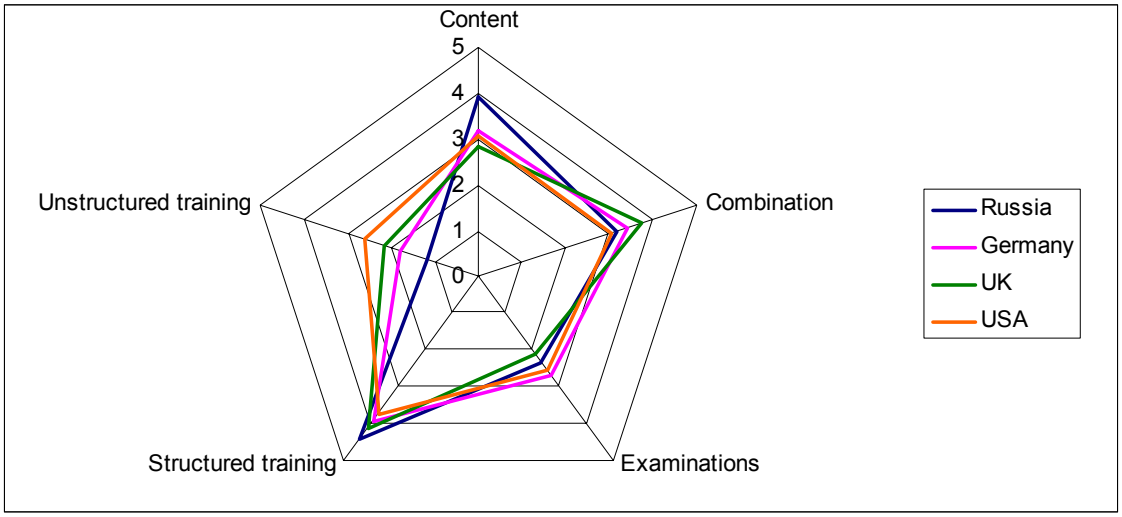


There do not appear to be any differences in the ranking of the student's acquired skills in the four countries.

TABLE 4-5 Average rank and rank order of curriculum followed

	Mean rank			
	Russia	**Germany**	**UK**	**USA**
Content of syllabus	3.91 (4)	3.19 (3)	2.84 (3)	3.07 (4)
Combination of syllabi	3.17 (3)	3.40 (4)	3.76 (4)	3.06 (3)
Regular examinations	2.32 (2)	2.69 (2)	2.12 (1)	2.55 (1)
Structured training programme	4.43 (5)	3.92 (5)	4.12 (5)	3.73 (5)
Unstructured training programme	1.17 (1)	1.79 (1)	2.16 (2)	2.59 (2)

FIGURE 4-11 Spiderweb plot of curriculum followed

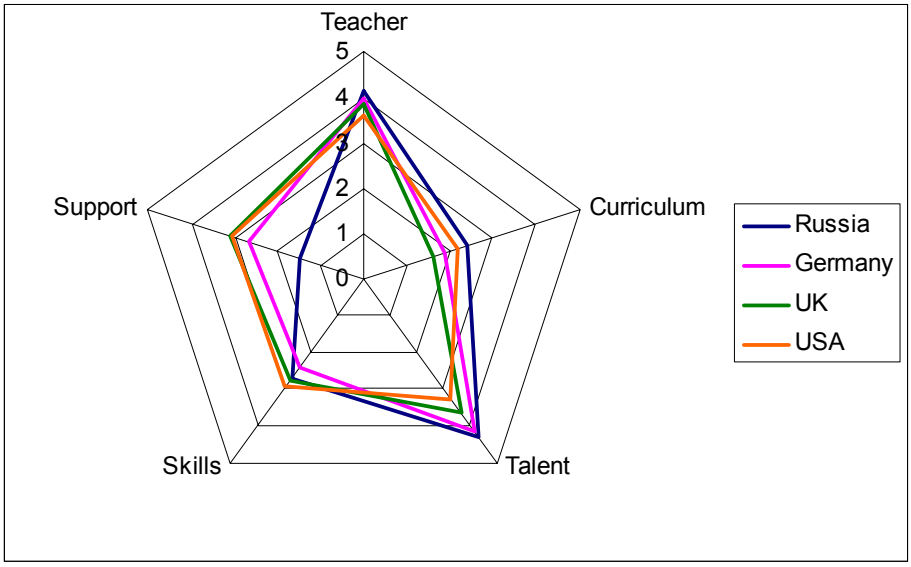


Large discrepancies in ranking occurred for both the importance of following an unstructured training programme and for the syllabus content.

TABLE 4-6 Average rank and rank order of the critical success factors

	Mean rank (rank)			
	Russia	**Germany**	**UK**	**USA**
Quality of the teacher	4.12 (4)	3.97 (4)	3.86 (5)	3.58 (5)
Curriculum followed in teaching	2.38 (2)	1.86 (1)	1.63 (1)	2.17 (1)
Talent and giftedness of student	4.31 (5)	4.13 (5)	3.65 (4)	3.26 (4)
Acquired skills	2.70 (3)	2.39 (2)	2.77 (2)	2.93 (2)
Support given to the student	1.49 (1)	2.65 (3)	3.09 (3)	3.05 (3)

FIGURE 4-12 Spiderweb plot of the critical success factors



Inspection of the spiderweb plot indicates that the four countries ranked the curriculum followed in teaching, the talent and giftedness of the student, the student's acquired skills and the support given to the student differently – that is, they attached different levels of importance to these factors.

4.2 FRIEDMAN TESTS

As a next step, Friedman tests were conducted for each set of items belonging to the five critical success factors (CSF) in cello training, as well as for the ranking of the five critical factors themselves. These six tests were performed for each of the four countries individually to verify that the rankings of the items were not spurious but truly different. The Friedman test is a non-parametric alternative to the repeated measures analysis of variance and is appropriate when the hypothesis concerns ordinal outcomes, as is the case here. The procedure involves the calculation of an average rank for each item.

The Chi-square test statistics and their associated significance values are displayed in table 4.7. The complete set of results is contained in annexure C on the CD.

TABLE 4-7 Friedman test results

	Chi-square test statistic (asymptotic significance)			
	Russia	**Germany**	**UK**	**USA**
CSF 1 Support given to the student	137.615 (0.000)	99.533 (0.000)	85.000 (0.000)	110.326 (0.000)
CSF 2 Quality of the teacher	56.045 (0.000)	10.886 (0.028)	87.308 (0.000)	96.041 (0.000)
CSF 3 Talent of the student	9.826 (0.043)	51.697 (0.000)	39.985 (0.000)	9.748 (0.045)
CSF 4 Acquired skills	69.479 (0.000)	101.759 (0.000)	61.477 (0.000)	133.435 (0.000)
CSF 5 Curriculum followed	142.385 (0.000)	61.949 (0.000)	68.298 (0.000)	53.082 (0.000)
Critical success factors	121.741 (0.000)	93.396 (0.000)	64.227 (0.000)	65.190 (0.000)

All the test statistics are statistically significant at the 5 percent level, hence validating the rankings of the critical success factors in all four countries.

4.3 KRUSKAL-WALLIS AND MANN-WHITNEY U-TESTS

The final step was to assess whether differences between the four countries with respect to their rankings of the individual critical success factors are statistically significant. The level of significance was specified as 5 percent. The apposite technique is the Kruskal-Wallis test which is the non-parametric counterpart of the one-way independent ANOVA.

A Kruskal-Wallis test was thus performed for each set of questions belonging to a critical success factor and for the five critical success factors themselves.

Post hoc tests designed to compare the different combinations of countries were subsequently conducted to determine which countries differ significantly from one another. These pairwise comparisons were only performed for the items that were ranked as significantly different, according to the Kruskal-Wallis test results. Mann-Whitney U-tests, which are non-parametric tests for differences between two independent samples, were used.

The observed significance level was adjusted for the fact that multiple comparisons were made by applying a Bonferroni correction. The overall Type I error rate is hence controlled by setting the error rate for each test to the experiment-wise error rate divided by the total number of tests (six, since four countries are compared). This means that an asymptotic significance of 0.05/6 = 0.008 was used to achieve the overall level of significance of 5 percent.

The complete set of results is available in annexure C on the CD at the back of the thesis. Summaries of the results, together with plots of the average ranks, are displayed in the tables and graphs below. In order to enhance the interpretation, all four countries were plotted on the same axes.

4.3.1 Support given to the student

TABLE 4-8 Kruskal-Wallis test results for support given to the student

	Chi-square	Df	Asymp. sig.
Teacher's support	23.814	3	.000
Financial support	15.605	3	.001
Parental support	1.706	3	.636
Psychological support	17.798	3	.000
Peer support	17.788	3	.000

The four countries do not differ statistically with respect to parental support. However, regarding teacher's support, financial support, psychological support and peer support, at least one of the four countries has a statistically significant different ranking from the others.

FIGURE 4-13 Graphical display of the average ranks of support given to the student

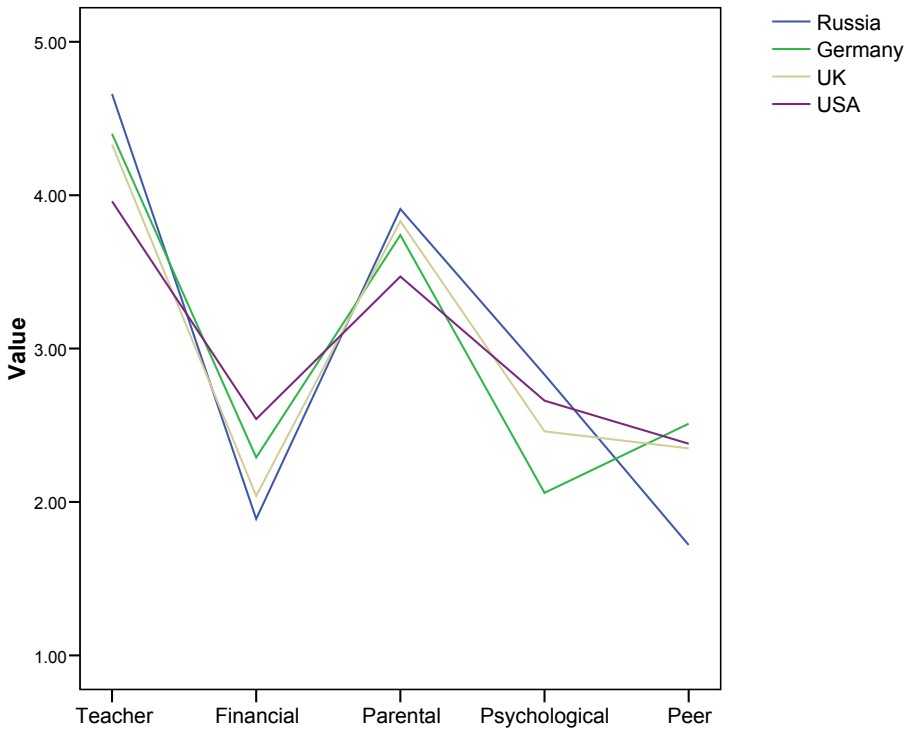


TABLE 4-9 Mann-Whitney U pairwise test results for teacher's support

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1480.000	-.779	.436
	UK	1225.500	-1.185	.236
	USA	2528.500	-4.154	.000
Germany	UK	1501.500	-.404	.686
	USA	3276.000	-3.194	.001
UK	USA	2997.000	-2.543	.011

There are no significant differences between Russia, Germany and the UK as far as teacher support is concerned, but all three these countries ranked teacher support significantly higher than the USA (the UK only at the 10% level of significance).

TABLE 4-10 Mann-Whitney U pairwise test results for financial support

Country		Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Russia	Germany	1187.000	-2.435	.015
	UK	1335.500	-.290	.772
	USA	2749.500	-3.346	.001
Germany	UK	1271.500	-1.764	.078
	USA	4077.500	-.953	.340
UK	USA	2922.000	-2.665	.008

As far as financial support is concerned, the only statistically significant differences at the 5 percent level are between Russia and the USA, and the UK and the USA. The USA rated financial support significantly higher than Russia and the UK. At the 10 percent level of significance, Germany ranked financial support higher than Russia. Since education in Russia used to be, and is largely still today, basically free of charge, financial support is not regarded as such an influential factor in the training of a cellist. Music education in the other

three countries is extremely expensive and subsequently received a higher ranking than in Russia.

TABLE 4-11 Mann-Whitney U pairwise test results for psychological support

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	862.000	-4.352	.000
	UK	1052.500	-2.251	.024
	USA	3580.500	-.974	.330
Germany	UK	1157.000	-2.451	.014
	USA	3248.500	-3.118	.002
UK	USA	3533.500	-.901	.367

Russia rated psychological support significantly higher than Germany and the USA. At the 10 percent level, Russia also rated psychological support higher than the UK.

TABLE 4-12 Mann-Whitney U pairwise test results for peer support

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	956.000	-3.810	.000
	UK	911.500	-3.144	.002
	USA	2634.000	-3.690	.000
Germany	UK	1442.500	-.710	.478
	USA	4125.500	-.827	.408
UK	USA	3842.500	-.016	.987

Germany, the UK and the USA all ranked peer support significantly higher than Russia. However, there are no statistically significant differences between the rankings of Germany, the UK and the USA.

The music education system in Russia is highly competitive. A limited number of students are trained and frequent competitions are held where students, not meeting the required level, are dismissed and training discontinued. This may explain why peer support received a lower ranking in Russia.

4.3.2 Quality of the teacher

TABLE 4-13 Kruskal-Wallis test results for quality of the teacher

	Chi-Square	df	Asymp. sig.
Teacher's qualification	67.592	3	.000
Teacher's personality	15.562	3	.001
Teacher's experience	3.334	3	.343
Teacher's teaching ability	33.397	3	.000
Teacher's attitude	56.591	3	.000

The four countries do not differ statistically with respect the experience of the teacher, although at least one of the four countries has a statistically significant different ranking from the others with respect to the teacher's qualification, personality, teaching ability and attitude.

FIGURE 4-14 Graphical display of the average ranks of quality of the teacher

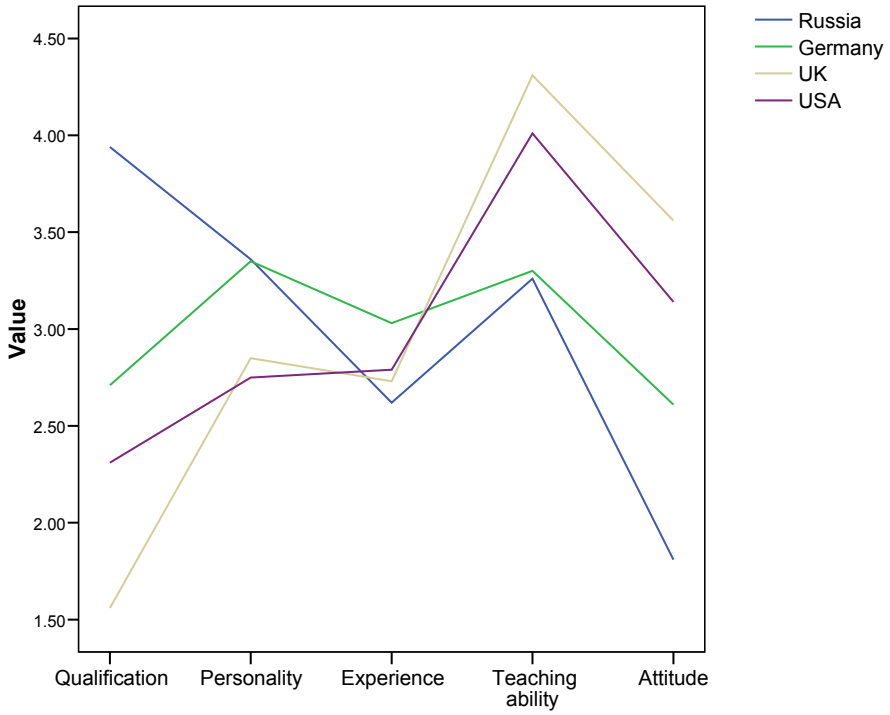


TABLE 4-14 Mann-Whitney U pairwise test results for teacher's qualification

Country		Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Russia	Germany	857.000	-4.329	.000
	UK	316.500	-7.145	.000
	USA	1675.000	-6.390	.000
Germany	UK	847.000	-4.521	.000
	USA	3739.000	-1.864	.062
UK	USA	2652.000	-3.644	.000

With the exception of Germany and the USA, all the countries differ significantly from another with respect to the ranking of the teacher's qualification. Russia ranked the teacher's qualification higher than the other three countries, while Germany and the USA both ranked it higher than the UK. The teacher's qualification (i.e. the professional training the teacher receives) in Russia, was ranked significantly higher. The quality of teaching is regarded as reflecting the quantity of training that the teacher received when he or she was trained. The education system exclude amateur music-making and employs only musicians who have received professional training.

TABLE 4-15 Mann-Whitney U pairwise test results for teacher's personality

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1573.000	-.100	.920
	UK	1030.500	-2.289	.022
	USA	2856.000	-3.007	.003
Germany	UK	1187.500	-2.226	.026
	USA	3280.000	-3.018	.003
UK	USA	3670.500	-.509	.611

Russia, as well as Germany, ranked the teacher's personality significantly higher than the USA. No other statistically significant different rankings were observed for this trait.

TABLE 4-16 Mann-Whitney U pairwise test results for teaching ability

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1550.000	-.236	.814
	UK	682.000	-4.667	.000
	USA	2487.000	-4.182	.000
Germany	UK	919.500	-3.954	.000
	USA	3140.000	-3.534	.000
UK	USA	3445.000	-1.257	.209

No statistical differences were observed for the ranking of teaching ability between Russia and Germany, nor between the UK and the USA. The UK and the USA both ranked teaching ability significantly higher than Russia and Germany.

TABLE 4-17 Mann-Whitney U pairwise test results for teacher's attitude

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1031.500	-3.369	.001
	UK	410.000	-6.371	.000
	USA	1675.500	-6.335	.000
Germany	UK	914.500	-3.856	.000
	USA	3363.500	-2.807	.005
UK	USA	3113.500	-2.119	.034

Only the UK and the USA did not differ statistically in their ranking of the teacher's attitude. Germany, the UK and the USA all ranked attitude significantly higher than Russia, while the UK and the USA also ranked it significantly higher than Germany.

This phenomenon may be explained as follows: In comparison to the West, Russian teachers are generally deemed to be stricter and harsher towards their students (Bunting 2007). The respondents thus ranked the importance of the teacher's attitude significantly lower.

4.3.3 Talent and giftedness of the student

TABLE 4-18 Kruskal-Wallis test results for talent and giftedness of the student

	Chi-Square	df	Asymp. sig.
Artistic performance abilities	5.239	3	.155
Student's aptitude for the cello	4.127	3	.248
Student's musical creativity	25.659	3	.000
Student's intellectual capacity	17.114	3	.001
Student's self-management	6.654	3	.084

The four countries differ significantly from one another as far as the student's musical creativity and intellectual capacity are concerned, but attached similar importance to the student's artistic performance abilities, aptitude for the cello and self-management.

FIGURE 4-15 Graphical display of the average ranks of talent and giftedness of the student

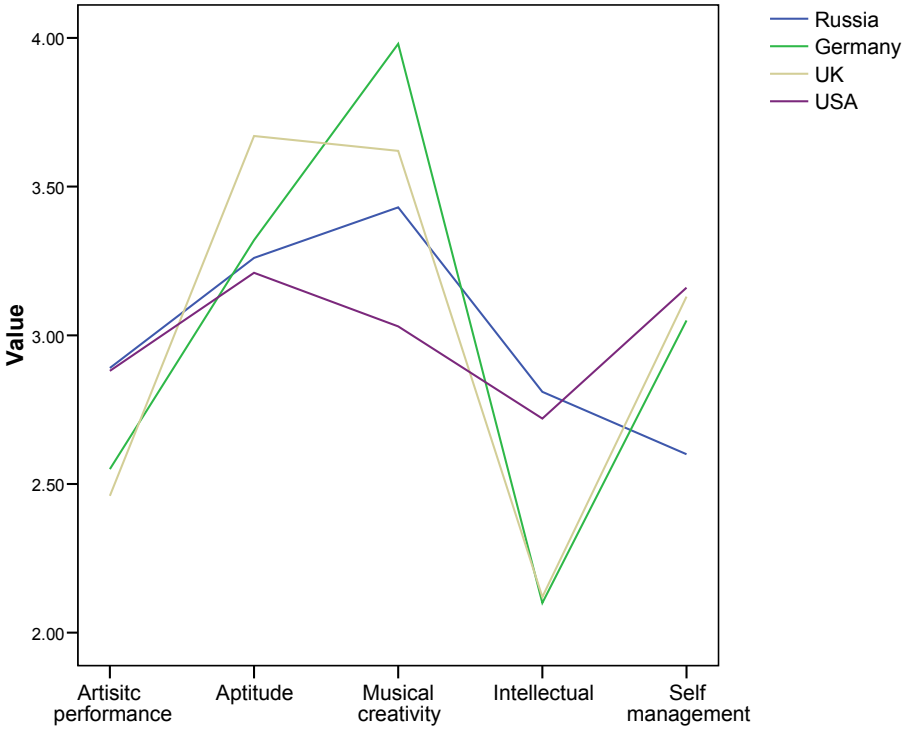


TABLE 4-19 Mann-Whitney pairwise test results for student's musical creativity

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1235.500	-2.124	.034
	UK	1277.000	-.667	.505
	USA	3198.500	-1.974	.048
Germany	UK	1324.500	-1.437	.151
	USA	2569.000	-4.824	.000
UK	USA	2828.500	-2.847	.004

Germany and the UK ranked musical creativity significantly higher than the USA. No other statistically significant differences were observed between the four countries.

TABLE 4-20 Mann-Whitney U pairwise test results for student's intellectual capacity

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1093.000	-2.953	.003
	UK	968.500	-2.713	.007
	USA	3760.000	-.384	.701
Germany	UK	1506.000	-.331	.741
	USA	3240.500	-3.081	.002
UK	USA	2842.000	-2.823	.005

Russia and the USA both ranked intellectual capacity significantly higher than Germany and the UK. However, even though Russia ranked this trait higher than the USA, the difference is not statistically significant.

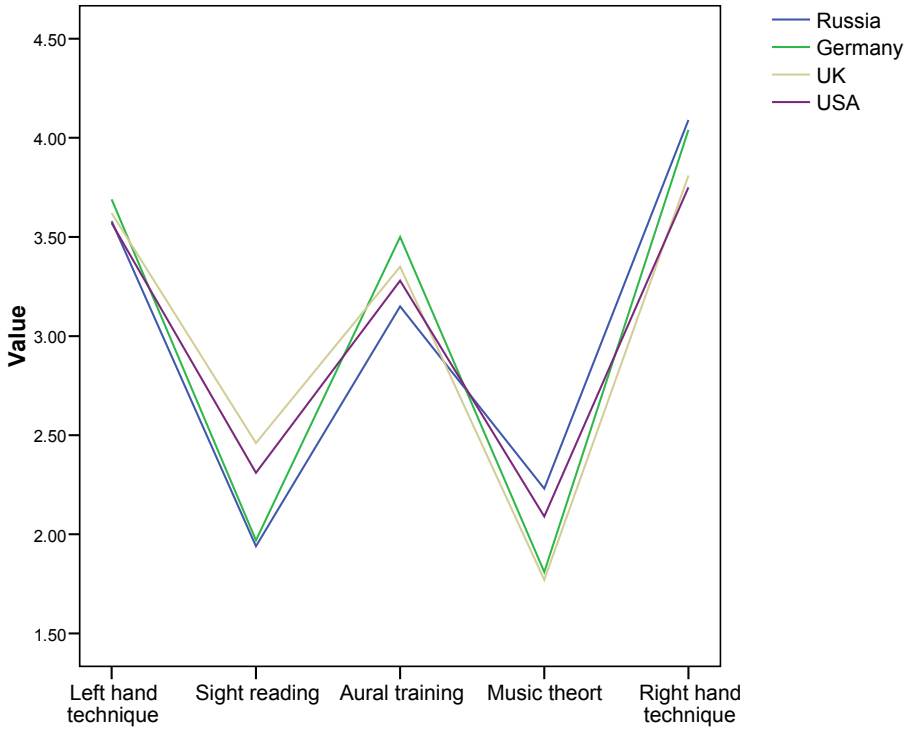
4.3.4 Acquired skills

TABLE 4-21 Kruskal-Wallis test results for acquired skills

	Chi-square	Df	Asymp. sig.
Left-hand technique	.422	3	.936
Sight reading	7.770	3	.051
Aural training	2.204	3	.531
Music theory	7.424	3	.060
Right hand technique	5.633	3	.131

There was general consensus between the four countries regarding the importance of the acquired skills. Only sight reading has an asymptotically significant value of 0.051 which can be interpreted in practice as being statistically significant at the 5 percent level. The Mann-Whitney U-statistics, however, did not detect any statistically significant differences in the rankings between pairs of countries, even at the 10 percent level.

FIGURE 4-16 Graphical display of the average ranks of acquired skills



4.3.5 Curriculum followed in teaching

TABLE 4-22 Kruskal-Wallis test results for the curriculum followed in teaching

	Chi-square	df	Asymp. sig.
Content of syllabus	26.744	3	.000
Combination of syllabi	16.825	3	.001
Regular examinations	8.129	3	.043
Structured training programme	8.812	3	.032
Unstructured training programme	37.737	3	.000

There were widely divergent opinions on the curriculum followed in teaching. The four countries ranked all the items as significantly different. The largest discrepancies occurred first for the syllabus content, and second for an unstructured training programme.

FIGURE 4-17 Graphical display of the average ranks of curriculum followed in teaching

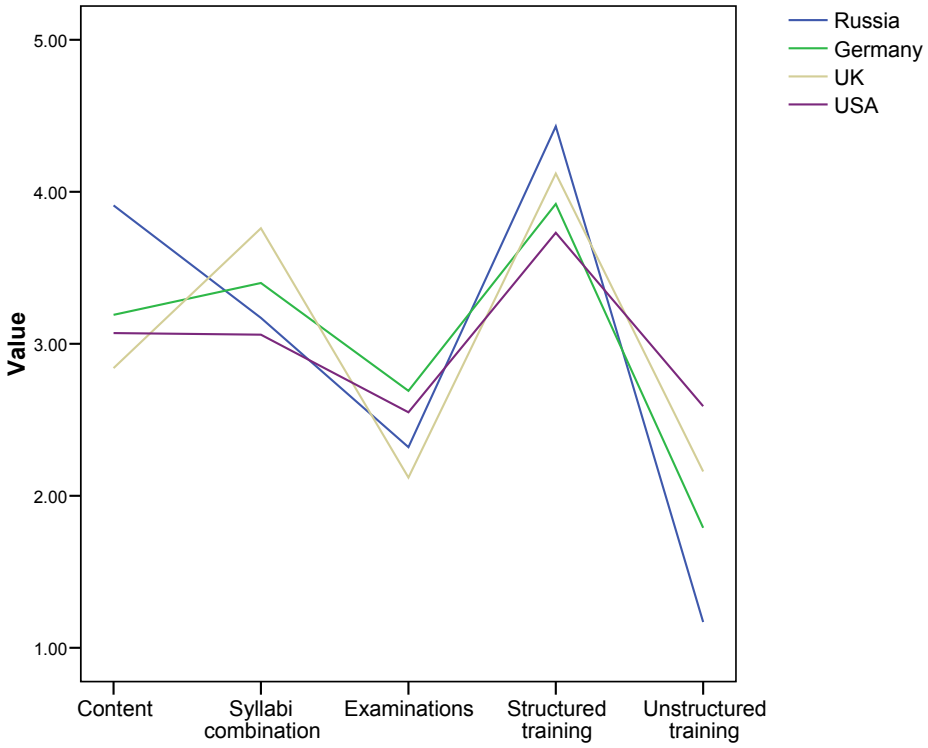


TABLE 4-23 Mann-Whitney U pairwise test results for content of syllabus

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1006.000	-3.357	.001
	UK	656.000	-4.663	.000
	USA	2283.000	-4.453	.000
Germany	UK	1229.000	-1.713	.087
	USA	4024.000	-.609	.543
UK	USA	3212.500	-1.372	.170

Germany, the USA and the UK were in agreement about the items ranked under the theme content of the syllabus, while Russia ranked these items significantly higher than the other three countries.

If the requirements for examinations or the syllabi of the four countries are compared, it is evident that the syllabus prescribed in Russia differs in content from the syllabi of the other three countries in the following ways:

(1) The student is required to do much more technical work (scales, arpeggios, etudes, etc.).
(2) More repertoire pieces are to be performed.
(3) There are more examinations and public performances.
(4) Music theory, aural training and piano as second instrument tuition are more intense.
(5) Although the content allows individual freedom regarding repertoire choice and technical work and outcomes, it is precisely described.
(6) Textbooks containing the etudes and repertoire pieces for each level are published, providing the teacher and student with a systemised structure.

TABLE 4-24 Mann-Whitney U pairwise test results for combination of syllabi

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1303.000	-1.593	.111
	UK	814.500	-3.731	.000
	USA	3524.500	-.851	.395
Germany	UK	1267.000	-1.497	.134
	USA	3590.500	-1.780	.075
UK	USA	2443.500	-3.654	.000

The UK ranked the combination of syllabi significantly higher than Russia and than the USA. This may be viewed from the perspective that examinations conducted by examining bodies in the UK are not level age related and that a candidate may enter at any given level, without being obliged to pass all the previous levels. The syllabus of the Royal Schools of Music, does not require the playing of etudes for examination purposes. In order to provide the student with a more complete training programme, teachers often combine syllabi (such as Trinity College and RSM, since the former requires technical etudes), as well as other etude books and repertoire pieces. No other statistically significant differences in ranking were observed for the other countries.

TABLE 4-25 Mann-Whitney U pairwise test results for regular examinations

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1263.500	-1.919	.055
	UK	1168.500	-1.284	.199
	USA	3517.000	-.874	.382
Germany	UK	1062.000	-2.787	.005
	USA	3906.000	-.928	.353
UK	USA	2999.000	-2.005	.045

Germany ranked regular examinations significantly higher than the UK.

TABLE 4-26 Mann-Whitney U pairwise test results for structured training programme

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1272.500	-1.838	.066
	UK	1350.500	-.007	.994
	USA	2970.000	-2.542	.011
Germany	UK	1301.000	-1.335	.182
	USA	4018.000	-.640	.522
UK	USA	3029.000	-1.990	.047

Russia ranked a structured training programme significantly higher than the USA at the 10 percent level.

TABLE 4-27 Mann-Whitney U pairwise test results for unstructured training programme

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1232.000	-2.615	.009
	UK	772.000	-4.532	.000
	USA	1992.500	-5.647	.000
Germany	UK	1224.500	-1.880	.060
	USA	3130.000	-3.167	.002
UK	USA	3231.000	-1.341	.180

Since a structured training programme is followed in Russia, teachers did not regard the unstructured programme as important, and therefore ranked it significantly lower than the other countries. It is interesting to note that only a few of the respondents were aware that an unstructured training programme was employed in the UK and USA. The USA ranked it significantly higher than Germany, but no other significant differences exist.

4.3.6 Critical success factors

TABLE 4-28 Kruskal-Wallis test results for the critical success factors

	Chi-square	df	Asymp. sig.
Support given to the student	62.624	3	.000
Quality of the teacher	9.504	3	.023
Talent and giftedness of the student	28.873	3	.000
Acquired skills	10.559	3	.014
Curriculum followed in teaching	18.747	3	.000

The four countries' ranking of the five critical success factors differs significantly, which means that they attach levels of importance to these factors.

FIGURE 4-18 Graphical display of the average ranks of the critical success factors

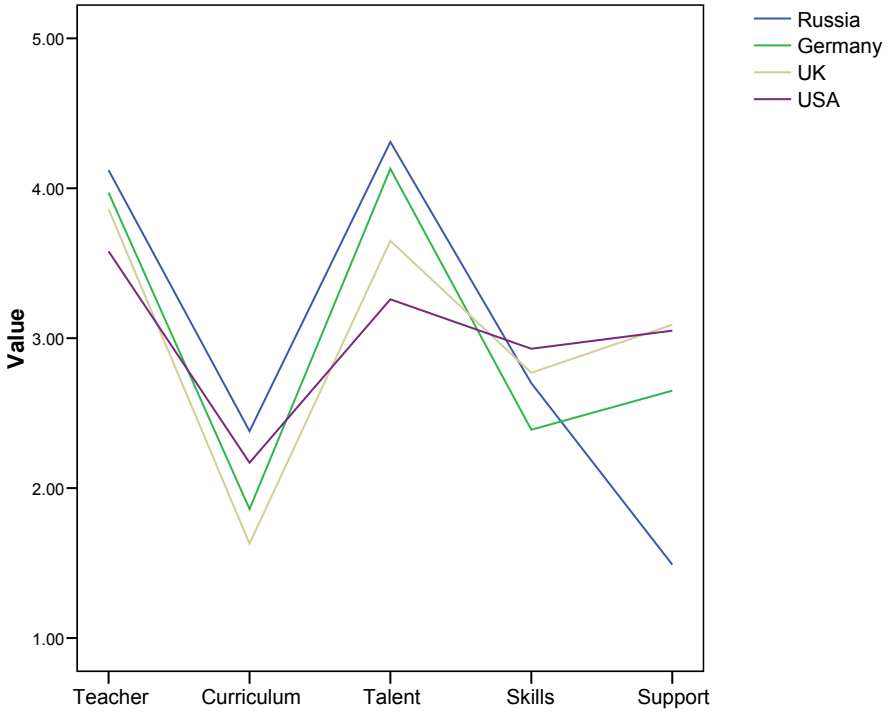


TABLE 4-29 Mann-Whitney U pairwise test results for the support given to the student

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	649.500	-5.527	.000
	UK	403.500	-6.520	.000
	USA	1325.000	-7.322	.000
Germany	UK	1218.500	-1.786	.074
	USA	3518.500	-2.061	.039
UK	USA	3816.000	-.091	.927

Germany, the UK and the USA all ranked the support given to students significantly higher than Russia, but because there are no significant differences between their rankings, the countries are in agreement about the importance of this trait.

TABLE 4-30 Mann-Whitney U pairwise test results for the quality of the teacher

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1500.000	-.237	.813
	UK	1263.500	-.794	.427
	USA	3035.000	-2.542	.011
Germany	UK	1376.000	-.836	.403
	USA	3430.000	-2.323	.020
UK	USA	3374.000	-1.366	.172

Using the Bonferroni adjusted level of significance (0.008), no statistically significant differences exist between the countries when judged. However, Russia ranked the quality of the teacher higher than the USA at the 10 percent Bonferroni adjusted level of significance.

TABLE 4-31 Mann-Whitney U pairwise test results for the talent and giftedness of student

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1294.000	-1.570	.117
	UK	976.500	-2.767	.006
	USA	2315.000	-4.587	.000
Germany	UK	1241.000	-1.681	.093
	USA	2903.500	-3.720	.000
UK	USA	3290.500	-1.594	.111

Russia ranked this trait significantly higher than the UK and the USA, while Germany also ranked it higher than the USA. In Russia, children are selected to start with musical training, after their physique, especially their hands, and their aptitude for music (more specifically the cello) are examined. In this competitive training system, fewer gifted students tend to be dismissed. This could explain why Russian teachers ranked talent and giftedness of the student significantly higher than the UK and the USA.

TABLE 4-32 Mann-Whitney U pairwise test results for the acquired skills

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	1255.000	-1.777	.076
	UK	1320.000	-.391	.696
	USA	3458.500	-1.321	.187
Germany	UK	1198.500	-1.944	.052
	USA	3132.500	-3.123	.002
UK	USA	3545.000	-.870	.384

The USA ranked acquired skills significantly higher than Germany, with no other significant differences in ranking between the countries.

TABLE 4-33 Mann-Whitney U pairwise test results for the curriculum followed in teaching

Country		Mann-Whitney U	Z	Asymp. sig. (2-tailed)
Russia	Germany	988.500	-3.412	.001
	UK	732.000	-4.375	.000
	USA	3048.500	-2.530	.011
Germany	UK	1393.500	-.793	.428
	USA	3899.000	-1.120	.263
UK	USA	3202.500	-1.984	.047

Russia ranked the curriculum followed higher than the other three countries, while no differences were evident in the three countries. The difference between Russia and the USA is only significant at the 10 percent level.

4.3 CONCLUSIONS

The aim of this research project was to compare the critical success factors for cello training in Russia, Germany, the UK and the USA. The conclusions that can be drawn from the statistical results of the study (see tables 4-1 to 4-33) are discussed below.

Russia, Germany, the UK and the USA were remarkably in agreement with a number of items on the five critical success factors, indicating the universal relative importance of these attributes as critical success factors in cello training. All four countries rated the support of the teacher, as well as parental support given to the student, as important. Russia and Germany ranked teacher support significantly higher than the USA, based on the average rankings. Likewise, the student's aptitude for the cello was also ranked high. The student's musical creativity was regarded as vitally important by Russia and Germany, and to a lesser degree by the UK (ranked fourth on average) and the USA (ranked third on average). More importance was attached to a student's

ability for self-management by the USA (ranked fourth on average) than the other three countries, although the mean rankings of the four countries did not differ statistically. All four countries were in agreement, attaining a high rank to right-hand technique followed by left-hand technique. A structured training programme was rated highest by the four countries, followed by the content of the syllabus (for Russia and the USA) and the combination of syllabi (by Germany and the UK).

At the other end of the scale, Russia, Germany, the UK and the USA all concurred that the student's intellectual capacity is the least important, with Germany and the UK assigning significantly lower scores to this trait than Russia and the USA. Financial support, sight reading, music theory, regular examinations and an unstructured training programme were also rated as relatively unimportant – the average rankings were around one or two (i.e. either first or second in the relative rankings). In Russia, the USA, and to a lesser degree in the UK, peer support was also regarded as unimportant. Germany rated psychological support as relatively unimportant, while it obtained a relative ranking of three by the three other countries.

The four countries were generally divided on the relative importance of the qualities of a teacher, excluding the experience of the teacher, which attained a relative ranking of two or three. With the exception of Russia, which rated it as very important, the teacher's qualification was regarded as relatively unimportant by the other three countries, with the UK ranking this factor significantly lower than Germany and the USA. The countries also differed significantly in their ranking of the teacher's attitude: Russia and Germany did not deem this trait important, while the UK and the USA did, as shown by the significant differences between the two clusters. As far as the teacher's personality is concerned, the relative importance differs between four countries, with Russia and Germany assigning high ranks in comparison with the UK and the USA; the only statistical difference was between Russia and the USA and Germany and the USA. The teaching ability of the teacher was regarded as

more important by the UK and the USA, which both ranked it statistically higher than Russia and Germany.

With the exception of the level of support given to the student, the relative rankings of the four countries are very similar for the critical success factors. The quality of the teacher and the talent and giftedness of the student achieved the highest rankings. Russia assigned a statistically higher mean rank than the USA to the quality of the teacher, but the latter attached the highest relative importance to this quality. Russia also rated the talent and giftedness of the student statistically higher than the UK and the USA, but the relative ranks were five for Russia and Germany, and four for the UK and the USA, underlying the relative importance of the talent and giftedness of the student overall. The curriculum followed achieved the lowest rankings from Germany, the UK and the USA. Russia ranked it second lowest, but statistically higher than the other three countries. Support given to the student was ranked significantly lower by Russia than by Germany, the UK and the USA, which assigned a relative ranking of three to it. Acquired skills was also ranked as relatively unimportant by Germany, the UK and the USA.

The statistical results of the study contributed to identify two prominent, significant critical success factors for cello training, which featured in all four countries, namely the quality of the teacher, and the talent and giftedness of the student. Other sub-factors in which countries were in agreement were identified and explained. In the final chapter, chapter 5, the focus will be on the findings, based on the statistical results, as well as recommendations to map the road ahead for cello training and future research.

CHAPTER 5

FINDINGS AND RECOMMENDATIONS

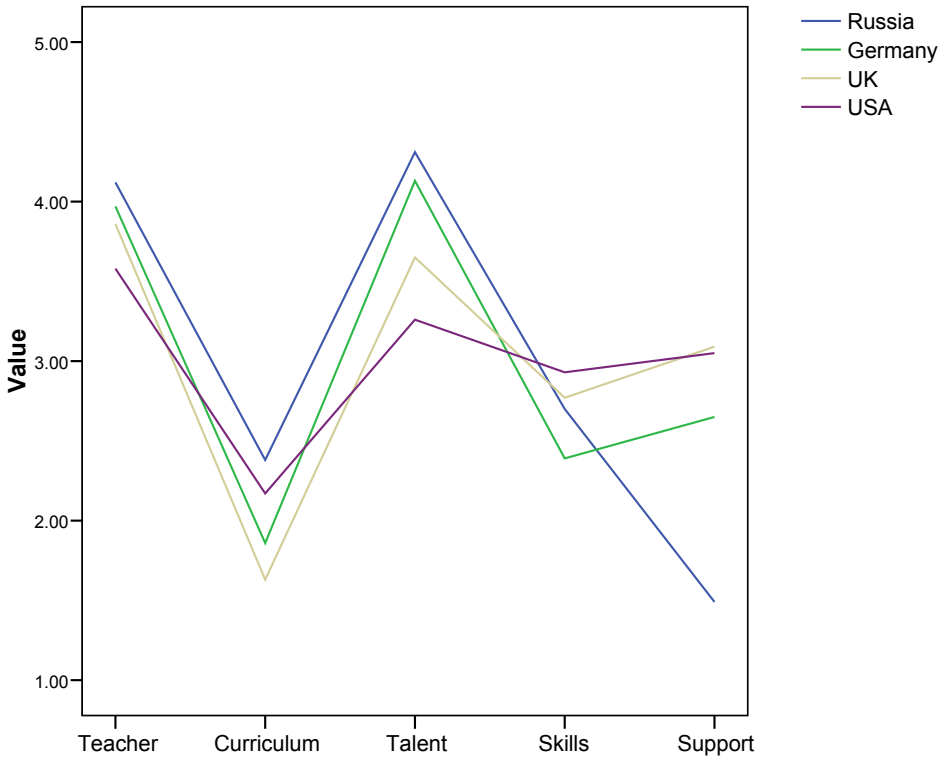
5.1 GENERAL

A number of significant findings emerged in this study, which could make a significant contribution to not only understanding the dynamics of cello training more clearly, but also opening up new frontiers for future research.

In the first instance, interesting information emerged in the comparison of the repertoire requirements for each of the four countries (see fig. 2-2). Although a significant difference was evident in the learning curve of cello students in these countries, the level of training at the end of secondary school education (after approximately 12 years) and just before tertiary education commenced, for all practical reasons, is at a similar level. Although Russian cello training seems to start at a faster pace, training in the countries compared, catches up. It would be interesting, however, to investigate the pattern of training at tertiary level (university and conservatory level), which could be a new field for future research.

From the statistical analysis of the data collected in the questionnaire, interesting and significant information crystallised. A thorough analysis of the critical success factors unveiled information, which prior to this study, had not been proven. Two factors dominated in terms of relevance and importance, namely the quality of the teacher and talent and giftedness of the student. In figure 5.1 below, the final mean ranks of the critical success factors for Russia, Germany, the UK and the USA are once again presented to elucidate this finding.

FIGURE 5-1 Final mean ranks of the critical success factors for Russia, Germany, the UK and the USA



From the above figure, it is evident that the quality of the teacher and the talent and giftedness of the student emerged as the two most critical success factors. This has serious implications for the direction in which cello training will have to be managed in the future.

However, before focussing on strategies for future cello training, it would be appropriate to highlight the findings of the statistical analysis in general, as summarised at the end of chapter 4.

5.2 Findings of the statistical research

The following findings emerged from the statistical analysis:

All four countries are remarkably in agreement with a number of the critical success factors in cello training, as highlighted below:

(1) Support of the teacher, as well as parental support, were rated as very important. The Russian and German respondents ranked teacher support significantly higher than the respondents in the USA.
(2) Students' aptitude for the cello received a high ranking.
(3) Students' musical creativity was regarded as vitally important by the respondents in Russia and Germany, and to a lesser degree by those in the UK and the USA.
(4) Right-hand technique followed by left-hand technique received a high ranking in all four countries.
(5) A structured training programme was rated as the highest subfactor with regard to the curriculum in all four countries.
(6) Content of the syllabus received a higher ranking by the respondents in Russia and the USA, while those in Germany and the UK ranked a combination of syllabi higher.
(7) The respondents in the USA attached more significance to the student's self-management than the respondents in the other three countries.
(8) The respondents in all four countries were in agreement about the student's intellectual capacity as the least important subfactor contributing to the talent and giftedness of the student. Subfactors that were regarded as being of less importance in comparison to other subfactors in each of the main critical success factors include the following:

- financial support
- sight reading
- music theory
- regular examinations
- unstructured training programme
- peer support
- psychological support

(9) Respondents in all four countries allocated the highest ranking to the quality of the teacher and the talent and giftedness of the student.

(10) The curriculum followed in teaching obtained the lowest rankings by respondents in Germany, the UK and USA. It was ranked as the second lowest subfactor regarding curriculum, by the Russian respondents.

(11) Support given to the student received a significantly lower ranking by the Russian respondents.

(12) Acquired skills was ranked as relatively unimportant by the respondents in Germany, the UK and the USA.

5.3 RANKING OF THE CRITICAL SUCCESS FACTORS IN CELLO TRAINING

The two critical success factors in cello training that were ranked highest by the respondents in the four countries involved were the:

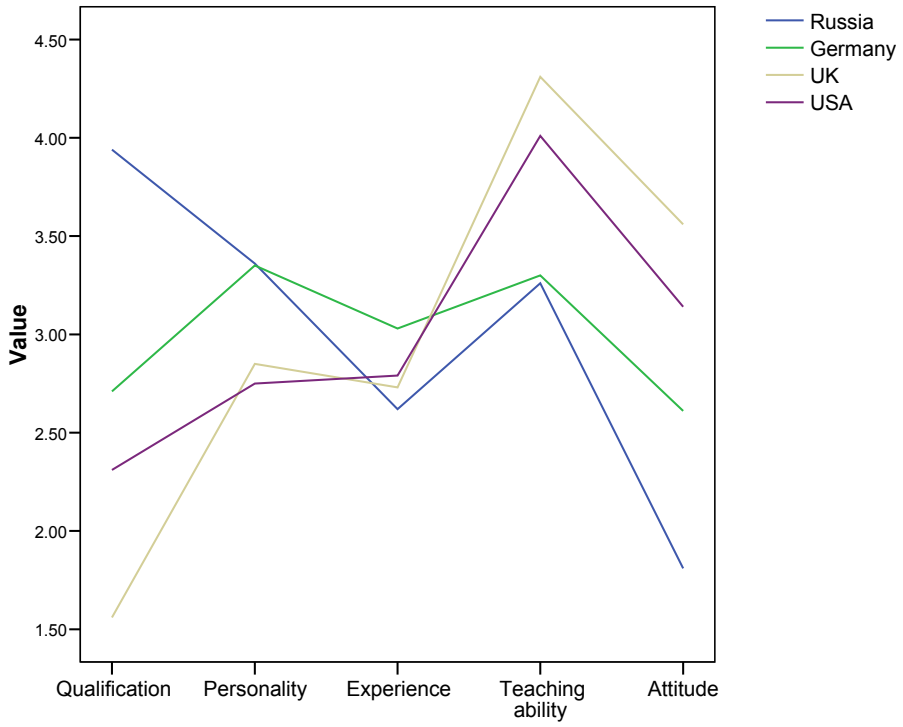
(1) quality of the teacher
(2) talent and giftedness of the student

It stands to reason that from a training perspective, due consideration should be given to the importance that the respondents attach to these two key contributors for successful cello training. It would thus be relevant to once again carefully

examine the subfactors that contribute to the two critical success factors mentioned above.

5.3.1 Quality of the teacher

FIGURE 5-2 Graphical display of the average ranks of quality of the teacher



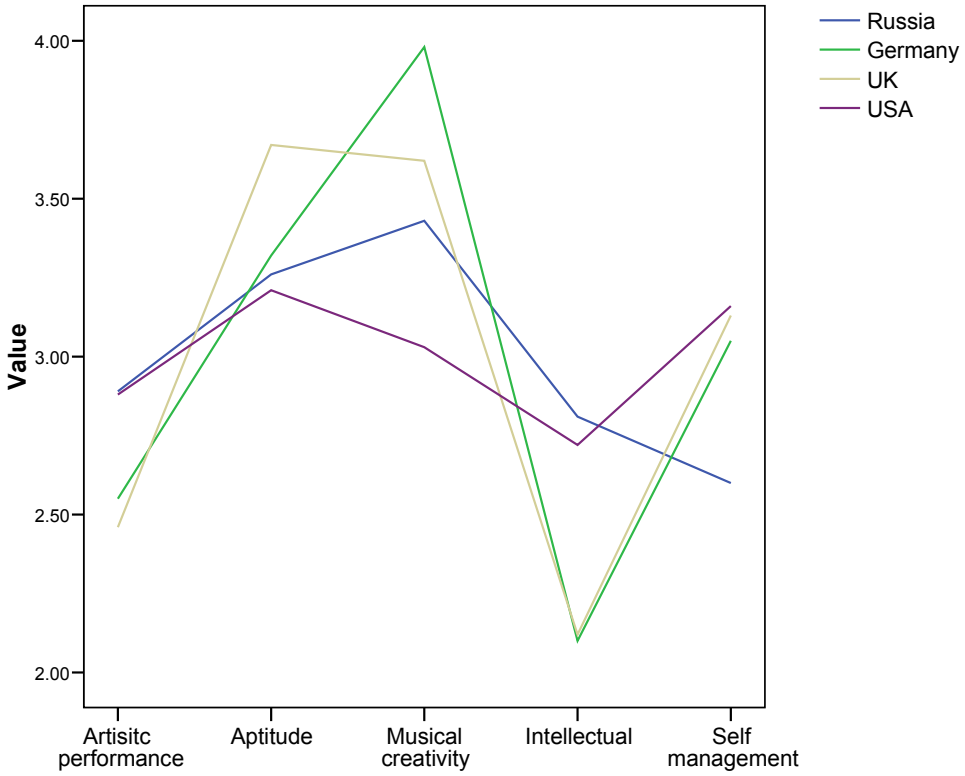
It is significant that a teacher's teaching ability is the one overriding attribute in all four countries. Only in Russia does the teacher's qualification evoke the same level of importance as teaching ability. This explains why teachers in Russia are only allowed to teach once they have obtained a high qualification after five years of tertiary education, now equal to a master's degree.

The curriculum for the training of cello teachers should emphasise training directed at cultivating the ability of the teacher in respect of *how* to teach and not

primarily only *what* to teach. This dimension of the requirements for successful cello training implies not only revisiting the curriculum requirements, but also thoroughly investigating the transfer of skills, cello technique, evaluation and psychological support of the student, performance management, career planning and total development of the individual student. A new perspective will focus on general cello training, but with the student's talent in mind, more specific needs should be attended to in order to offer the most effective training.

5.3.2 The talent and giftedness of the student

FIGURE 5-3 Graphical display of talent and giftedness of the student



Musical creativity featured as the single most important subfactor with respondents in Germany, Russia and the UK expressing themselves most prominently in this respect.

It is also significant to observe that the intellectual capacity of the student is ranked as relatively the lowest contributor to successful cello training by Germany and the UK.

The importance attached to talent and giftedness by the four countries, require special attention to be focused on this critical factor. Although special tests have been developed to identify musical talent, the focus should be narrowed to refine this selection process. It should aim at achieving the following:

- Further refine the process to distinguish various types of string players once they have been selected, that is, violin, viola, cello or double bass. Tests should be developed to identify, inter alia, the type of finger dexterity, aptitude for the specific instrument, size of the hands, physique, muscle strength, etc., that is required for each instrument.

- Tests should be developed to identify at an early stage what the limitations for the training of a specific cello student will be.

- A specific programme should be developed to provide psychological support to the talented and gifted student, especially where he or she is following an international performing career. (Psychological support was discussed in section 2.2.4.4 in chapter 2). The teacher and music psychologist should work in collaboration to provide the student with the necessary psychological support. This approach has proved to be highly successful in Russia, where young, highly talented cello students receive psychological guidance. The music psychologist should come on board, at an early stage of the development of talent.

5.4 NEW FIELDS OF RESEARCH

In this research, it became evident that certain fields surfaced that lay outside the scope of the study. Some of these were mentioned or briefly touched upon. It is, however, imperative that these areas should be specifically and formally identified for future research.

- This study focused on pre-tertiary cello training and identified critical success factors specific to this domain. The study should be expanded to investigate what happens to cello training at a tertiary level and focus on the outcome of this training in the various occupations (e.g. orchestral players, teachers, soloists, etc.).

- New research should be conducted to broaden the basis of selection of cello students. New testing devices should be developed and existing ones refined to improve the quality of selection and performance prediction.

- Research on the teaching skills required for the talented and the gifted cello student should be documented by involving the existing teachers of top performing cellists. This data base should be at a higher level than the existing master classes which fulfil a separate role. The special techniques applied should form an ongoing study into best practices applied.

- Finally, a study should be conducted to investigate and document a process to ensure that international cello training standards are upheld and constantly improved. A single international cello training authority could be considered.

5.5. CONCLUDING REMARKS

This study identified the factors that contribute most significantly towards cello training. More specifically, it managed to rank these factors in order of significance. Although a similar outcome was anticipated from the outset, the factors identified provided scientific evidence that helped to pave the way for successful cello training. The ranking process identified the importance of the contribution of the cello teacher as well as the talent and giftedness of the cello student. These two factors have provided enough ground for interventions to be developed in the short term. These interventions have been mapped in the section above dealing with new fields of research.

Finally, cello training is now occurring in a global village in which barriers and boundaries have largely been removed. This should contribute to the international effort to organise and manage cello training in a more effective, coherent and sophisticated manner. Hopefully this study will make a small but significant contribution towards this momentous task.

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