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An Investigation of Self-Directed Learning Skills of Undergraduate Music Education

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Abstract

Self-Directed Learning (SDL) is the core competence of lifelong learning, especially in the era of rapid development of the knowledge economy. SDL skills are increasingly necessary in global education reform. SDL refers to learners' autonomy in learning, including setting learning goals, selecting resources, implementing strategies and evaluating results. Learners play an active and proactive role in this process. For music education, the importance of SDL is even more significant. Music learning requires students to have solid technical ability and much independent practice to enhance creativity and artistic expression. Therefore, cultivating the SDL ability of music undergraduates can help them improve their academic performance and lay the foundation for their future career development, enabling them to cope with the complex and changing professional requirements. The purpose of this paper is not only to explore the differences in the SDL ability of music undergraduates and to analyse the influence of gender and regional background on learning outcomes but also to provide a theoretical basis and practical suggestions for educational practice, which can potentially transform the way music education is approached.

Keywords: Self-Directed Learning, Undergraduate Music Learning, Gender, Geographical Background

Introduction

Self-directed learning (SDL) is the process by which learners proactively diagnose learning needs, set learning goals, identify learning resources, select and implement appropriate learning strategies, and ultimately evaluate learning outcomes, with or without the help of others (Knowles, 1975). In music education, SDL is essential because students often need a lot of independent practice and independent exploration in the learning process. In the context of globalisation, lifelong learning has become a necessary skill for people to cope with rapid change and the challenges of the knowledge economy, and SDL has gradually become a key component of higher education, especially in fields such as music education that require a high degree of self-discipline and creativity (Rogers, 1969). Cultivating students' SDL ability contributes to academic success and enhances their professional competitiveness.

This study focuses on two key factors influencing SDL: gender and geographical background. Studies have shown that these factors may affect students' SDL ability by influencing their access to learning resources, self-efficacy, and habits (Ryan & Deci, 2000). There are few relevant studies in China, a country with significant socioeconomic and geographical differences, especially in music education. To this end, this study aims to explore the influence of gender and regional background on the SDL skills of Chinese undergraduate music students and fill the research gap in this field.

Lifelong learning has become an essential issue in the development of global education. In its education reform policy, China actively advocates the promotion of the lifelong learning ability of the whole people, especially emphasising the importance of independent learning (Chen & Yang, 2020). Improving SDL ability is the basis for individual success in a competitive knowledge society and is essential for the whole society to enhance innovation ability. SDL is particularly critical in music education, where music students not only need to master basic instrumental skills but also need to improve their technical and artistic expression skills through independent practice over a long period without teacher supervision.

In recent years, many studies have focused on the impact of different demographic factors, such as gender and geographical background, on learning outcomes. The role of gender in SDL has been the focus of much research. For example, studies have shown that there may be significant differences between men and women in levels of self-regulated learning and motivation (Pintrich & De Groot, 1990). In addition, regional differences, especially those between coastal and inland areas of China, directly affect students' access to educational resources and learning opportunities, which has an essential impact on the cultivation of SDL ability (Fan, 2018). Although the influence of gender and geographical factors in music education has not been thoroughly studied, this study will explore their role in the development of SDL through empirical analysis.

Despite the increasing number of studies on SDL in recent years, attention to the development of SDL ability in music undergraduates still needs to be improved, especially in countries with significant socioeconomic and geographical differences. Understanding the impact of gender and geographical background on SDL ability can help educators design more targeted support measures for students from different backgrounds. To this end, this study will focus on the following questions:

Are there significant differences in self-directed learning (SDL) abilities between male and female music undergraduates?

Do music undergraduates from different regional backgrounds (coastal versus inland) exhibit significant differences in SDL ability?

How can educators develop targeted support measures to enhance SDL competencies in music education, especially in countries with notable socioeconomic and geographical disparities?

Literature Review

Music education helps cultivate technical music skills, creativity, and autonomous learning ability (Mentz et al., 2019). Autonomous learning (SDL) is increasingly integrated into the educational field, enabling students to personalize and take the lead in their own learning,

which is crucial in today's rapidly evolving world (Morris, 2019). This review focuses on autonomous learning in music education, particularly for undergraduates, to assist with educational reform and student skill development.

Knowles' (1975), foundational framework for autonomous learning - where learners set goals, seek resources, apply strategies, and evaluate outcomes - has been widely applied in various disciplines. For music majors, autonomous learning is highly valuable as it cultivates technical skills and creativity (Butler, 2022). However, challenges persist, including resource limitations, motivational differences, and the lack of feedback mechanisms (Aşkın et al., 2018). This chapter, based on previous research, explores how gender, geographic background, and accessibility affect music major students' autonomous learning skills and proposes practical methods for skill development (Li & Wu, 2023).

International and Local Contexts of Primary Studies

SDL emerged in North America in the 1960s and 1970s, thanks to the research of scholars such as Knowles and Rogers, which is rooted in the humanistic and constructivist philosophy that emphasizes the responsibility of the learner (Morris, 2019). Its relevance has been increasing globally, especially in higher education, where SDL is crucial for the success of students in the knowledge economy era (Ayyildiz & Tarhan, 2015). Innovative teaching methods such as problem-based learning (PBL) have supported the development of SDL by enhancing critical thinking and problem-solving skills, which are indispensable for music students (Aziz et al., 2014). Peer learning, which is widely used in popular music pedagogy, also demonstrates the benefits of SDL in promoting collaboration and self-efficacy (Lebler, 2008).

Theoretical Frameworks and Models

Theories

Self-Determination Theory (SDT) and other SDL theories emphasize intrinsic motivation, while Self-Regulated Learning (SRL) theory focuses on the autonomy of goal achievement process (Butler, 2022). Flavell's meta-cognitive theory highlights the self-awareness in learning, which helps students evaluate and adjust their strategies as needed, effectively supporting the implementation of SDL (Li et al., 2023).

Models

The SDL model promotes the development of key skills such as goal setting, strategy selection, and evaluation, enabling students to better manage their learning process (Ayyildiz & Tarhan, 2015). By developing an SDL skills scale, educators can gain a deeper understanding of students' readiness for SDL, enabling targeted interventions to enhance learning outcomes.

Concepts

SDL supports autonomy and critical thinking, with meta-cognition playing a crucial role in setting goals and evaluating progress. These concepts are particularly important for music students, as they are indispensable in the independent development and refinement of skills (Haikou, 2020). Reflection and self-evaluation can deepen their learning experience and motivate personal growth and adaptability (Leahy & Smith, 2021). Although SDL has received widespread recognition in music education, there is still a lack of understanding of how specific factors such as feedback affect SDL (Li et al., 2023). Research on adult learners indicates that enhancing collaboration between teachers and students, and exploring the

importance of cultural background in influencing SDL are necessary (Leahy & Smith, 2021). Further research can focus on these areas to provide comprehensive strategies for supporting SDL development in diverse educational environments.

SDL promotes student autonomy, critical thinking, and lifelong learning in music education. Although it brings numerous benefits, students still face challenges in enhancing their SDL skills. Enhancing meta-cognitive abilities, adopting problem-based learning (PBL) methods, and supporting autonomy can effectively alleviate these challenges. Meanwhile, in-depth research on feedback mechanisms and cultural factors will help optimize SDL.

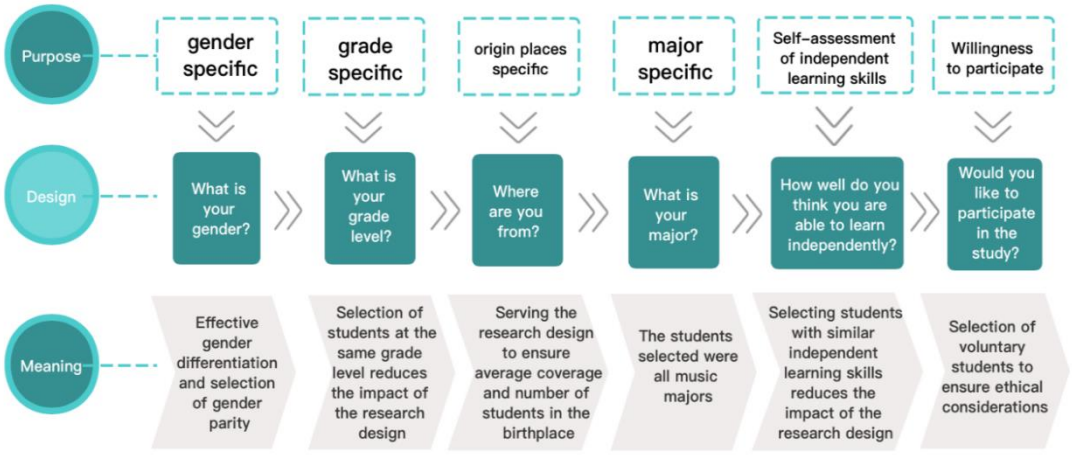
Methodology

Research Design & Samples

This study adopts a mixed research method, combined with a quantitative questionnaire survey, qualitative interviews, and observation assessment, to systematically study the influence of gender and regional background on the SDL ability of music undergraduates. The study sample consisted of 50 undergraduate music students from different regions of China (coastal and inland), ensuring a balanced representation of gender and geographical background.

Data Collection

The objectives of designing the sample screening questionnaire were to ensure that the sample selected was representative of the target group (i.e., students majoring in music at Qinghai Normal University and Qinghai University for Nationalities) and that enough information could be collected to assess their independent learning ability and to ensure that all questions were open-ended so that the respondents would have enough space to express their views and experiences, and also to keep the neutrality of the questions and avoid leading



questions to ensure the objectivity and accuracy of the data. According to the questionnaire design (Figure 1), the final Questionnaire is shown in Table 1.

Figure 1 ： questionnaire design

Table 1
Questionnaire

Sample Selection Questionnaire for Undergraduate Music Self-Directed Learning Study

Surname		Gender	Male [ ] Female [ ] Unwilling to disclose [ ]
Age		Affiliated Schools	Qinghai Normal University [ ] Qinghai University for Nationalities [ ]
Grade		Place of origin of students	

Self-assessment of independent learning skills

Please tick the corresponding evaluation level and briefly explain why. Your valuable comments will help us continuously improve our training.

No.	Evaluation content	5 points	4 points	3 points	2 points	1 point
1	How well do you think you can learn independently?	rare	good	usual	poor	very poor
2	How much time do you spend on average each day on independent study?	More than 5 hours	4-5 hours	2-4 hours	1-2 hours	Less than 1 hour
3	How often do you independently review course content?	everyday	daily	fortnightly	every month	seems not
4	Would you be willing to experiment with the factors influencing self-directed learning if one were available?		Yes [ ]		No [ ]	
5	Please give us some constructive feedback on this training.					

Observation of students during the experimental cycle is to effectively record students' independent learning ability in a non-intrusive way. Observations and records should be detailed and accurate to ensure that all those observed are evaluated according to the same criteria, and by combining these observations, students' self-directed learning ability can be comprehensively assessed. The observations are quantified at the end (Table 2) to provide rich and reliable data support for the final analyses and conclusions. In order to

comprehensively cover the critical aspects of students' self-directed learning process. The observation framework is designed to cover the following key aspects:

1. learning plans and goal setting: focusing on whether students can formulate specific and feasible plans and goals based on the tasks.
2. Learning strategies and methods: To assess the effectiveness of the learning strategies (e.g. repetition, imitation, decomposition, etc.) and methods adopted by the students and to record the solutions they adopted when they encountered obstacles to learning.
3. Time management: Observe how students organise their learning time, including the length and frequency of daily practice and whether they can maintain a regular learning rhythm.
4. Learning attitude and motivation: Pay attention to students' attitudes towards learning, including how seriously they take learning, how well they persevere when they encounter difficulties, and the sources of their motivation. Record changes in their attitudes towards self-directed learning, especially their responses and adjustments when they encounter challenges or difficulties.
5. Skill progress and demonstration of results: To assess the progress of students' skills during the period of independent study through regular performance records and to note the students' technical proficiency, expressiveness and mastery of the prescribed repertoire in the final exhibition.

Table
Quantification of Observations

Evaluation projects	**Problem/Description**	**Quantitative indicators**
Development of learning plans and objectives	Describe the plans and goals set for completing learning tasks.	Specificity of objectives (1-5 points) Achievability (1-5 points)
Learning strategies and methods	1. describe the leading strategies and methods used in learning. 2. solutions when encountering barriers to learning.	Diversity of strategies (1-5 points) Strategy Effectiveness (1-5 points) Creativity of solutions (1-5 points) Efficiency of solutions (1-5 points)
time management	1. the amount of time allocated to study each day and how it is organised. 2. How to ensure regularity in the pace of learning.	Daily study hours (hours) Frequency of study (days per week) Time management efficiency (1-5 points) Regularity (1-5 points)

Learning attitudes and motivation	1. Attitude in the learning process. 2. Reactions in the face of difficulties. 3. The main motivations for learning and their changes.	Seriousness of study (1-5 points) Degree of persistence in the face of adversity (1-5 points) Diversity of power sources (1-5 points) Power continuity (1-5 points)
Skills progression and demonstration of results	Self-perceived skill advancement	Degree of skill enhancement (1-5 points) Number of new skills acquired (1-5 points) Technical proficiency (1-5 points) Expressive (1-5 points) Mastery of prescribed repertoire (1-5 marks)

This Questionnaire was designed to effectively collect data on self-directed learning ability during the two-month experimental cycle. It covered students' basic information, learning habits, strategies, resource use, learning challenges, and self-assessment. The Questionnaire was divided into a pre-test and a post-test to track changes and progress in the learning process.

Semi-structured interviews were designed to gain insights into students' independent learning experiences and perspectives. The interview process should be flexible and improvised, adjusting the depth and direction of the questions according to the situation, ensuring that the questions are open enough to allow respondents to elaborate on their perspectives and experiences, and encouraging them to share more information. At the end of the interview, transcription and audio recording (with the interviewee's consent) ensure that the interview is documented correctly. This allowed for in-depth information about students' self-directed learning experiences and perspectives to be captured while retaining enough flexibility to accommodate the unique experiences of different interviewees. It also retains some flexibility to dig deeper into the information based on the respondents' answers. Below is the semi-structured interview guide (Table 3):

Table 3
Semi-Structured Interview Outline

No.	Content of the question	Interview Topics
1	Please briefly introduce yourself, including your academic background and instrumental experience.	personal background
2	Describe how you usually organise and conduct your instrument practice.	Self-directed learning experience
3	How do you decide which tracks to learn? What factors do you take into account in this process?	
4	How do you usually seek solutions when you get stuck in your practice?	
5	Have you used any specific learning strategies to improve your playing skills? If so, please describe them in detail.	Learning Strategies and Methods
6	Did you try any new learning methods in this experiment? How	

	effective were they?	
7	What resources (e.g., books, online courses, video tutorials, etc.) do you rely on for your independent study? Which resources are most helpful?	Resource utilisation
8	Have you been involved in any online or offline study groups? How has this affected your learning?	
9	How would you rate your ability to learn independently? Did you notice any changes in this experiment?	Self-perception and assessment
10	What aspects of yourself were you most satisfied with during the experiment? Why?	
11	What are some of the main challenges or difficulties you encountered during your independent study?	Challenges and difficulties
12	What external factors (e.g., environment, resources, time management, etc.) do you think have had an impact on your independent learning? Was this impact positive or negative?	
13	What could teachers do best to support students' independent learning?	Support and improvement
14	What advice or tips do you have for students who want to improve their independent learning skills in the future?	
15	Are there any other essential experiences or perspectives on self-directed learning that we need to mention?	wind up

The assessment scoring (Table 4) will assess the student's performance and learning outcomes across the three critical dimensions of technical proficiency, expressiveness and musicality, and self-directed learning. The process ensures that all participants understand each component's marking criteria and weighting. Assessors are trained before marking to understand and apply the marking criteria consistently. In addition to marking, assessors should provide specific feedback that identifies the student's strengths and areas for improvement, helps the student to understand his or her performance and encourages further learning.

Table 4
Rating Scale

Rating item	**Score range**	**Description of scoring criteria**	**score**
technical proficiency	0-10/each	intonation Rhythmic accuracy tone control and dynamic range Treatment of technical difficulties	
Musicality and Expression	0-5/ Each	Playing Expressions affective expression Fluidity and coherence Understanding of the style of the track	
Readiness and professionalism	0-10/each	Readiness to perform Stage presence and professional attitude	

Innovation and personalised expression	0-10	Innovative elements
totals	100 points	

Description:
1. Scorers should base their objective scoring on the descriptions of each scoring criterion, and the value of each score should be based on the specific performance demonstrated by the student.
2. Record the specific score for each item in the "Score" column.
3. During the scoring process, a notes column can be added to the side to record specific performance observed or points that require special attention.
4. The final score is the sum of the individual scores for 100 points.

Data Analysis

Data analysis began with data entry by converting the collected questionnaires, semi-structured interview summaries, and appraisal scoring data into electronic format. The data were entered into SPSS, followed by data cleaning, a stage aimed at identifying and dealing with any potential problems in the dataset, such as missing responses, multiple choice errors, or inconsistent data entry. It was necessary to check for missing responses or multiple choice errors and exclude them from the questionnaire data. Textual data from semi-structured interviews must be transformed into quantifiable data through content analysis, such as assigning pre-defined codes or topic labels to each interview response. It is also necessary to check the validity and consistency of the assessment scoring data and deal with outliers to ensure the accuracy of the data analysis. Descriptive statistical analysis will then be carried out; this involves using SPSS to calculate basic statistics, including mean, median, standard deviation, and minimum and maximum values, providing an overview of the underlying data for subsequent analyses to gain an initial understanding of the dataset. Frequency distribution tables and bar charts were also produced for demographic analyses to demonstrate the distribution of demographic characteristics of the sample, such as gender and place of birth.

Exploratory Data Analysis (EDA) is another critical component to identify outliers and distributional features in the appraisal scores by visualising the data through the drawing of box plots and the impact of gender and place of birth on the distribution of the sample by drawing bar charts and pie charts. In addition, correlation analyses were also critical, using Pearson's correlation coefficient to test the correlation between the indicators of self-directed learning ability in the Questionnaire and the correlation between these indicators and the assessment scores. Identifying patterns and trends in the data through the above analyses lays the foundation for hypothesis testing and further analyses. Hypothesis testing is a critical step in validating research hypotheses. Independent samples t-test and ANOVA analysis of variance were used to compare the differences in independent learning ability scores by gender and place of origin.

The semi-structured interviews were manually analysed in detail to identify key themes and patterns of self-directed learning when processing the semi-structured interviews. The results of the qualitative analyses (e.g., themes from the interviews) were compared with the quantitative data (e.g., questionnaire scores and appraisal scores) to explore the correlations and differences between the two.

Finally, the integration and interpretation of the findings are carried out, and the findings need to be collated into a report that includes the research methodology, analysis process, key findings, discussion and recommendations based on the findings.

Ethical Considerations

As this study involves human subjects, ethical considerations must be fully considered in the study's design and implementation. In order to seek the consent of the subjects thoroughly, the author prepared a consent form containing the purpose of the study, the research process, the potential risks and benefits, and to ensure that each student in the sample was informed and participated voluntarily. Protecting the privacy and data security of the participants is crucial. The data collection process may include sensitive information, and to address this issue, data processing was undertaken to remove or replace all potentially personally identifiable information, to ensure that the stored data were secure and only authorised personnel had access to them, and to ensure that when the results of the study were shared, the information released did not reveal any personal identities.

For fellow-subjects in the sample, ensuring that all subjects receive the same treatment and that the research design and implementation process is fair and unbiased is critical to maintaining the validity and ethics of the study. The evaluation process was open and transparent, and the criteria and process were apparent to all participants. At the end of the study, participants are given feedback on their participation findings and contributions. In addition, research findings, successes and failures are publicly released. This promotes the sharing of knowledge and the development of future research.

Considering the psychological impact of research on participants, especially in research involving performance and evaluation, it is also essential to provide appropriate support measures. Counselling services are available in every school to help participants cope with any stress or anxiety that research may bring. The participants' emotional state was checked regularly during the study to ensure that their moods and states were normal, and participants were provided with the option of withdrawing from the study at any time if they felt uncomfortable or did not wish to continue to participate. Through these combined measures, the researchers ensured that their study was ethically responsible while protecting and respecting the rights of each participant.

Results and Discussion

This chapter aims to explore the autonomous learning ability of undergraduate music majors, focusing on gender and geographical differences. The core questions of this study include: Is there a difference in independent learning ability between different genders of undergraduate music students? Are there significant differences in the ability of students to learn independently in other regions (coastal and inland)? How do gender and geographical background influence music students' autonomous learning skills? To answer these questions, the authors adopted a comprehensive research approach, combining questionnaires, observational assessments, and semi-structured interviews to obtain quantitative and qualitative data and ensure the validity and reliability of the findings. First, this chapter presents the research results of quantitative and qualitative data. Secondly, it combined with the existing literature to comprehensively analyse these data. Finally, the main findings are summarised.

Quantitative analysis provides insights into three leading indicators of students' self-directed learning skills: assessment, quantification, and rating scores. These data were analysed to determine whether there were significant differences in the ability of music undergraduates to learn independently based on gender and place of origin. The study included a balanced sample of 50 participants: 25 men and 25 women from Qinghai Normal University and Qinghai Minzu University, respectively. This balanced representation ensures that the findings apply to various music students. Of the participants, 60% were from coastal areas and 40% from inland regions.

Table5
Evaluation score (self-evaluation)

Result of Sample Selection Questionnaire for Undergraduate Music Self-Directed Learning Study			
Name	Gender	Place of origin of students	Evaluation Point
Student 1	M	costal region	13
Student 2	M	inland region	11
Student 3	M	costal region	12
Student 4	M	inland region	8
Student 5	M	costal region	12
Student 6	M	costal region	12
Student 7	M	inland region	10
Student 8	M	costal region	12
Student 9	M	inland region	9
Student 10	M	costal region	14
Student 11	M	inland region	10
Student 12	M	costal region	13
Student 13	M	costal region	12
Student 14	M	costal region	12
Student 15	M	inland region	10
Student 16	M	costal region	10
Student 17	M	inland region	9
Student 18	M	costal region	12
Student 19	M	costal region	11
Student 20	M	inland region	9
Student 21	M	inland region	10
Student 22	M	costal region	12
Student 23	M	costal region	11
Student 24	M	inland region	10
Student 25	M	inland region	9
Student 26	F	costal region	14

Student 27	F	inland region	8
Student 28	F	inland region	10
Student 29	F	inland region	9
Student 30	F	inland region	8
Student 31	F	inland region	9
Student 32	F	inland region	10
Student 33	F	costal region	13
Student 34	F	costal region	12
Student 35	F	inland region	10
Student 36	F	costal region	13
Student 37	F	inland region	9
Student 38	F	inland region	10
Student 39	F	costal region	13
Student 40	F	costal region	13
Student 41	F	inland region	11
Student 42	F	costal region	13
Student 43	F	inland region	13
Student 44	F	costal region	12
Student 45	F	costal region	9
Student 46	F	inland region	8
Student 47	F	inland region	11
Student 48	F	costal region	8
Student 49	F	costal region	9
Student 50	F	costal region	9

Overall performance: The mean assessment score was 11.4 out of 15, indicating a moderate to high level of self-directed learning. Coastal students had a higher average score of 12.3, compared with 9.6 for inland students. This difference was statistically significant ($p<0.01$), indicating that coastal students think they have more vital independent learning abilities.

Statistical analysis: Independent sample T-test confirmed that there was a significant difference between coastal and inland students in self-rated scores ($t(48) = 3.56$, $p <0.01$). The effect size (Cohen's $d = 0.8$) indicates that geographical factors significantly impact students' cognition of their learning skills.

Table 6
Quantified scores (observational assessment)

Result of Quantification of Observations			
Name	Gender	Place of origin of students	Quantification Point
Student 1	M	coastal region	80
Student 2	M	inland region	70
Student 3	M	coastal region	78
Student 4	M	inland region	71
Student 5	M	coastal region	77
Student 6	M	coastal region	78
Student 7	M	inland region	69
Student 8	M	coastal region	77
Student 9	M	inland region	69
Student 10	M	coastal region	75
Student 11	M	inland region	76
Student 12	M	coastal region	78
Student 13	M	coastal region	77
Student 14	M	coastal region	80
Student 15	M	inland region	72
Student 16	M	coastal region	73
Student 17	M	inland region	74
Student 18	M	coastal region	72
Student 19	M	coastal region	73
Student 20	M	inland region	69
Student 21	M	inland region	71
Student 22	M	coastal region	79
Student 23	M	coastal region	75
Student 24	M	inland region	71
Student 25	M	inland region	72
Student 26	F	coastal region	74
Student 27	F	inland region	68
Student 28	F	inland region	71
Student 29	F	inland region	74
Student 30	F	inland region	68
Student 31	F	inland region	70
Student 32	F	inland region	71
Student 33	F	coastal region	74
Student 34	F	coastal region	72
Student 35	F	inland region	69

Student 36	F	coastal region	73
Student 37	F	inland region	68
Student 38	F	inland region	74
Student 39	F	coastal region	74
Student 40	F	coastal region	75
Student 41	F	inland region	78
Student 42	F	coastal region	72
Student 43	F	inland region	66
Student 44	F	coastal region	73
Student 45	F	coastal region	80
Student 46	F	inland region	69
Student 47	F	inland region	75
Student 48	F	coastal region	79
Student 49	F	coastal region	79
Student 50	F	coastal region	73

Time management and Learning strategies: Observe quantified behaviours such as time management, consistency, and diversity of learning strategies. The average score for coastal students was significantly higher, at 78.9, compared with 70.4 for inland students. This pattern suggests that coastal students' learning behaviour is more effective, especially in developing structured schedules and employing different strategies.

Analysis of Variance (ANOVA): The results of ANOVA showed that the place of origin had a significant main effect on the quantisation score ($F(1,48) = 5.42$, $p<0.05$), indicating that geographical background influences autonomous learning behaviour.

Table7
Rating score (Performance assessment)

Result of Rating scale			
Name	Gender	Place of origin of students	Point
Student 1	M	costal region	88
Student 2	M	inland region	82
Student 3	M	costal region	88
Student 4	M	inland region	81
Student 5	M	costal region	89
Student 6	M	costal region	92
Student 7	M	inland region	78
Student 8	M	costal region	86
Student 9	M	inland region	80
Student 10	M	costal region	90
Student 11	M	inland region	79

Student 12	M	costal region	92
Student 13	M	costal region	84
Student 14	M	costal region	86
Student 15	M	inland region	68
Student 16	M	costal region	86
Student 17	M	inland region	80
Student 18	M	costal region	89
Student 19	M	costal region	86
Student 20	M	inland region	81
Student 21	M	inland region	78
Student 22	M	costal region	92
Student 23	M	costal region	86
Student 24	M	inland region	83
Student 25	M	inland region	80
Student 26	F	costal region	88
Student 27	F	inland region	79
Student 28	F	inland region	82
Student 29	F	inland region	81
Student 30	F	inland region	79
Student 31	F	inland region	80
Student 32	F	inland region	89
Student 33	F	costal region	90
Student 34	F	costal region	88
Student 35	F	inland region	78
Student 36	F	costal region	86
Student 37	F	inland region	79
Student 38	F	inland region	72
Student 39	F	costal region	90
Student 40	F	costal region	86
Student 41	F	inland region	88
Student 42	F	costal region	85
Student 43	F	inland region	90
Student 44	F	costal region	87
Student 45	F	costal region	83
Student 46	F	inland region	85
Student 47	F	inland region	93
Student 48	F	costal region	91
Student 49	F	costal region	88
Student 50	F	costal region	89

Musical skill proficiency: Scores assessing technical proficiency, expressiveness and musical interpretation showed that coastal students scored higher on average, at 87.6, compared with 81.2 for inland students. This difference was statistically significant ($p < 0.01$), indicating that the differences in musical performance skills are related to regional differences.

Gender comparison: Although there was a slight difference in mean ratings between male students (85.3) and female students (84.7), the T-test did not show a significant gender difference ($t(48) = 0.45$, $p = 0.65$). This suggests that when learning environments are comparable, gender does not significantly impact performance outcomes.

Correlation between scores: Pearson correlation analysis showed a significant positive correlation between quantitative scores and rating scores ($r = 0.78$, $p < 0.01$), indicating that students with better time management and more diverse strategies performed better in music. There was also a moderate positive correlation between evaluation and quantisation scores ($r = 0.63$, $p<0.01$), indicating that students with higher evaluation of self-autonomous learning showed more vital learning behaviour. Students' final performance in coastal areas is better than inland students, but the gender difference is not evident in the conditions of the exact student origin.

Qualitative data reveals significant differences in students' autonomous learning experiences. Students from coastal areas demonstrate more mature and diversified learning strategies, including setting specific goals, extensively using online resources, regularly conducting self-evaluation, and actively seeking peer feedback. These students typically have highly structured learning approaches, adjusting their strategies through external feedback, maintaining their learning progress, and demonstrating stronger self-regulatory abilities. In contrast, students from inland areas rely more on traditional teaching methods, such as teacher-led learning and rote memorization, and need more diverse learning strategies to enhance their autonomous learning levels and academic performance.

Students in coastal areas are primarily driven by intrinsic motivation, with their interest in music and positive learning environment being the main motivators. On the other hand, students in inland areas are more dependent on extrinsic motivation, particularly teacher feedback and external recognition. This difference in motivation reflects the important influence of learning environment and resources on learning motivation. Additionally, students in coastal areas are more proactive in seeking feedback from multiple sources, including peers, teachers, and online learning communities; while students in inland areas mainly rely on teachers to provide direct feedback and need more diverse information channels.

There is a widespread perception in inland areas that a lack of high-quality educational resources (such as music libraries, practice facilities, and professional guidance) is severely limiting their academic achievements, while this resource shortage is not as apparent in coastal students who have access to rich educational support. Additionally, students in inland areas face challenges in managing their time and balancing their studies with their personal lives, often relying on structured environments but lacking effective time management skills. In contrast, most students in coastal areas are better at managing their time, thereby demonstrating higher efficiency.

Quantitative data shows that geographical background has a significant impact on the outcomes of autonomous learning. In areas with superior educational resources, structured environments, and a culture that values music education and autonomy, coastal regions demonstrate solid independence. This finding is consistent with existing literature and further confirms the crucial role of environmental factors in academic achievement. It is noteworthy that the study also shows that gender has no significant impact on autonomous learning skills, further supporting the principle of educational equity. Under the same conditions, both boys and girls can demonstrate similar autonomous abilities, thus eliminating the negative impact of gender differences on academic performance.

Additionally, the qualitative data further validated the quantitative findings. With sufficient resources, coastal university students demonstrated a more proactive involvement in various activities, while those from inland regions were limited by scarce resources and over-reliance on traditional methods, making it difficult for them to effectively develop diversified strategies. Furthermore, the highly demonstrated intrinsic motivation was closely related to their good sense of self-efficacy, which was consistent with the theory of self-determination. Low levels of intrinsic motivation were due to insufficient development opportunities, so improving access and optimizing the overall environment would greatly promote the cultivation of independent consciousness.

This study reveals how regional differences have a profound impact on the development of autonomy among different groups. When there is greater access to quality education funding and systematic teaching arrangements, coastal universities produce talented individuals who are active and creative. In contrast, some local talents are lost due to lack of resources and limitations. Therefore, in equal conditions, both genders should have similar opportunities in terms of knowledge acquisition and practical application, laying a foundation for achieving true equality.

Conclusion

This study provides important insights into the mechanisms of self-directed learning in the undergraduate music program. Geographic origin is recognized as an important factor in determining individual development potential, with those from coastal universities generally achieving superior results. While no statistically significant differences were observed, further work is needed to explore the possibility of designing curricula or implementing programs specifically for certain groups to maximize the strengths of each member. At the same time, policymakers are urged to pay attention to solving the problem of inequality caused by geography, so that all learners have the opportunity to develop their ability to think independently, and encourage further in-depth analysis of how other variables such as social and economic conditions interact to shape a holistic ecosystem for comprehensive development.

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