COVID-19 팬데믹 기간 동안 온라인 악기 교육이 요르단 대학교 음악 학생들의 인식된 학습 성과에 미친 영향: 행동적 접근*,**

The Impact of Online Instrumental Education on the Perceived Learning Outcomes of Music Students at the University of Jordan during the Covid-19 Pandemic: A Behavioral Approach

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Abstract　　Instrumental learning in music education is a complex process that requires specific teaching methods and strategies and entails a variety of intricate social, behavioral, cognitive, and emotional elements that collectively shape students' academic development. The coronavirus pandemic forced a change from face-to-face to virtual instruction of musical instruments. The present study explores the impact of this shift on music students' perceived learning outcomes from a behavioral perspective by examining the effect of remote teaching on students' learning environments, interpersonal relationships, and intrapersonal reflections − factors that influence behavioral attitudes toward learning. A questionnaire was distributed to music students who undertook instrumental lessons at the University of Jordan during the pandemic. The analyzed data suggested that participants were less motivated to practice their instruments remotely, had lower senses of competence and self-regulation, and were dissatisfied with the learning outcomes achieved during the pandemic. Due to the scarcity of students enrolling in music programs at the University of Jordan and in the country more broadly, the research used a small sample size of 32 participants. This sample size can maintain the study's findings, as many scholars presented evidence that a minimum number of 30 participants can be statistically sufficient for testing research hypotheses in certain fields (Kish, 1965; Louangrath, 2017). The authors urge educational institutions to consider the findings of this paper prior to adopting instrumental E-learning programs.

Key words: online instrumental learning, psychology of music education, behavior, motivation, interpersonal relationships

초록　　악기 교육은 특정한 교수 방법과 전략을 요구하며, 학생들의 학업 발전을 집합적으로 형성하는 다양한 복잡한 사회적, 행동적, 인지적 및 정서적 요소를 한다. 코로나 바이러스 팬데믹은 오프라인 교육에서 온라인 교육으로의 전환을 촉진하였다. 본 연구는 온라인 교육이 학생들의 학습 환경, 대인 관계, 자기 성찰에 미치는 영향을 조사하여 이러한 변화가 행동적 관점에서 학생들의 학습 성과에 미친 영향을 알아보고자 한다. 설문조사는 코로나 기간동안 요르단 대학교에서 악기 수업을 들은 음악 학생들을 대상으로 실시하였다. 여러 학자가 특정 분야에서 연구 가설을 테스트하는 데 통계 적으로 충분한 최소 참가자 수가 30명이라는 증거를 제시하고, 요르단 대학교에서 음악 프로그램에 등록하는 학생들이 적기 때문에 본 연구는 32명의 소규모 표본을 사용하였다. 연구결과, 참가자들은 원격으로 악기를 연습하는 동기가 적고, 능력과 자기 규제에 대한 감각이 낮으며, 팬데믹 동안 달성한 학습 성과에 불만을 느낀 것으로 보인다.

주제어: 온라인 악기 학습, 음악 교육의 심리학, 행동, 동기, 대인 관계

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Ⅰ. Introduction

The concept of "human nature" is central to theorizing human experiences and learning practices. Behavioral patterns are embedded in a complex system of networks involving individuals, groups, and environments, jointly interacting and operating in diverse physical and social ecosystems. One of these ecosystems is the educational system, which processes multiple social, emotional, psychological, and intellectual factors that shape personal experiences and acquired behaviors. These interpersonal and intrapersonal factors collectively construct students' behaviors toward achieving their academic goals. The COVID-19 pandemic has profoundly affected the educational system, enforcing the implementation of online learning and disrupting conventional approaches to pedagogy. This sudden shift forced a change in students and teachers' social and behavioral conduct (Chiu, 2022; Virtič, Dolenc & Sorgo, 2021).

Research on distance learning predates the pandemic, as the phenomenon has proliferated in the past couple of decades due to the institutional need to develop new teaching systems that correspond to the interests and skills of new generations. Scholars addressed how and where to employ virtual learning and the cases, fields, or subjects in which its application could be successful (Albert, 2015; Girardi, 2016; Marshall, 2016; Salavuo, 2008). Given the growing interest in this topic, the pandemic presented an opportunity for the field exploration of online education, whereby scholars worldwide have dedicated their efforts to exploring the repercussions, challenges, and benefits of the imposed social restrictions and "emergency remote teaching" measures (Hodges, Moore, Lockee, Trust & Bond, 2020). The positive reports registered increased equality in education (UNESCO, 2020), the ability to archive and record lectures (Agha, 2020), free access and geographic flexibility (Singh & Thurman, 2019), and low-cost effectiveness (Scarpetta & Quintini, 2020). On the other hand, remarks on the disadvantages of virtual learning include its restriction of social interactions, and group discussions and activities (Donlevy, 2003), which contribute to a lack of discipline and motivation (Savenye, 2005), learner isolation (Petrie et al., 2020), and an increase in stress levels, anxiety, and symptoms of depression (Aristovnik, Keržič, Ravšelj, Tomaževič & Umek, 2020; Browning et al., 2021; Sankhi & Marasine, 2020).

In the field of music education, particularly instrumental lessons, researchers have explored teacher-student connectedness and adaptability to Online Distance Learning − ODL (de Bruin, 2021; Vaizman, 2022), student engagement and self-regulation during the pandemic (Ibid.; Šimunovič, 2020), and the technical challenges of and pedagogical approaches to online instrumental lessons − OIL (Al Bakri, 2023; Biasutti et al., 2022; Pozo et al., 2022; Vaizman, 2022). Collectively,

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these studies highlight that ODL of musical instruments has had some benefits: Increasing students' sense of autonomy and enabling teachers to observe and envision students' home practice environments and routines. However, the prevailing conception is that teaching instruments during the pandemic was exceptionally challenging and even deemed unsuccessful (Šimunovič, 2020), due to the decline of student-teacher engagement, acoustic and technical limitations, and the infeasibility of implementing conventional teaching strategies in an online setting, among other reasons (Al Bakri, 2023; Pozo et al., 2022; Vaizman, 2022). These insights are invaluable to educational institutions, as instrumental lessons remain on the periphery of academic research, with the predominant focus being on theoretical disciplines. Given the inevitable trajectory of education toward digitization, any vulnerabilities must be thoroughly examined to inform future institutional decisions about the effective implementation of virtual learning programs. Education during the pandemic, therefore, could be viewed as a temporary experiment, one that has forcibly occurred, accelerating the shift of education to an online setting, with no regard to the suitability of the subjects or fields for e-Learning, nor the preparedness of teachers, educational institutions, or students.

Following COVID-19, many scholars focused on studying students' behavioral change and motivation to learn in a "forced online distance learning" environment (Virtič, Dolenc & Sorgo, 2021, p. 394). The close connection between human behavior and education has long been a topic of interest in academia. Leading theories on behavior, including Behaviorism, Implicit Needs Theory, and self-efficacy, have informed a vast amount of psychological literature in the twentieth century (Kaplan & Patrick, 2016; Schunk & DiBenedetto, 2016). In recent decades, the most prominent behavioral model steering academic research is Self-Determination Theory(SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000), which posits that human motivation increases when the basic psychological needs of relatedness (i.e., sense of social connectedness), autonomy (i.e., sense of control), and competence (i.e., perceived capabilities for achieving tasks) are met. Ryan and Deci argue that "environments that are most facilitating of intrinsic motivation are those that support people's basic psychological needs for autonomy, competence and relatedness" (Ryan and Deci, 2017, p.160). Undoubtedly, the pandemic pushed learning environments into unfamiliar grounds, disrupting how students receive and process information and interact with their teachers and peers. Mace argues that "human behavior is highly plastic and differs between groups and between individuals according to the environment in which they find themselves at any particular time" (Mace, 2010, p. 396). Considering the attested dependency of behavior on the environment within which humans reside, it is right to assume that the massive environmental changes imposed by the pandemic affected students' behavioral attitudes in the context of education. This hypothesis

was proven true by researchers who demonstrated that the coerced shift into ODL spurred a change in students' need satisfaction, thereby negatively affecting their motivation (Samsen-Bronsveld, Sanne, Van der Ven, Speetjens & Bakx, 2023). The effect of the pandemic on the educational system – with its interwoven and joint social, emotional, intellectual, and psychological elements – and the corresponding ways in which it influences students' learning processes and behaviors are crucial to assessing the effectiveness of online education. This is particularly true for instrumental lessons; a field mainly foreign to the virtual world until the pandemic.

While several studies addressed the challenges and benefits of OIL from practical, social, and technical points of view (Biasutti, Philippe & Schiavio, 2022; Šimunovič, 2020; Pozo et al., 2022; Vaizman, 2022), the relationship between online instrumental lessons and behavioral change is an area that is yet to be explored. As teachers, we experienced the difficulties of teaching a musical instrument online first-hand, and more importantly, we have witnessed students' disappointment with their perceived learning outcomes following the pandemic. Many students reported that ODL hampered the communication between participants involved in the learning process and complained that the "human touch", ever so important to instrumental lessons, was lost. A similar concern was shared by Dhawan, who recorded increased frustration and confusion among students operating digitally during the Pandemic (Dhawan, 2020). Students as learners are different; they vary in their capabilities, confidence, ambitions, and talents and have therefore responded to the educational shift differently.

With these student experiences in mind, it is important to emphasize their perspectives of OIL, and examine the 'experiment' that is the pandemic from a different lens to answer the following questions: In what ways has the shift to ODL affected students' learning experiences? Were students' psychological needs met in virtual learning environments, and how has that affected their motivation to learn? Are students satisfied with the learning outcomes they achieved during the pandemic? And finally, is digital education an effective medium for learning musical instruments? Informed by psychological theories of behavior, including SDT and self-efficacy, the present study aims to investigate the impact of the pandemic on the perceived learning outcomes of music students, by examining the effect of ODL on their motivation to learn. The objective of this research is to determine whether ODL is suitable for instrumental education. The research uses a mixed method approach, by exploring the factors influencing students' motivation to achieve their learning outcomes and developing the hypotheses, which are tested through a survey distributed to the music students at the University of Jordan concerning OIL. The following section introduces the Behavioral Paradigm of Learning (BPoL, [Figure 1]), which displays the factors affecting

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students' behavior throughout the learning process, and explains the ways in which these factors can support or thwart students' motivation to practice musical instruments and attain satisfactory learning outcomes.

Ⅱ. Behavioral Paradigm of Learning

Learning a musical instrument is highly complex, as it includes many intricately connected, reciprocal components that jointly impact and formulate students' behavioral attitudes toward learning. These educational, socio-contextual, or psychological components drive students' learning experiences, motivation, and ultimately, their academic progress. The BPoL presents these factors hierarchically, displaying the psychological depth at which they influence students' behavior. The reflective interaction of the elements constituting the BPoL ([Figure 1]) can be presented as a configuration that consists of a basic triad, wherein elements at the bottom consecutively and jointly influence the upper ones. On the lowest level of the pyramid is the learning environment, which impacts student at a basic psychological level, constituting of the mode of instruction, academic content, and physical surroundings. On the next level, students' motivation and behavioral attitudes are influenced by their interpersonal relationships with peers and teachers, their sense of social connectedness and belonging. These interpersonal relationships, jointly with the learning environment, shape students' intrapersonal reflections (the 3rd level of the pyramid, [Figure 1]) — their internalization of social and academic activities — which include self-regulation, autonomy, self-efficacy, and intrinsic and extrinsic motivation. The three factors influencing students' behavioral attitudes towards learning culminate to shape the final layer at the top of the pyramid: the learning outcomes. The BPoL, although presented in a simplified manner herein, represents a complex, intricate system of multifaceted components that direct the effectiveness of the educational process. Any minor change affecting the system's balance can impact the academic result. In other words, to improve learning outcomes, as illustrated in the BPoL, institutions and instructors must provide students with an optimal learning environment, a sense of social connectedness and belonging, and support for healthy intrapersonal reflection.
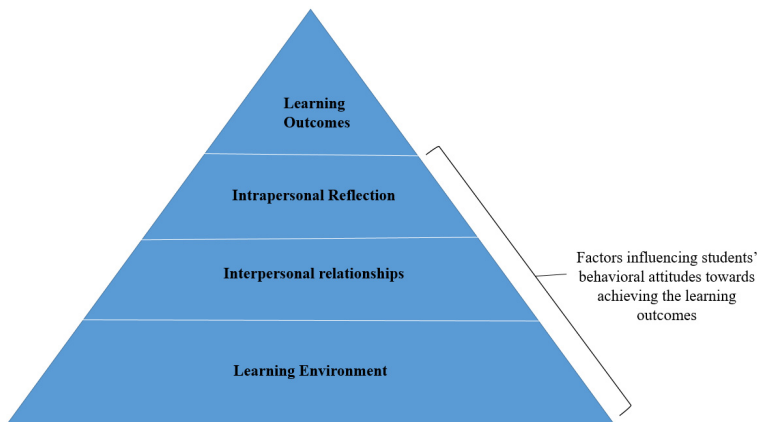
[Figure 1] Behavioral Paradigm of Learning (BPoL)

1. Learning Environment

Musical instruments are typically taught on a one-to-one basis, wherein specific strategies like "modeling", i.e., the teacher demonstrates by performing while commenting (Biasutti, Philippe & Schiavio, 2022) and "side-coaching", i.e., the teacher commenting while the student is playing (Vaizman, 2022) are employed. Close physical proximity between students and teachers is necessary to effectively deliver specific performance skills and techniques, such as sound extraction, timbral differences, dynamic colors, temporal varieties, and developing a response to the instruments' mechanism. Verbalizing how to execute these techniques is an intricate process, better explained through the teachers' live performances. Other matters like posture, finger positioning, and bow movements, to name a few, require emphasis through touch, which is unfeasible in an online environment.

Other limitations of virtual learning include poor digital literacy, adaptation, access, and training, fear of engaging with technology, and lack of audio-video synchronization and clear visuals of students while performing (Al Bakri, 2023; Al-Maroof, Salloum, Hassanien & Shalaan, 2020; Ebbini, 2023; Virtič, Dolenc & Sorgo, 2021, p. 394). According to some researchers, the failure of OIL during the pandemic owes to the resistance of teachers to replace "teacher-centered" approaches with novel, constructivist methods that encourage student autonomy (Pozo et al., 2022). One must argue, however, that while a student-centered approach may encourage the development of certain skills (e.g., group performance and creativity), the professionalism of performing musical instruments is yet to be successfully achieved through this approach.

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Professionalism in performance requires carefully structured instruction, tailored to meet students' individualized needs. Each student requires a different teaching approach that best suits their performance skills, talents, capabilities, personal characteristics, and sensitivities. While the "teacher-centered" approach might be criticized for its lack of autonomy support, it better enables teachers to satisfy the academic and socioemotional needs necessary for students to gain more dependability in practice and grow as professional musicians.

Physical presence on the university campus can have exceptional psychological and emotional connotations for music students. Musicians tend to be attached to a specific routine that includes practicing at home and going to campus, the latter of which can have an emblematic value to students, symbolizing a bubble in which two main components come into play. The first component is the instrumental lesson, a special place nuanced with shared experiences, memories, and emotions, where a teacher and student are psychologically connected in the pursuit of theoretical and practical accumulation of competence. The transfer of proficiency and knowledge is not simply a teaching mechanism, but a medium for exchanging professional growth. Physical surroundings also play a role in students' level of focus during face-to-face lessons, facilitating the direct, uninterrupted transmission of technical expertise from teacher to student. The second component is the university campus; a place where art is created, where surrounding musical sounds inspire students to participate in performing music and forging a culture. Presence on campus enables students to become part of a community, one that is targeted to producing art, sharing sounds, exchanging thoughts, and experimenting with colleagues and friends. The involvement in such social surroundings is invaluable to the establishment of future professional musicians. These components fortify students' learning routines and are fundamental for their academic development and motivation to learn and practice their instruments.

2. Interpersonal Relationships

Human beings are integrated parts of complex systems, a cognitive unit embedded in specific social environments (Maslow, 1954; Mayer & Salovey, 1990). These systems constitute highly complex relations, influencing human behavior and forming particular emotional, psychological, cognitive, and social ties. As Martin notes, "positive interpersonal relationships have been proposed as a buffer against stress and risk, instrumental help for tasks, emotional support in daily life, companionship in shared activities, and a basis for social and emotional development" (Martin, 2014, p. 10). Research has proven the salient effect of interpersonal relationships on students'

motivation and academic success (Su & Wang, 2022; Wu, Jiang, Liu, Konorova & Yang, 2022). Martin argues that the student-teacher relationship is one of the most integral relationships within an educational environment (Martin, 2014). Given the private student-teacher setting of instrumental classes, it is essential that students not only interact with their tutors, but also feel a sense of comfort that allows them to freely and fully engage in the learning process. Collaborative pedagogical approaches typically adopted in instrumental lessons, including 'scaffolding', 'cognitive apprenticeship', and 'master-apprentice' (de Bruin, 2018; Vaizman, 2022), depend on close social and emotional contact between the tutor and learner, or as Vaizman describes it, a sense of 'intimacy' (Vaizman, 2022, p.158). This deep level of connection is difficult to achieve in an online setting; in fact, some scholars believe that "the more virtual the educational environment, the more disconnected students become" (Vaizman, 2022, p. 154). In instrumental lessons, more so than any other discipline, the teachers' advice, instruction, and mentoring are fundamental bricks in the educational process. The learning process entirely depends on the direct transfer of expertise from teacher to student. Every physical and technical skill, including sound extraction, articulation, pedaling, bowing, dynamics, and tempo variety, relies on transmission through person-to-person contact.

Peer relationships also play a significant role in the motivational engagement of students. The interaction between peers helps build a socio-contextual environment wherein students exchange daily learning experiences, difficulties, achievements, or frustrations. This shared community supports the fulfillment of students' psychological needs for relatedness. Virtual learning during the pandemic limited the social interaction between students, stripping them of the 'normal university experience', where they can meet their colleagues daily, and become affiliated with an artistic, creative community. Group practice endeavors help increase students' motivation, allowing them to assist, compete and compare with, and encourage one another. In music schooling, healthy competition is one of the most important stimuli for personal development. Enabling Students to listen to the performance interpretations and accomplishments of their peers and compare them with their own largely contributes to elevating their motivation to practice and advance as musicians.

3. Intrapersonal Reflection

Intrapersonal reflection, which describes how students cognitively, psychologically, and emotionally internalize their learning experiences, is the final factor influencing their motivation, self-efficacy, and self-sufficiency. Students' learning environments, the academic content and learning modes they receive, and their interactions with peers and teachers, all contribute to how they internalize

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information, feelings, and ideas. Learners' social contexts influence their perceived competence to achieve learning outcomes, as they tend to be more self-efficacious when they feel supported by their teachers and peers (Schunk & DiBenedetto; 2016). Self-efficacy is also improved when students receive a "suitable learning structure" that enables them to adequately comprehend the content (Chiu, 2022). As Ryan and Deci note, "students will more likely adopt and internalize a goal if they understand it and have the relevant skills to succeed at it" (Ryan & Deci, 2000, p.64). There is no question that online learning during the pandemic hindered social relations between the participants involved in the educational process. In addition, it forcibly changed the conventional learning structure used for instrumental lessons. While some researchers argue that utilizing digital material in virtual lessons enables support for competence (Pozo et al., 2022), implementing this approach is inapplicable to the nature of instrumental lessons. Sending digital materials (e.g., audios and videos) is insufficient to explaining how to implement and develop specific musical techniques or skills, nor can it be tailored to students' individual capabilities and challenges.

Intrapersonal reflection includes students' abilities to self-regulate their learning endeavors, feel autonomous, and be in control of decisions concerned with education. Music students must acquire a set of functioning skills central to their academic development, including task management, time-planning, self-regulation, and self-evaluation. The development of these skills must be carefully nurtured through autonomy-supportive learning environments. In instrumental lessons, musical skills and instructions on achieving a particular task through home practice are typically passed down from the teacher to the student. One of the most critical problems in OIL is that teachers cannot properly evaluate students' progress, give them feedback, and continually present them with new targets to achieve, due to the technical and physical limitations of remote education. Therefore, OIL limits the guidance that students receive from instructors on attaining correct practice methods, developing the self-regulation and organization skills necessary to succeed, and grasping the importance of agency and self-reliance when it comes to instrumental learning. These limitations could negatively affect learners' senses of autonomy, and judgments of their capabilities, leaving them to feel incompetent.

To achieve their learning outcomes, music students must have the self-determination to practice in specific, calculated, and well-considered methods. The characteristics of "high-quality" practice, as Evans describes it, is that "it needs to be *deliberate practice* − an activity designed with the explicit goal of improving performance, informed by an expert coach or teacher, and which by definition is effortful, demands time and economic resources and requires considerable motivation"

(Evans, 2023, p.655). For musicians to reach a sufficient level of motivation to practice 'deliberately', they must be equipped with the necessary skills and knowledge, be emotionally and academically supported by their teachers, feel a sense of social connectedness with their peers, and develop positive intrapersonal reflection. As Ryan and Deci argue, "the facilitation of more self-determined learning requires classroom conditions that allow satisfaction of these three basic human needs——that is that support the innate needs to feel connected, effective, and agentic as one is exposed to new ideas and exercises new skills" (Ryan and Deci, 2000, 65).

Ⅲ. Methodology

1. Participants and Procedure

A survey was conducted to examine whether online distance learning impacted music students' learning experiences and outcomes, and determine the nature of that impact. On the 17th of May, 2023, an electronic questionnaire was distributed to all the students who undertook instrumental music courses at the University of Jordan during the pandemic. Out of 35 students, 32 questionnaires were retrieved. The research population comprises eight post-graduate and 24 undergraduate students, 29 specializing in music performance and three in music education. Participants' demographic information in terms of gender consists of 17 female students (53.13%) and 15 male students (46.87%). The number of participants for each academic year during the pandemic was as follows: First year = 5 students, second year = 11 students, third year = 5 students, and fourth year = 5 students.

2. Description of Questionnaire

The questionnaire consisted of four sections, the first three as independent variables (IV): Learning environments, interpersonal relationships, and intrapersonal reflection; the final section was dedicated to participants' perceived learning outcomes as a dependent variable (DV). Each section consisted of five to seven statements covering significant issues and obstacles related to the online instrumental learning process, including social connectedness with teachers and peers, pedagogical strategies, comprehension of learning material via virtual platforms, and students' self-reflection and motivation to practice the musical instruments. The questionnaire data was

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assessed using a 5-point Likert Scale: 1 = to a very small extent, 2 = to a small extent, 3 = to a moderate extent, 4 = to a large extent, 5 = to a very large extent. As per each written statement, these options were formed as a response to assessing the extent to which online distance learning, or its repercussions, negatively impacted a certain aspect of students' learning experiences.

3. Validity and Reliability Procedures

Expert judgement was consulted to ensure content validity: The questionnaire was distributed to two music professors at the University of Jordan and one statistics professor who confirmed the coverage of all aspects of the construct being measured prior to the distribution to participants[1]. The test-retest method was undertaken to ensure the reliability of the survey: A paper-based version of the questionnaire was distributed to the same participants two months prior to the online survey (as a form of pilot testing, considering the small sample size), and the results were found consistent.

Literature testing the psychological impact of the pandemic on students was taken as reference for phrasing the questionnaire items negatively (Browning et al., 2021; Nguyen, Pham & Nguyen, 2020). Since this study is concerned with testing the negative impact of online instrumental learning on students' satisfaction and the factors influencing behavioral change, the questionnaire statements were tailored to focus on the negative psychological and experiential impacts that students may have encountered. The negative worded items were found more methodologically effective for testing the hypotheses of this research. Semantically, negative-oriented questions can be more effective for extracting participants' opinions than neutral questions, triggering either a negative or a positive response. The 5-point Likert scale allowed participants the opportunity to clearly express the degree to which they have or have not been impacted by online instrumental learning. The questionnaire was constructed with the consultancy of two experts in the field of statistics, who advised that the phrasing of items (negatively worded) should remain relatively consistent throughout the questionnaire to avoid confusion amongst participants or careless responses[2]. This decision aligns with Weems, Onwuegbuzie and Collins' (2006) stance against using a mixed approach of positive and negative worded items in the same survey. However,

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   Dr. Dalia Sabri, Associate Professor, The University of Jordan, Amman, Jordan.
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2) Dr. Nizar Al-Labadi, Associate Professor, The University of Jordan, Amman, Jordan.
   Dr. Wisam Al-Rishq, Amman, Jordan.

since the final conclusive section of the questionnaire is more concerned with learning outcomes rather than the elements influencing behavioral attitudes towards learning, positively worded items were mainly included to avoid acquiescence bias.

4. Measurements

The analysis of the results was based on a scale measuring the degree of negative impact, which was devised by dividing the 5-point scale into three equal sections: 1 − 2.33, indicating a low negative impact, 2.34 − 3.67, indicating a moderate negative impact, and 3.68 − 5:00, indicating a high negative impact. The conventional approach to interpreting Pearson's correlation coefficient values (Schober and Boer, 2018, p. 5) was used to interpret the degree of correlation between each IV and the DV (<Table 1>).

<Table 1> Interpretation of Correlation Coefficient Values

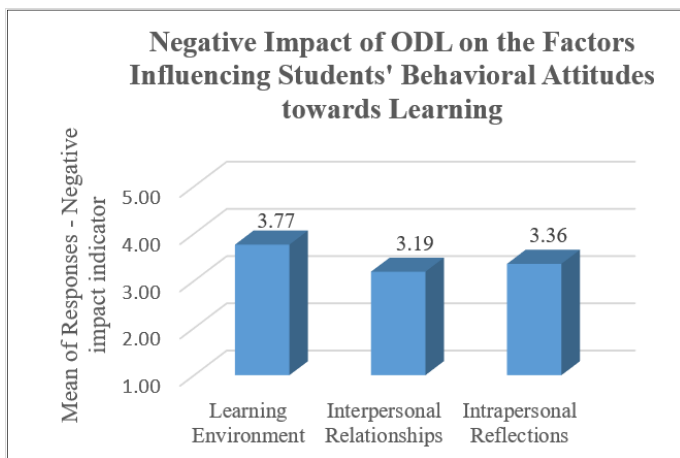| Correlation Coefficient Interval	Interpretation
0.00 − 0.10	Negligible correlation
0.10 − 0.39	Weak correlation
0.40 − 0.69	Moderate correlation
0.70 − 0.89	Strong correlation
0.90 − 1.00	Very strong correlation

5. Research Hypotheses

The discussions presented thus far highlighted the social, emotional, academic, and technical challenges and limitations of online instrumental lessons, and how they influence students' behavioral attitudes toward learning musical instruments. With these issues in mind, the following set of hypotheses were formulated to investigate the impact of the ODL on students' learning experiences and outcomes from a behavioral perspective:

H1: ODL of musical instruments negatively impacted students' learning environments.

H2: ODL of musical instruments negatively impacted students' interpersonal relationships.

H3: ODL of musical instruments negatively impacted students' intrapersonal reflection.

H4: There is a negative correlation between the impact of ODL on the factors influencing students' behavioral attitudes toward education (i.e. learning environments, interpersonal relationships, and intrapersonal reflection) and their perceived learning outcomes.

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Ⅳ. Results

The results reveal that ODL negatively impacted all three independent variables from the students' perspectives. [Figure 2] demonstrates the mean of responses to questions related to the effect of ODL on the factors influencing students' behavior toward learning (IV). Concerning the devised measuring scale, the learning environment is the factor that was mostly impacted by the shift to online education ($\bar{x}$ = 3.77, indicating a high negative impact), followed by intrapersonal reflections ($\bar{x}$ = 3.36, indicating a moderate negative impact), and interpersonal relationships ($\bar{x}$ = 3.19, indicating a low negative impact).

[Figure 2] The Negative Impact of ODL on the Elements of the BPoL

<Table 2> below shows the descriptive statistics for each section in the questionnaire, upon which the main discussions for the survey are based. Responses regarding participants' learning environment during the pandemic ([Figure 3]) reveal that their physical absence from the university campus was the factor that had the most negative impact on their learning process ($\bar{x}$ = 4.50). Another aspect firmly established by the questionnaire is the inability to apply the pedagogical strategies used in face-to-face instrumental lessons through digital platforms ($\bar{x}$ = 4.06). The rest of the responses in this section indicated a moderate-high negative impact of ODL on aspects included in students' learning environment.

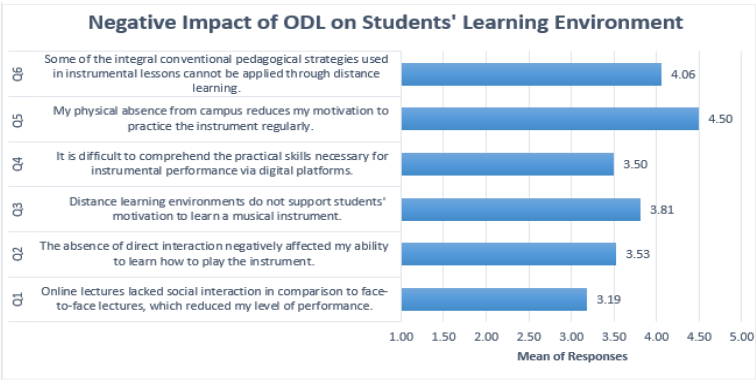<Table 2> Descriptive Statistics for Questionnaire Statements

	Questions	Mean	Standard Deviation
	Learning Environment		
Q1	Online lectures lacked social interaction in comparison to face-to-face lectures, which reduced my level of performance.	3.19	1.15
Q2	The absence of direct interaction negatively affected my ability to learn how to play the instrument.	3.53	1.05
Q3	Distance learning environments do not support students' motivation to learn a musical instrument.	3.81	0.97
Q4	It is difficult to comprehend the practical skills necessary for instrumental performance via digital platforms.	3.50	1.19
Q5	My physical absence from campus reduces my motivation to practice the instrument regularly.	4.50	0.72
Q6	Some of the integral conventional pedagogical strategies used in instrumental lessons cannot be applied through distance learning.	4.06	0.80
	Interpersonal Relationships		
Q7	The lack of direct communication with my instrumental teacher led me to feel stressed about learning the instrument.	3.38	1.10
Q8*	My friendly relationship with my musical instrument instructor continued throughout the pandemic.	1.91	0.86
Q9	The degree of support I received from my instrumental teacher was reduced during E-learning.	2.78	1.04
Q10	I could not maintain a good relationship with my peers or build new relationships during the period of online distance learning.	3.44	0.91
Q11	I was unable to discuss and analyze the topics raised during online instrumental lessons with my colleagues, which negatively affected my performance level.	3.53	0.88
Q12	My inability to directly communicate and compete with my peers during the pandemic thwarted my motivation to practice the musical instrument.	3.69	0.97
Q13	I felt isolated from my teachers and peers during the pandemic, which lessened my motivation to practice the instrument.	3.63	1.29
	Intrapersonal Reflection		
Q14	I felt that learning to play the instrument remotely was more difficult than learning it face-to-face.	4.09	0.93
Q15	The sudden and forced shift to online learning reduced my sense of self-regulation over the process of learning to play the musical instrument.	3.81	0.97
Q16	I felt that I lacked the necessary competencies to accomplish the tasks required in musical instrumental lessons during the period of distance learning.	3.34	1.04
Q17	I had no motivation to practice the musical instrument during the pandemic due to my inability to comprehend the information I received through electronic platforms.	3.16	1.11

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<Table 2> Continued

	Questions	Mean	Standard Deviation
	Intrapersonal Reflection		
Q18*	My inability to directly communicate with my teacher led me to put more effort into practicing the musical instrument.	2.44	0.91
Q19	Learning to play the instrument remotely reduced my ability to organize time and follow the necessary instructions to master performance.	3.31	1.03
	Perceived Learning Outcomes		
Q20	Online education was suitable for learning the skills necessary to play a musical instruments.	2.44	1.08
Q21**	Online learning has negatively impacted my performance level.	2.72	1.17
Q22	The outcomes I achieved during online learning are satisfactory.	2.81	1.00
Q23	The learning outcomes of online distance learning are better than those I have achieved through face-to-face education.	1.94	1.01
Q24	I understood all the practical and technical instructions I received in online instrumental lessons.	2.69	1.18

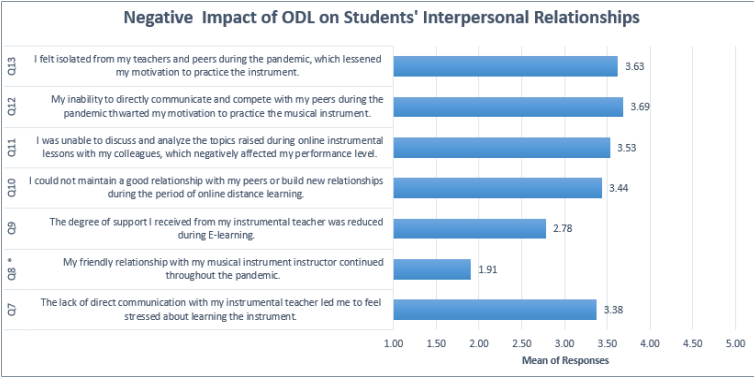* Responses for this statement were reversed to calculate negative impact.

** Responses for this statement were reversed to match the reversed scale used for section 4.

[Figure 3] Negative Impact of ODL on Students' Learning Environment
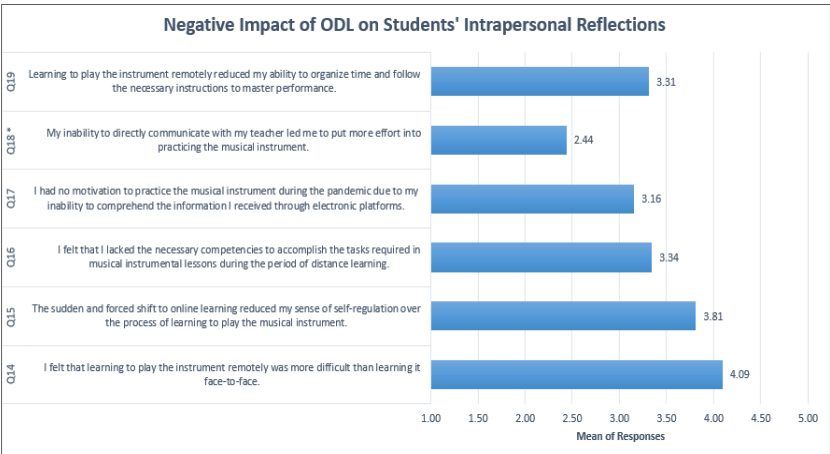
Regarding interpersonal relationships ([Figure 4]), the lack of students' direct communication with their peers had the most substantial negative impact on their motivation to practice the instruments ($\bar{x}$ = 3.69), followed by feelings of isolation from their teachers and peers ($\bar{x}$ = 3.63). Responses registered a moderately negative impact of distance learning on students' abilities to discuss and analyze topics raised in instrumental lessons with their peers during the pandemic,

which they believed to have reduced their performance levels ($\bar{x}$ = 3.53).

[Figure 4] Negative Impact of ODL on Students' Interpersonal Relationships

The study also proved that online distance learning negatively affected students' intrapersonal reflections ([Figure 5]). The perceived difficulty of OIL compared to the traditional mode of education, followed by the ineffectiveness of self-regulating practice time, were confirmed to be the most disturbed aspects in this section ($\bar{x}$ = 4.09 and $\bar{x}$ = 3.81 respectively).

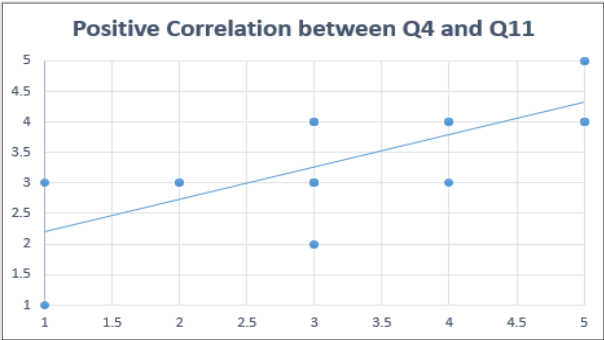**[Figure 5]** Negative Impact of ODL on Students' Intrapersonal Reflections

The results revealed that the negative impact of ODL on students' learning environment, interpersonal relationships, and intrapersonal reflection yielded less satisfactory perceived learning

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outcomes. This statement is verified by the negative correlation between each of the independent variables and the learning outcomes (<Table 3>). According to the scale of interpreting correlation coefficient values (<Table 1>), a moderate, verging on strong, correlation exists between intrapersonal reflection and perceived learning outcomes (r = -0.678). The other two values (r = -0.559 and r = -0.493) representing interpersonal relationships and the learning environment, respectively, indicate a moderate negative correlation relationship with participants' perceived learning outcomes.

<Table 3> Correlation Coefficient Values between IV and DV

		Learning Outcomes
Learning Environment	Correlation Coefficient	-.493-**
	Significance Level	.004
	Sample	32
Interpersonal Relationships	Correlation Coefficient	-.559-**
	Significance Level	.001
	Sample	32
intrapersonal Reflection	Correlation Coefficient	-.678-**
	Significance Level	.000
	Sample	32

Another correlation was established between students' inabilities to comprehend the practical skills necessary for instrumental performance via digital platforms (Q4) and their lack of communication with peers (Q11). [Figure 6] shows the positive correlation between the responses to these two questions.

[Figure 6] Positive Correlation between Q4 and Q11

V. Discussion & Limitation

The present paper explored the impact of OIL on the factors influencing students' behavior toward learning, ultimately affecting their perceived learning outcomes. The analyzed data reflects the students' opinions about the presented BPoL, of which elements interact and formulate students' satisfaction with their learning experiences and outcomes. The study has one primary objective: determining whether ODL is an effective mode for learning musical instruments. This investigation is crucial to music education, particularly with the increased digitization of programs in higher educational institutions worldwide.

Based on the research findings, the first three hypotheses (H1, H2, and H3) are accepted: ODL had a negative impact on all three factors presented in the BPoL (learning environment, interpersonal relationships, and intrapersonal reflection). According to the reported data ([Figure 3]), students were mainly affected by their lack of presence on the university campus. This aspect is essential for music students, as their attendance on campus reinforces their progress in multiple ways: Communicating with their peers and gaining social and emotional support, interacting with their instructors, having a more structured schedule for practice, and receiving face-to-face instrumental instruction. Conventional strategies used in practical lessons have proven more effective according to students' perceptions. The development of musical skills and the creation of musicianship require specific pedagogical methods and strategies, the absence of which reflects on students' academic improvement, professional growth, self-efficacy, and satisfaction. The results support the notion that music students are exceptionally vulnerable to changes in the traditional modes of instrumental instruction.

The findings suggest a connection between interpersonal relationships and students' motivation to learn. This connection is rooted in the satisfaction of students' feelings of emotional security and belonging, encouragement from colleagues and teachers, and the positive outcomes of peer competitiveness. These results are consistent with studies that highlight the significance of peer and student-teacher relationships on learners' academic development and motivation (de Bruin, 2021; Furrer & Skinner, 2003; Juvonen, Espinoza & Knifsend, 2012; Opdennaker & Minnaert, 2014). Participants' reports of changes in their behavioral attitudes toward learning due to feelings of isolation from teachers and peers during the pandemic manifest the importance of fulfilling learners' needs for relatedness − a notion supported by a vast amount of research (Ryan and Deci, 2017; Ryan, 2023; Opdennaker & Minnaert, 2014).

The two most vital aspects of intrapersonal reflection affected by online distance learning,

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are students' senses of self-regulation and competence. Participants declared that learning to play an instrument remotely is more difficult than face-to-face. The perception of increased difficulty can negatively impact students' sense of competence, lowering their self-efficacy and, thereby, their motivation and academic outcomes. Similarly, students' abilities to self-regulate their instrumental practice and gain control over their learning experiences through an autonomy-supportive environment must be carefully developed through the guidance of instructors. Fulfilling the basic need for autonomy is the key to fostering students' intrinsic motivation (Ruzek et al., 2016; Trenshaw, Revelo, Earl & Herman, 2016); an element particularly necessary for learners to exercise in "deliberate" practice.

The fourth hypothesis (H4) is accepted as a clear negative correlation exists between the impact of ODL on all three factors influencing students' behavioral attitudes toward learning and the perceived learning outcome. The negative consequences of ODL on students' behavior owes to the disruption of the Behavioral Paradigm of Learning, its elements, and the interconnected psycho-social network it pertains. Based on these findings, it can be stated that according to students, the conventional mode of education is preferred to ODL when it comes to learning musical instruments, which corroborates the results of recent studies on OIL during the pandemic (Šimunovič, 2020; Vaizman, 2022).

While the findings of this study could be of great value to both academia and the field of education, it contains several limitations: First, due to the general scarcity of students enrolling in music programs at the University of Jordan, and in the country more broadly, the sample size of the study is small. While scholars have proven that a minimum number of 30 participants can be statistically sufficient for testing research hypotheses in certain fields (Kish, 1965; Louangrath, 2017), this research will be more promising with a larger sample size, scaled across multiple educational institutions and in different geographic regions. Second, participants' perceived learning outcomes were measured based on their perspectives; a comparative statistical study of the grades students receive in face-to-face versus distance learning might either strengthen the arguments presented herein or yield different results. Finally, due to the small sample size, the findings were generalized to students in different academic years and performance levels; the impact of OIL on students in different stages of their education requires further investigation.

Ⅵ. **Conclusion**

The enforced lockdowns during the COVID-19 pandemic resulted in a sudden shift in modes

of education, upon which the implementation of ODL became a trend. The search for more sophisticated, updated, and suitable methods for educating the new millennium has prompted academics to advocate and probe online learning platforms. Music education is no stranger to this phenomenon, as ideas and attempts for implementing virtual instrumental lessons have escalated since the pandemic. The lack of sufficient research on OIL inspired the authors to examine its effectiveness as an alternative to traditional modes of instruction in higher educational institutions. The researchers investigated the matter from a behavioral lens, by identifying the factors that influence students' behavioral attitudes toward achieving their learning outcomes, and exploring the impact of ODL on these factors. To gain an understanding of students' learning experiences and evaluation of OIL, a questionnaire was distributed to all students who undertook OIL at the University of Jordan during the pandemic. The questions were tailored to address the psychological, emotional, social, academic, and cognitive parameters that frame students' motivation to learn musical instruments. The survey results present clear evidence that most students found instrumental learning more challenging in an online setting. In addition, learners were less motivated to practice their instruments and were dissatisfied with the learning outcomes they achieved during the pandemic. The disconnection in interpersonal, environmental, social, and academic relations negatively impacted students' senses of self-regulation, autonomy, self-efficacy, motivation, and satisfaction.

Based on the study results and the discussions presented herein, the authors stress that the implementation of OIL must be approached with great caution, particularly at the current stage of technological development, as providing the necessary requirements for effective learning through digital modes of instruction is an area that remains to be underexplored. Extensive interdisciplinary research must be undertaken in the future to examine the relationship between music pedagogy and behavioral sciences more closely. Utilizing behavioral models for the betterment of music education is of high significance to educational institutions and, more specifically, teachers. This is especially true for instrumental lessons, as students' progress and motivation largely depend on their emotional and psychological attitudes. While a few scholars dedicated their studies to the impact of distance learning on instrumental education, further investigation on the matter is necessary. Future studies are recommended to examine the suitability of remote learning for instrumental education, either by taking a similar approach to the current study and applying it to different universities worldwide to enrich these findings, or using a strictly qualitative research method to enable a deeper understanding of students' individualized experiences with OIL. Research dedicated to finding alternative teaching methods and strategies for instrumental learning that focus on promoting close interpersonal relationships

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and supporting autonomy and competence in an online setting is crucial. The success of these methods, however, requires the presence of specialized online platforms for instrumental learning that contribute to the effective transmission of technical skills and knowledge from teachers to students. The authors recommend the development of such digital platforms to benefit future endeavors of OIL.

The present research contributes to educational institutions as it provides new insights on the behavioral and academic implications of online instrumental learning. The study sheds light on the social, cognitive, emotional, and behavioral challenges that students might encounter while learning to play a musical instrument remotely, and therefore, highlights important issues for institutions to consider prior to the digitization of music programs. The article also contributes to academia, as it derives from existing behavioral theories to emphasize the key parameters of instrumental learning, which could inform future research on the discipline of music education.

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