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A Prototype of Phygital Learning in Pianistic Interpretation of Brazilian Classical Music for University Students in Thailand

ต้นแบบการเรียนรู้ด้วยฟิจิทัล วิชาการตีความการเล่นเปียโนแบบคลาสสิคของประเทศบราซิล สำหรับนักศึกษามหาวิทยาลัยในประเทศไทย

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Abstract

The main objective of this qualitative research was to design a prototype of a phygital learning in the pianistic interpretation of Brazilian classical music for international university students in Bangkok, Thailand. The phygital learning in the pianistic interpretation of Brazilian classical music refers to an approach for providing piano students' insight into the specific technical and musical problems and to enhance a deeper learning environment by integrating physical practice with digital contents. The prototype has been designed based upon a literature review and the researcher's experience. Three experts in piano performance were invited to validate the prototype. The research instruments were 1) a prototype of phygital learning which is comprised of a) guideline of phygital learning in the pianistic interpretation of Brazilian classical music, and b) interactive video integrated with questions based on piano performance technique, and 2) an appraisal of a prototype. The data were analyzed from experts' comments and feedback. The research findings were comprised of the developed prototype consisting of 1) a guideline for phygital learning in pianistic interpretation of Brazilian classical music showing all steps on how to participate, 2) an interactive video which encourages students to practice by asking interactive questions based on piano performance techniques which was a link between physical environment and digital contents. The prototype of phygital learning should be recommended to students to evaluate and

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gather more details to improve the physical part and digital part of phygital learning. This innovation should shed a light on enhancing competence in the musical objectives of students' piano practice by adding a new dimension and an improvement in benefiting the teaching in the pianistic interpretation of Brazilian classical music.

Keywords: 1. Augmented Reality technology, 2. Blended learning, 3. Brazilian Classical music, 4. Pianistic Interpretation, 5. Phygital learning

บทคัดย่อ

การวิจัยเชิงคุณภาพครั้งนี้มีวัตถุประสงค์หลักเพื่อออกแบบต้นแบบการเรียนรู้ด้วยฟิจิทัล วิชาการตีความการเล่นเปียโนแบบคลาสสิคของประเทศบราซิล สำหรับนักศึกษาในมหาวิทยาลัยนานาชาติ ในกรุงเทพฯ ประเทศไทย การเรียนรู้แบบฟิจิทัล วิชาการตีความการเล่นเปียโนแบบคลาสสิคของประเทศบราซิล คือ กระบวนการที่จัดให้ผู้เรียนเปียโนเกิดความเข้าใจอย่างลึกซึ่งถึงวิธีการ และปัญหาด้านดนตรี และเพื่อให้มีสภาพแวดล้อมทางการเรียนรู้ที่ส่งเสริมอย่างลึกซึ้งยิ่งขึ้น โดยการผสมผสานการฝึกกับเครื่องดนตรี (กายภาพ) และใช้เนื้อหาที่เป็นดิจิทัล ต้นแบบได้ออกแบบจากการทบทวนวรรณกรรม และประสบการณ์ของผู้วิจัย ผู้เชี่ยวชาญด้านการสอนเปียโนจำนวน 3 ท่านได้รับเชิญเพื่อทำการทวนสอบต้นแบบที่สร้างขึ้น เครื่องมือในการวิจัยคือ 1. ต้นแบบของการเรียนรู้ด้วยฟิจิทัลซึ่งประกอบด้วย ก. คู่มือการเรียนรู้ด้วยฟิจิทัล วิชาการตีความการเล่นเปียโนแบบคลาสสิค และข.วีดิโอปฏิสัมพันธ์ ที่มีคำถามด้านตามลำดับของการแสดงเปียโน และ 2. แบบประเมินต้นแบบ แล้วนำความคิดเห็นของผู้เชี่ยวชาญมาวิเคราะห์ข้อมูลซึ่งทำให้ได้ผลการวิจัยว่าต้นแบบที่พัฒนาขึ้น ว่ามีส่วนประกอบของ 1 คู่มือที่แสดงขั้นตอนของการเรียนในแต่ละลำดับ 2 วิดีโอปฏิสัมพันธ์ที่ส่งเสริมให้ผู้เรียนฝึกฝนเทคนิคการเล่นเปียโนซึ่งเชื่อมโยงการฝึกด้วยเครื่องดนตรี (กายภาพ) และเนื้อหาแบบดิจิทัล ดังนั้นขั้นต่อไปของการวิจัยต้นแบบของการเรียนรู้ด้วยฟิจิทัลควรแนะนำให้นักศึกษาใช้ ประเมินเพื่อให้ได้ข้อมูลที่ลึกซึ้งมากขึ้น เพื่อนำมาพัฒนาทั้งทางด้านกายภาพและทางด้านดิจิทัลควบคู่กันไป นวัตกรรมนี้ย่อมแสดงให้เห็นถึงการฝึกเล่นเปียโนของผู้เรียนที่ต้องเข้าใจวัตถุประสงค์ของดนตรี นับเป็นการศึกษาที่แสดงมิติใหม่ ที่เป็นประโยชน์ต่อการเรียนการสอนการตีความการเล่นเปียโนแบบคลาสสิคของประเทศบราซิล

I. INTRODUCTION

A prototype of phygital learning in the pianistic interpretation of Brazilian classical music is created to form a smart learning environment based on e-learning methodology to support and improve piano tutorial and to correct piano practice deficiencies. Phygital learning is a new learning concept that is composed of two important elements: physical and digital (Vate-U-Lan, Masouras, & Quigley, 2016). This concept may foster hyper-learning experiences for students' piano practicing. The digital part of phygital learning is integrated with different technologies which introduces a new dimensional edge to piano performance art by creating a smart learning environment among instructors and students while the physical part places emphasis on real music instruments, for example.

The potential of a phygital learning environment in the pianistic interpretation of Brazilian classical music will play a significant role in helping students to a clear understanding in piano class, not because this concept replaces instructor's reasoning, but rather because it can inspire students to achieve a specific objective to the highest quality attainable of musical aesthetic and development in the pianistic interpretation of Brazilian classical music. By conducting piano practice through phygital learning and pointing out complex aspects of piano techniques clearly, students can be encouraged to practice systematically. The physical learning environment will offer many benefits effectively in piano practicing. Digital technology or online driven technology and applications on mobile devices will provide students consistency in accessing all contents and information to support piano practice. Physical or tangible objects such as music scores, piano chairs or musical instruments will provide an ideal learning ecosystem balanced with digital contents. The interaction of live-contexts or physical environment with virtual contents creates the most attractive learning environment, has the greatest influence, stimulates the acquisitional process of students resulting in more valuable learning and also enhancing piano tutorial and assessment.

To provide a comprehensive assessment of this new concept the researcher has drafted the prototype and consult experts in phygital learning and experts in piano performance with the aim of determining the effectiveness of the phygital learning environment. The prototype of phygital learning methodology relates to the subjects' psychomotor domain skills which require abilities such as playing the piano. This article follows a step by step systematic approach toward progress that leads to the higher levels of piano practicing.

The statement of the problem

Piano tutorials and piano practicing involve to a multisensory motor skill experience and require selective attention in order to project complex musical structures and also its affective aspects. Piano students often lose their attention in the classroom because piano performance requires a mind and body connection and these are too complex to be developed and assimilated in a short period of time. The most appropriate piano practice for students is by being monitored by the instructor at least three times a week, while many universities in Thailand and other music schools only enable students to have piano class for one hour per week. In contrast students in many universities in Europe, North America, and South America, are allotted two hours' worth of piano class every week.

Thus, the purpose of this study is to provide a new means of supporting and improving piano tutorial deficiencies, and hopefully the findings will assist students' piano practice, enhancing most significantly the psychomotor domain and levels of competence. The prototype needs to be validated before being tested with the students. In order to improve and modify the prototype systematically, three experts in piano performance have been invited to validate.

Research objective

This research aims to design, develop, and validate a prototype of a physical learning environment for Brazilian classical music piano interpretation for international university students in Bangkok, Thailand.

Research question

The main research question for this current research is "What are the elements of a prototype of phygital learning environment in Brazilian classical music piano interpretation for university students in order to address considerable and suitable assistance for piano practicing?"

II. LITERATURE REVIEW

The phygital learning environment of this current study is a state of the art concept which is related to the learning domain, phygital learning, methodologies in pianistic interpretation of classical music, and advanced technologies that inspire to the highest levels of competence in attaining superior psychomotor learning.

Learning Domain

Learning is a process of developing and enhancing the brain's growth in which its domain can be categorized into three main ideas: cognitive, affective, and psychomotor. All three domains reveal a development of learning from a lower to a higher level of learning. The prototype of the phygital learning environment is to expand all three learning domains and to promote knowledge acquisition, especially psychomotor learning which obtains knowledge through physical interactions or mind/body connection.

Digital Media in context of eLearning or learning in a sense can only present visual and audio experiences and does not possess the capability to accomplish all learning domains. Nevertheless, music education can increase or improve the capacity to induce holistic development and cognitive domains of students (Kafol et al., 2015; Martinez-Pons, 2001). A review of the findings on the psychomotor domain for music education, proven by Kibler Barker and Miles's (1970), the taxonomy enables efficient classification of music objectives. The psychomotor domain according to the taxonomy developed by Kibler et al (1970) consists of four levels: Gross Body Movements, Finely Coordinated Movements, Non-Verbal Communication Sets, and Speech Behaviors. The live physical contexts for music education such as playing piano that aims to create student psychomotor skills might be considered to follow these four steps for piano practice development of students.

Phygital Learning

Phygital Learning is a concept of a smart learning ecosystem among instructors and students which balances digital contents or online technology-driven (Vate-U-Lan et al., 2016). Phygital (physical plus digital) is a technology approach that embodies the combination of digital technology, sharing knowledge with physical ones or students. The concept of "Phygital Learning" is to enhance all three learning domains, especially the psychomotor domain which requires a strong connection between mind and body. Music education can improve the capability to induce holistic development and improve the psychomotor, affective, and cognitive domain of students. Meanwhile, technology and applications on mobile devices such as quick response (QR), augmented reality (AR), and google glasses will help create a new learning environment between physical and digital by blurring the boundary between both areas.

Phygital learning in piano interpretation will help students to develop greater efficiency in musical objectives of affective, psychomotor, and cognitive learning domains in the piano interpretation of Brazilian classical music. Augmented Reality (AR) is an advanced interface technical computation or software, in which objects from the real environment are

virtually inserted into computation, creating a virtual environment and allowing the user to experience said environment through a video monitor. Thus, the objective of using AR technology in this research is to assist as a means to provide learning objects for piano students through visualization and hearing. Educational software is classified according to the instructors' pedagogical objectives as follows: tutorials, exercise and practice, multimedia and internet, simulation, all of which can help promote the educational learning process even further. Augmented Reality should not be considered as a mere teaching tool but as a supplement that helps visualize the learning environment, thereby promoting reflection, innovation, and knowledge development. Throughout a research of learning called blended learning which refers to learning activity aiming to foster the quality of learning. Blended learning or online learning video gives significant contribution for learners offering the best of traditional learning (Dwiyogo, 2018). A study of eLearning prototype found three components that can support user's skills consisting of: content engagement, interaction, and effective appraisal (Cheevirot & Vate-U-Lan, 2017). Moreover, the students indicated that learning from videos can assist them to understand the contents easier (Cheevirot & Vate-U-Lan, 2017).

Processes of Phygital Learning

The new concept of a piano course is based on the prototype of a phygital learning environment in the pianistic interpretation of Brazilian classical music drafted and illustrated upon an ideal collaboration including all aspects to enhance a deeper learning environment.



Figure 1: a Prototype of Phygital Learning

Source: Vate-U-Lan et al., (2016)

The prototype of phygital learning environment is comprised of a guideline by adding an AR marker to a real object such an instrument or music score (Fig.1) which can be listed in an 8C's process: 1) Connection, 2) Captivation, 3) Contexts, 4) Contents, 5) Communication, 6) Collaboration, 7) Consistency, and 8) Competency. The 8Cs steps should be performed as follows:

1) Connection, students need to be fully familiar with technology and connected to advanced technology when arriving in a piano class by "bring your own devices" (BYOD). Students will access the Internet, to access 'HP Reveal', an augmented reality application that will prompt the physical learning materials such as a piano instrument or music score.

2) Captivation, is a digital symbol that will be shown in a student's profile as a congratulatory icon after students successfully finish learning tasks integrated in the Phygital piano class or when students successfully answer questions given on interactive videos. This will encourage students to be more active by improving their quality and productivity at higher levels of competence.

3) Contexts in the piano class act as symbols of the real environment or real objects in learning contexts. Items such as piano instrument, music scores, or piano chair, are usable tools to inspire student's learning.

4) Contents consisting of digital media which is well prepared to comply with learning goals in a micro learning environment in a specific way. Creating interactive videos or mobile applications can also make the Phygital learning more efficient and significant.

5) Collaboration provided inside the learning process in each Phygital Learning Piano Class enables piano students to take part in the learning process, which allows the exchange of knowledge and stimulates them to have a more critical and problem-solving mind.

6) Communication will allow the piano students to connect with the context as well as the content of the study in the pianistic interpretation of Brazilian classical music, which later will improve students' skills, especially in the psychomotor domain and information development.

7) Consistency to perform as a professional pianist requires systematic practice every day, which is extremely important in improving one's psychomotor domain. Students are actively advised to practice piano regularly in a phygital learning environment. Digital learning media has to be well-designed to improve students' skills every single day when they are practicing by themselves or interacting indirectly with the piano instructor.

8) Competency in piano performance is the desired result of learning from a complex musical aesthetic and stylistic view, ethical values, understanding cognitive skills, creativity; and the student should be able to benefit by the outcome of their learning established by phygital learning.

Piano Interpretation of Brazilian Music

Brazil was discovered by Portuguese and remained a colony from the 15th century until the 19th century. Brazil's residents consist of different nationalities ranging from Europeans, Indians, and black slaves from Africa. Naturally, such diversity in these cultural differences was the breeding ground for a variety of musical genres due to various contributions from different ethnicities. The narrative elements and features present in the piano interpretation of Brazilian classical music define insight, intuition, intellect, creativity, imagination, and reveal the exhibition of urban popular music, an historical and cultural context, and the political environment in Brazil. Pianistic interpretation is multi-dimensional and these features are the pillars of the Brazilian musical language.

In conclusion, the prototype of phygital learning in the piano interpretation of Brazilian classical music can be illustrated as a concept of an artful learning environment, where this form of education combines the strength of digital and physical spaces systematically with an emphasis on subjects that are linked to skills within the psychomotor domain. The skill in this area demands practice with actual objects such as sport and music. The prototype of phygital learning is not an independent method but employs many aspects and principles that work seamlessly as an ecosystem. Hence, it is a method that integrates many functions and technologies together to form an artful learning system.

III. RESEARCH METHODOLOGY

This research adopted the qualitative method which has been explored, observed and discussed specific empirical experiences in piano classes in Piano Interpretation of Brazilian classical music. The Population and Sample for this research consisted of three experts in piano performance and obtained the feedback and validated. After collecting the experts' feedback, the researcher revised and finalized the contents of videos. The data collection was adopted on interview to investigate practicability, ease of navigation, and functionality of phygital learning in-depth understanding of a systematic piano practice process. The proposed data analysis employed the qualitative research method.

The prototype has been designed based upon the literature review and the researcher's experience. Three experts in piano performance were invited to validate the prototype**.** The research instruments were:

1) A prototype of phygital learning which is comprised of:

a) A guideline of phygital learning in the pianistic interpretation of Brazilian classical music,

b) An interactive video integrated with questions based on piano performance technique,

2) An appraisal of a prototype. The data were analysed from experts' comments and feedback.

The first part of a prototype is the guideline of phygital learning in the pianistic interpretation of Brazilian classical music which explains the step by step process on how to access the online lesson through AR and follows 8C's processes as mentioned earlier.

The guideline of phygital learning in the pianistic interpretation of Brazilian classical music has been organized in four steps:

- The 1st step allows the participants to operate the advanced technologies by "Bring Your Own Devices" (BYOD) and is in line with the phygital learning.
- The 2nd step will be the application of the technology: in this step the participants will be supported by AR technology to access digital learning materials such as music score, piano instrument, piano chair, or books.
- The 3rd step will be an interactive video which will be created to meet the learning objectives through visualization and hearing based on the students' and instructors' feedbacks.
- The 4th step, the student will participate with specific questions related to the complex aspect of musical performance in pianistic interpretation of Brazilian classical music.

The second part of the prototype is the interactive video which aims to help and motivate students to participate consistently in accessing all instruction in the piano pedagogy class and create greater efficiency and satisfaction for communication between instructors and their students. The researcher has created 13 interactive videos to assist students in accomplishing their goals and convey appropriate and effective piano practice in a systemic way that the students would otherwise not be able to achieve by themselves. The aim of interactive videos in the phygital learning process is to seek, nourish, and enrich the practice process and tuition. Interactive video brings a whole new dimension to piano teaching methods and piano practice. Interactive videos enable a person to transform traditional experiences from a monologue into a dialogue. The interactive video embodies a wide variety

of interactive elements directly into the video itself, including hot spots, questions, calculations, lead generation, and more.

The interactive video consists not only of the video but also the questions based on piano performance technique. Interactive questions based on the piano performance technique of selected Brazilian classical music solo piano works are related to the psychomotor domain such as: pedaling, articulation, scales, dynamics style, and musical language.

In this study, an appraisal of a prototype was adopted from the index; Item-Objective Congruence, IOC (Hambleton, 1978; Rovinelli & Hambleton, 1977). It is a process in which the experts rate individual objects based on the degree to which they measure specific objectives listed by the test developer. Specifically speaking, a content expert will appraise each object by giving the object a rating of 1 (pass, acceptable), -1 (not pass), or 0 (not sure) for each objective.

There were six aspects asking three experts of piano performance covering all processes of phygital learning to select one of the following: The experts can choose +1, 0 or -1 (Pass, acceptable, not sure or not pass).

1. The objectives and contents of instruction for practice piano technique on interactive videos will guide students to understand the pianistic interpretation of Brazilian classical music.

2. The developed 8C's processes presented in practice piano methodology enrich students to achieve a better pianistic interpretation of Brazilian classical music.

3. Pedagogical methodology encourages piano practicing processes systematically.

4. The methodology embedded in interactive videos leads to higher levels of studying and improves psychomotor domain skills in subjects.

5. The demonstration of interactive videos provides greater opportunities for students to practice accurately.

6. The questions asked on the interactive video enable students to achieve all objectives.

Referring to the research question the researcher obtained feedback from experts in piano performance to modify and validate the prototype of phygital learning. The feedback and all comments and recommendations from experts will be detailed in the next section considered in modifying and refining the proposed prototype of phygital learning in the pianistic interpretation of Brazilian classical music.

IV. RESEARCH FINDINGS

Regarding the research question the elements of a prototype of phygital learning in pianistic interpretation of Brazilian classical music consist of 1) guideline of phygital learning by adding an AR marker to a real object such as an instrument or musical score which emphasizes the 8C's processes of participating, 2) an interactive video integrated with questions including hot spots, calculations based on piano performance technique, which forms a linkage between the physical environment and digital contents.

The part of the prototype of 13 interactive videos and six statements were accepted and validated by three experts which can then be a part of a phygital learning process and described as a new concept of a smart learning environment. The 13 interactive videos in Brazilian classical music can be used for demonstrating and giving instructions; pointing out complex aspects of piano techniques clearly to the participants. This form of piano practicing systematically stimulates students to continually improve subjects that are linked skills such a psychomotor domain.



Figure 2: Prototype of Phygital Learning

The prototype of phygital learning in the pianistic interpretation of Brazilian classical music of the current research in figure 3 covers basically two main sections: 1) Guideline of phygital learning which emphasizes the 8C's processes of participating, and 2) interactive videos integrated with questions including hot spots, calculations based on piano performance techniques which form a link between the physical environment and digital contents. Section 1 encourages participants to be fully familiar with and connected to advanced technologies by BYOD and adding an augmented reality application to access a linkage to digital learning materials.Section 2 supports the interactive video learning strategy integrated with demonstrations and questions based on piano performance providing the right material to help students to successfully develop the psychomotor domain skills. The two sections clearly reveal a view into the process of phygital learning. Furthermore, the prototype of phygital learning methods provides a communication channel between instructor and students and facilitates immediate improvement. Prototype of a phygital learning environment is to create a piano course tutorial that is easy to understand and manageable. It is also regarded as a revolutionary and groundbreaking innovation to support piano practicing for international university students in Thailand.

V. DISCUSSION AND CONCLUSION

Referring to statement of the problem which concerning the insufficiency piano class per week, this current research found that expert's feedback showed that phygital learning was a right strategy to solve insufficient time to study in a normal class. The developed phygital learning determined the effectiveness of piano practice. The components found to integrate to this research consisted of a systematic differential learning method creating contents of 13 interactive videos. This interaction enabled students to participate consistently in accessing all instructions to fulfil the right material and knowledge and helped students to achieve a specific objective.

The prototype of phygital learning in the pianistic interpretation of Brazilian classical music concepts is still in the initial stage driven by the combination of digital contents and physical contexts. Prototype learning concepts also are viewed as a methodology which can be successfully deployed, and it is imperative for universities of music to challenge the approach of the orthodox piano class in favour of building an integrated education environment that can effortlessly bridge the physical and virtual worlds successfully. Having long explored the concept of integrating the digital with the physical context, the concept of a

prototype of phygital learning is taking things one step further by blending physical and digital, to create a unique piano class and expand students' experiences to achieve aspired learning outcomes.

The crucial word here is 'enrichment' of experiences, of exchanges and interaction. It's about to make things a whole lot different in the digital age. The era of digital technology with university students is merging to create the 'Phygital Learning' landscape. The objective of the current study was to design, develop, implement, and validate a prototype of phygital learning in the pianistic interpretation of Brazilian classical music for international university students in Bangkok, Thailand**.** To understand the effects of a prototype of phygital learning concept based upon literature review and the researcher's experience, this study has shown that the research findings of a combined physical environment and digital contents which is the guideline of phygital learning incorporated with interactive videos addresses a tremendous contribution and provides assistance to instructors and students. This innovative approach of a prototype of phygital learning was accepted and validated by three experts in piano performance and defined as a new concept of smart learning environment. The innovation of a prototype of phygital learning redefines learning and teaching using advanced technologies in order to inspire students to devote themselves to more effective piano practice resulting in significantly increased knowledge, specifically the psychomotor domain. The research results presented here offers a real benefit for the students, in that it is more embracing, more forward thinking, more creative, more engaged, and it increases the velocity of learning. Advanced technologies are boundless and phygital learning in piano practice and the instructors' pedagogical objectives results an unconditional powerful education.

VI. RECOMMENDATION

This qualitative research accomplished providing piano students' assistance into the specific obstacles in piano technique and musical interpretation in their piano practice. Furthermore, to enhance a deeper learning environment by integrating physical practice combined with digital contents. Since this research was conducted in one university in Bangkok, Thailand. The future research in Phygital learning in Classical Piano Interpretation should have tested with other universities and expand its effectiveness in piano practice. The future researcher should include both the qualitative and quantitative methods to collect data from students and experts' feedback in piano performance as well as questionnaires for the instructors to evaluate a comprehensive assessment of this new concept. The outcome of this research should be used for extent the Phygital learning approach in supporting the collaborative piano tutorial and piano practice in Classical Music for university students in Thailand and other countries.

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