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GAMIFICATION AS A METHOD TO ENCOURAGE NOVICE PLAYERS TO LEARN AND PRACTICE DRUMMING

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

ARAT BARAN KESKİN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
INDUSTRIAL DESIGN

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Approval of the thesis:

GAMIFICATION AS A METHOD TO ENCOURAGE NOVICE PLAYERS TO LEARN AND PRACTICE DRUMMING

submitted by **ARAT BARAN KESKİN** in partial fulfillment of the requirements for the degree of **Master of Science** i**n Industrial Design, Middle East Technical University** by,

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ABSTRACT

GAMIFICATION AS A METHOD TO ENCOURAGE NOVICE PLAYERS TO LEARN AND PRACTICE DRUMMING

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Master of Science, Industrial Design
Supervisor : Prof. Dr. Owain Pedgley

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The most prominent effect of music on listeners is that it results in spontaneous movements expressed by clapping, dancing and tapping as well as performing. Among the musical instruments, percussion sounds constitute the spine of musical cues leading to spontaneous movements. Within the relationship between body motion and musical instrument performance, the drum kit is an exemplary instrument that includes both a wide range of pitches and considerable freedom of motion during interaction through the use of four limbs. To learn to play the drum kit, rhythm should be embraced and internalized. Musical instrument learning has exclusive aspects compared to conventional learning methods, since it involves a wide variety of skills including reading, hearing and motor skills. Another distinctive characteristic that makes musical instrument learning unique is the overwhelming motivation factor. As an unconventional medium of learning, gamification has potential to contribute to learners' motivation by means of unplanned activities, transcending space and time limits, and developing cognitive abilities. Unlike conventional pedagogy-oriented didactic models, the first half of the 21st century has used new mediums to reinforce the learning stage of musical instruments. These new mediums involve interactive and portable technological products. The products have great potential and open new areas to discovery regarding the implementation of game contexts within educational objectives. However, gamification is not widely embraced, although its

implementation on smart devices has considerable potential due to its multilayered structure and interactive nature. Hence, the thesis explores the potentials of gamification to impact positively on novice learners' drum kit practicing, transitioning from an exploration of the area to concept designs for new physical and digital practice tools.

Keywords: musical instrument practice, drum kit, gamification, physical design, digital design

ÖZ

YENİ BAŞLAYANLARI DAVUL ÇALMAYI ÖĞRENMEYE VE PRATİK YAPMAYA TEŞVİK ETMEK İÇİN BİR YÖNTEM OLARAK OYUNLAŞTIRMA

Yüksek Lisans, Endüstriyel Tasarım
Tez Yöneticisi: Prof. Dr. Owain Pedgley

Nisan 2023, 202 sayfa

Müziğin dinleyiciler üzerindeki en belirgin etkisi, alkışlama, dans etme veya hafif vuruşlarla tempo tutma gibi dışavurulan spontane hareketlerle sonuçlanmasıdır. Müzik aletleri arasında istemsiz hareketlere yol açan müzikal ögelerin kaynağını vurmalı çalgılar oluşturmaktadır. Hareket ve müzikal performans arasındaki ilişki açısından bateri, dört uzuvumuzun kullanılmasını sağlar. Ayrıca hem geniş perde aralığı hem de hareket özgürlüğü içermesi nedeniyle vurmalı çalgılar arasında en belirgin olanıdır. Bateri öğrenimi için ritmin benimsenmesi ve içselleştirilmesi gerekmektedir. Müzik aleti öğrenimi, nota okuma, işitme ve motor beceriler dahil olmak üzere çok çeşitli bileşenler içerdiğinden, geleneksel öğrenme yöntemlerine kıyasla istisnai yönlere sahiptir. Enstrüman öğrenimini benzersiz kılan bir diğer ayırt edici özellik ise motivasyon faktörüdür. Alışılmışın dışında bir öğrenim aracı olan oyunlaştırma, zaman ve mekan sınırlarını ortadan kaldıran, bilişsel yetenekleri geliştiren ve spontan etkinlikler yoluyla öğrencilerin motivasyonunu artıran bir yöntemdir. Pedagoji odaklı didaktik modellerin aksine, 21. yüzyılın ilk yarısı, öğrenme aşamasını pekiştirmek için yeni araçların kullanılmasına olanak sağlamıştır. Bu yeni araçlar etkileşimli ve portatif teknolojik ürünleri içermektedir. Bu multimedya tabanlı ürünler, oyun bağlamının eğitim kapsamında uygulanması için keşfedilecek potansiyeller ve yeni alanlar sağlamaktadır. Ancak bunlara rağmen

oyunlaştırma, yaygın bir öğrenim yöntemi olarak benimsenmemiştir. Bu nedenle tez, yeni başlayan öğrencilerin bateri öğrenimi aşamasında oyunlaştırmanın potansiyellerini tasarım yoluyla keşfetmeyi amaçlamaktadır.

Anahtar Kelimeler: müzikal enstrüman öğrenimi, bateri, oyunlaştırma, ürün tasarımı, dijital tasarım

Dedicated to my beloved family…

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With hope to see the brighter days in the near future…

TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The rhythm is a phenomenon that corresponds to timing of all motions and activities on a regular, repetitive and organized basis. In other words, the rhythm, which is an inseparable notion of our life, is embodied by certain laws rather than coincidences (Mariana, Octavian, Daniela & Iliana, 2016). Such integrity can be exemplified in a wide scope ranging from our heartbeats or breathing movements to an impression or a pleasure derived from a work of art. For the latter, the rhythm is the core of an artwork and an outstanding medium of the content (Mariana et al., 2016). Such content can be shaped by means of images, melodies, forms, materials and so forth.

Time is the most prominent element of rhythm and among the branches of art, 'time' is the key concept in music. This is because, unlike visual arts that materialize in space, music is manifested across time (Levitin, Grahn & London, 2018). Mariana et al. (2016) state that musical rhythm is an expression of ourselves, whilst the rhythmic perception is related to the concept of 'embodied music cognition' that bridges the gap between the music perception and urge to move by means of sensorimotor functioning (Levitin et al., 2018). Phillips-Silver and Trainor (2007) also highlight the relationship between movement and sound by stating that it is developed at early ages of childhood and improved through music processing. Zenter and Erola (2010) point out a similar tendency in people at very young ages, by asserting that infants respond to music by moving their bodies in a rhythmical manner. Such motions occur by means of various gestures driven by rhythm and tempo (Mariana et al., 2016). To illustrate, listeners are inclined to synchronize their taps during a certain tempo or maintain to tap even if the music stopped a short while earlier. Thus, music results in spontaneous movements expressed by clapping,

dancing and tapping as well as performing (Cross, 2005), in other words, in expressions other than playing a musical instrument.

Among the musical instruments, percussion sounds constitute the spine of musical cues leading to spontaneous movements. For instance, head motions are associated with low-frequency kick drums, whilst hand movements tend to be associated with high-frequency hi-hats or cymbals (Levitin et al., 2018). In terms of the relationship between the motion and musical instrument performance, the drum kit is the most essential instrument that includes a wide range of pitches as well as freedom of motion through the use of a player's four limbs. Therefore, the high flexibility of making a sound and relying on motion justify people's tendency to play percussion instruments at young ages (Gomes, Bidarra & Figueiredo, 2014).

To learn to play the drum kit, rhythm should be embraced and internalized. Although every human possesses their own rhythms and there is a strong connection between music and unwanted motion, discovery of a rhythm should be assisted by guidance in the learning stage of the drum kit (Karma, 1982). However, musical instrument learning has exclusive aspects compared to conventional learning methods, since it involves a wide variety of skills including reading, hearing and motor skills (Clarke, 2002). Another distinctive characteristic that makes musical instrument learning unique is the overwhelming motivation factor (Slobodan & Davidson, 1996). Moreover, Gomes et al. (2014) emphasize the importance of motivation by juxtaposing musical learning and other learning contexts in a school environment. They clarify that motivation has 20% of weight in overall school performance, while this ratio increases to 38% for the case of musical learning. As an unconventional medium of learning, games or playful activity include high potentials. Games can contribute to learners' motivation by means of spontaneous activities, transcending space and time limits, developing cognitive abilities, and so forth (Gomes et al., 2014). Furthermore, playful activity is quite effective for personal development and reinforcing the educational process (Snyder, 1989), owing to the involvement of enhanced imagination unreliant on external adult intervention.

Games, as an ‘educational lever’ (Gomes et al., 2014), are gaining a significant interest. The growing tendency to use game elements for educational purposes relies on several aspects. Unlike the pedagogy-oriented didactic models, the first half of the 21st century enabled the use of new mediums to reinforce the learning stage of new activities or practices. These new mediums involve interactive and portable technological products including, for example, augmented reality, smart devices, and multimedia features (Gomes et al., 2014). Thus, these multimedia-based artefacts enable great potential and new areas to discover (Eck, 2006) for the implementation of games within the scope and context of education. Also, the growing computer game industry contributed to adoption of games for serious tasks (Robson et al., 2015). In combination, emerging technologies and the growing digital entertainment industry have opened a new approach that attempts to use game mechanics for non-game texts: this new approach is called ‘gamification’ (Gomes et al., 2014).

Gamification can be seen to be adopted by many firms, organizations, and legal entities for accomplishing aims such as increasing profits, raising awareness, education and so forth. However, gamification is not widely embraced, although its implementation on smart devices has considerable potential due to its multi-layered structure and interactive nature. Currently there are several prejudices that still resist using gamification for serious tasks, including high development costs, low market attraction and prejudice of considering the game as a ‘less serious activity’ (Gomes et al., 2014).

1.1 Aim and Scope of the Research

As a method, gamification has outstanding characteristics for increasing the learner’s motivation. When gamification is combined with contemporary technological artefacts it opens new potentials for researchers to discover and define. In relation to practicing with a drum kit, gamification can serve learners’ purposes, since

motivation is a crucial driver in musical instrument learning. The research reported in this thesis aimed to investigate the potentials of gamification to improve the design of drum kit practice tools that can encourage young players, aged between 15-19, to practice the drum kit in the early learning of their instrument journey. The purpose of limiting the user group to the mentioned age range is due to those participants having everyday close contact with technological artefacts and a positive attitude on gamified contexts.

1.2 Research Questions

The thesis provides a documentation of work that aimed to construct answers to the following questions, by means of a literature survey, fieldwork and practical design activity.

- In what ways might gamification positively affect the musical instrument learning experience?
- Which mediums are suitable for applying a gamification method during the drum kit learning stage? What design concepts may be appropriate?
- How can gamification motivate the user to commit to practicing and learning the drum kit?

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review was based on two trivets listed as the drum kit and gamification. The concepts of ‘rhythm’ and ‘groove’; the history, evolution, physical aspects and basic musical terms of the drums; assisting hardware and software solutions for drum kit practicing were analysed for the first section. The latter section mainly focused on gamification’s principles, remarkable examples, outstanding fields of implementations and its relationship between the significant learning and motivational theories.

2.2 The Drums

In the first section of the literature review, the rhythm and its relationship between people will be discussed. Then, as a rhythm-oriented instrument, the drum kit’s brief history will be covered and the setup, including the fundamentals, will be introduced. Finally, drumming practice’s focal points and products intended to assist the learning and practice of drumming will be mentioned.

2.2.1 Rhythm

As an indispensable aspect of our lives, beginning from the initial bodily functions including our heartbeats and breathing movements to an unexpected response to a work of art, the rhythm corresponds to movement. In other words, it is one of the main trivets of life (Mariana et al., 2016). Giuleanu (1986) summarizes the broad

term by clarifying that rhythm evolves in time and flows through activities in society, nature, and the physiological and psychological states of every human being.

The word rhythm takes its roots from the ancient Greek and is directly related to the concept of movement, in the scope of both material and spiritual world (Giuleanu, 1986). It is a phenomenon that has been discussed over historical eras and considered in the scope of various disciplines including art, philosophy, literature, and science. For instance, Heraclitus asserts that rhythm is the representation of movement and every moving thing changes in time, similar to Plato's opinion that considers rhythm as the order of movement (Edgar, 1954). Besides the movement, Mariana et al. (2016) claim that rhythm involves a regular repetition with respect to specific periods of the same moments.

Rhythm is a common term for all people, since humans own their rhythms embodied in their walking, talking, running and so forth (LubanPlozza & Iamandescu, 1997). Another aspect that makes the rhythm exclusive for each human being is through the pleasure or impression driven by a work of art including painting, sculpture, literature, dance and music. Similar to every life-related aspect, rhythm constitutes an artwork's core. Moreover, it is a criterion for transmitting a message or content that may be in the form of images, notations, forms, materials, words and feelings. Hence, in the world of art, rhythm shapes the message and influences change in spectators or listeners via aesthetic, creative and emotional elements (Giuleanu, 1986).

Listening to specific genres of music, carrying out rhythmic exercises or looking at an object of art result in humans' responses (Mariana et al., 2016). While some of these responses require time before occurrence in order to be embraced and internalized, some of them arise instantly including unwanted movements. Such instant and unwanted responses are related to time and these instances can directly be seen in the field of music. This is because music manifests across time, unlike visual arts that materialize in space (Levitin et al., 2018). The close relationship

between motion and music can be seen in definition of rhythm in music, made by the philosopher Jean Jacques Rousseau, stated as the difference occurred by the slow and rapid movement and the duration of time (Giuleanu, 1986). Similar to Rousseau, Mariana et al. (2016) relates musical rhythm to a sound's duration and its intensities, which are determined by accents. These terms will be discussed in the subsection 'musical meter'.

As the "serial pattern of variable note duration in a melody" (Schulkind, 1999, p. 896), perception of musical rhythm plays a crucial role to initiate an interaction. As supported by Figure 2.1, human perception is able to capture rhythmic sound intervals ranging from 100 ms to 5-6 seconds (Levitin et al., 2018).

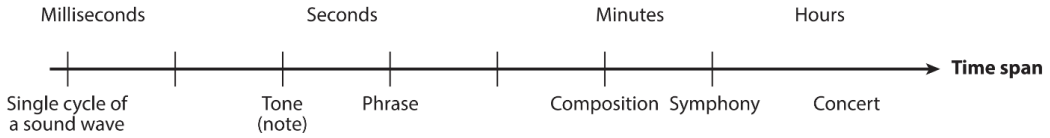

Figure 2.1 Timeline of typical durations for different musical events (Levitin et al., 2018)

Apart from a sound's duration, another aspect that plays an important role in perception of rhythm is the 'tempo' which is also quite effective in emotional interpretation of a song (Levitin et al., 2018). As a term strongly linked to the unit bpm, beats per minute, humans can perceive a beat strongly in the range of 100-120 bpm (Levitin et al., 2018). McAuley (2010) defines the tempo as the 'pace of music'. Additionally, Drake, Gros and Penel (1999) associate tempo with a sound's density and loudness, besides the bpm. Therefore, tempo, as an inbuilt part of a song (Levitin et al., 2018), is an element of rhythm that gives an identity to a musical piece.

In addition to tempo, Hugo Riemann, a German musicologist, relates rhythm to musical meter (Mariana et al., 2016), which is another essential concept that shapes

musical perception. Even though there is a repeating pattern of beats, musical meter enables to perceive the series of beat segment with the help of stressed and unstressed beats. McAuley exemplifies the musical meter by mentioning the ‘Happy Birthday’ song that is played in ¾ time. The reason listeners perceive the rhythm as waltz time is that every third beat is stressed (See Figure 2.2)

```
(rest) (rest) Hap-py |birth day to |you, (rest) Hap-py |birth day to |you
1      2      3      1     2   3   1    2      3      1     2   3   1.
```

Figure 2.2 Stressed beats and rests on the 'Happy Birthday' song

2.2.1.1 Rhythm & Motion

Rhythm is a phenomenon that relies on a well-organized succession of repeating patterns. It includes a structured order by means of duration, tempo and musical meter. Quintilian, a Roman educator and rhetoricist, emphasizes this order by asserting that the musical rhythm consists of beats organized in a certain order and these beats embody a continuous phenomenon and process over time (Mariana et al., 2016). Even though production of musical rhythm requires a well-defined organization, its reflection on a listener occurs intrinsically and does not rely on a certain rule or constraints.

The most prominent reaction of a listener in response to a rhythm is motion. Even though Mariana et al. (2016) point out that motion with respect to rhythm is determined by certain laws rather than a chance, the relationship between sound and human motion dates back to an individual’s infancy. Zentner and Erola (2010) illustrate that infants move their bodies in a rhythmical manner as a response to music, once they become capable of controlling their motor system. Martin (2005) states that such synchronized motions starting at very young ages do not require any training - on the contrary, it’s inherited. The broad term that corresponds to these synchronized events are called ‘entrainment’. Levitin et al (2018) explain

entrainment as a condition in which bodily movements become synchronized to music, such as when people clap, tap, dance, and so forth. In this respect, rhythm and tempo are key determinants (Mariana et al., 2016) that make the listener to entrain their motions to an ordered stimuli with respect to regular beats (Repp & Su ,2013). The underlying concept that results in entrainment is defined as 'embodied music cognition', relating to unwanted motions through to lower-level sensorimotor functioning (Levitin et al., 2018). A network is established between the motor output and resulting sensory input during the musical perception.

2.2.1.2 Groove

Initial studies for entrainment pointed out that the accuracy of synchronized motions are measured by taking tapping into consideration (Levitin et al., 2018). Listeners tend to synchronize their tapping along with the music or maintain the tapping even after the music stops. The tendency to tap along to a melody or a beat with respect to the driven force of music is related to the term 'groove' (Janata, Tomic & Haberman, 2012). Groove is experienced as an urgency to physically move along with the music, stimulated by the positive influence derived from the musical piece (Janata et al., 2012). It cannot be considered as a form of rhythm but as an auxiliary aspect that makes us become aware of the rhythmic flow. Hence, the full set of motions involved in groove are not limited to tapping. Groove differs from entrainment in such a way that it not only leads to unwanted movements but also makes us to become aware of our bodies' capabilities to move alongside a musical piece (Levitin et al., 2018). The motions driven by positive effect of music are strongly related to percussion instruments. Janata et al. (2012) exemplify the tapping example by stating its relationship between the drumbeats. Furthermore, among the musical instruments, percussion sounds constitute the spine of musical cues leading to motion. For instance, head movements are associated with the occasional sounding of kick drums whilst hand movements are associated with the rapid sounding of hi-hats or cymbals (Levitin et al., 2018). Pleasure derived from music is

not only driven by listening but also by performing (Cross, 2005). In terms of the relationship between movements and musical instrument performance, the drum kit is the most essential instrument that both includes the wide range of pitches and freedom of motion by enabling the use of our four limbs. Therefore, the enriched flexibility of making a sound and motioning justifies people's tendency to play percussion instruments at young ages (Gomes et al., 2014).

2.2.2 The Drum kit

The evolution of the drum kit dates to the migration of Africans to America between the late 19th century and early 20th century (Burchell, 2019). The immigrants brought their percussion instruments with them and enabled the beginning of a cross-cultural interaction. However, each percussion instrument that constitutes the drum kit has its own significance per se. The major components embodying the drum kit are listed as: the bass drum, snare drum, tom-tom drums and cymbals.

Bass drum, the largest element of the setup, dates back to 2500 BCE, the era of Sumer Empire, but prominent instances of bass drum can be seen in Turkish Janissary Bands during the Ottoman Empire era with its two headed structure (Cunningham, 2017), which is also known as the 'Turkish davul' (O'Connor, 2022). Likewise in current marching bands, the davul is played by attaching on the chest via durable straps and striking on the heads by the knobs (see Figure 2.3) The extension of the Ottoman Empire to Northern Africa, enabled the bass drum to spread on a large geographical region and variations including long drums, gong drums and so forth.

Figure 2.3 Ottoman Military Band (Jones, 2021)

Then, the bass drum started to become an inspiration of Classical Western music as well, which can be exemplified by Joseph Haydn's Military Symphony in 1794 (Cunningham, 2017). However, the remarkable characteristic of bass drum, the pedal, wasn't applicable until the Ludwig family's design in 1910 (Vic Firth, n.d.).

Page 42

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It has a direct lever action, a long powerful stroke—adjustable to any volume. The tone is that produced by the natural arm stroke.

For prices see price list enclosed.

Figure 2.4 An early advertisement of Ludwig pedal (Vic Firth, n.d.)

Another drum kit component, which involves the influence of Turkish Janissary bands', is the snare drum (Brensilver, n.d.). Similar to Janissary bands and davul's impact on the bass drum, kettledrum's use in Janissary Bands contributed to snare drum's use in European military bands as well. However, Rodriguez et al. (2017) point out that implementation of snares on tambourines dates to ancient Egypt and introduction of snare drum to Europe is directly enabled by Eastern countries during crusades. The iconic look of the snare drum's use in military bands, depicted with a shoulder strap on soldier's left side, was originated in Swiss infantry regiments in the 14th century (Rodriguez et al., 2017). The primary role of the drummer was maintaining the march's pace accurately and give cues via beats to march.

Figure 2.5 Snare drum in Medieval Europe

Swiss drummers' origins of snare drum play, formed the instrument's discipline and, moreover, influenced the rudiment development universally (Brensilver, n.d.). Even though, the origin of snare drum is strongly linked to military bands, its initial instances of orchestral use are listed as 'Alcyone' by Marin Marais (a viol virtuoso) in 1706 and Rossini's opera 'La gazza ladra' in 1817. However, it became a standard instrument of the orchestra by Nikolay Rimsky-Korsakov in the late 19th century (Rodriguez et al., 2017). The unique characteristic of the snare drum is the snare

located at the bottom head of the instrument that enables to increase the pitch of the instrument. Starting from the 16th century, snares were made with guts. Then, it was replaced by materials including braided linen, wire-wound silk and coiled wire chronologically (Brensilver, n.d.).

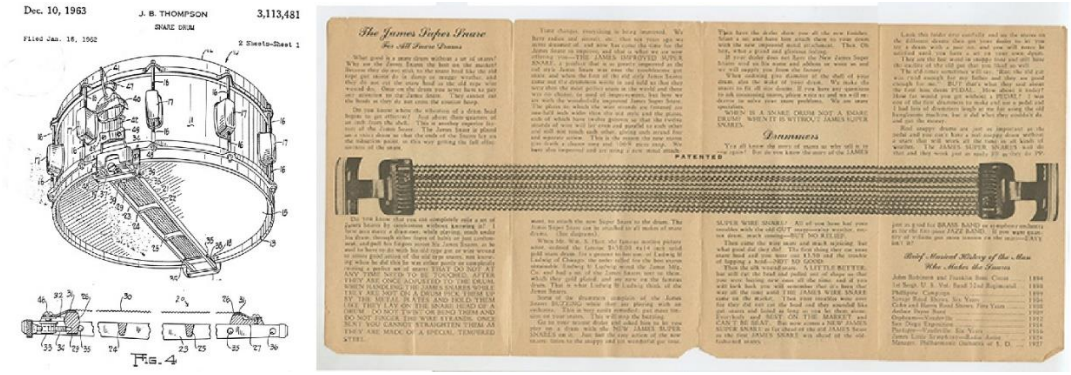


Figure 2.6 The snare (Brensilver, n.d.)

Another essential component of the setup which resembles the snare drum, but excludes the coiled wires, is the tom-tom drum. The word ‘tom-tom’ is originated in Sinhala language in Sri Lanka. It’s also attributed to Chinese musical culture that involves a gong-like instrument as known as tam-tam (MasterClass, 2021). In the early 20th century, tom-tom drum got integrated in the drum kit thanks to Chinese immigrants in the U.S. dwelled in 19th century. Unlike their current appearance, they couldn’t be tuned until they became integrated with the setup. As it can be seen in the Figure 2.7, they were crafted with colourful paintings. Previously they were used for stage shows, silent films and radio shows. Tuneable tom-tom drum was designed and integrated to the kit with the leadership of drummer Gene Krupa, who also developed the current modern drum kit (Glass, 2018).

Figure 2.7 Chinese tom-tom drum (Glass, 2018)

Lastly, the cymbals date back to ancient times starting from 1100 BCE, including the civilizations Assyria, Israel and Egypt. Then, they reached East Asia and Europe in the late 12th century (Lotha, 2021). Unlike their current purposes, cymbals were primarily used for celebrations, entertainment and religious objectives (Pinksterboer, n.d.). Also, they were actively used by military forces to scare their enemies by creating a cacophony via clashing them. Lotha et al. (2021) state that cymbals' orchestral use is driven by their use in Turkish Janissary Band which inspired the musicians, similar to bass drum.

Figure 2.8 An Assyrian Quartet (Pinksterboer, n.d.)

Instances of cymbals use was initialized by the German composer Nicolaus Strungk in 1860 for opera. After 100 years, they were also used by Haydn and Mozart (Pinksterboer, n.d.). However, until Hector Berlioz, the cymbals were used in pairs. With Berlioz, suspended cymbals were also started to be played via sticks. In terms of the current modern cymbals, which is also used in the drum kit, Avedis Zildjian is a milestone figure (Loncaric, n.d.). His cymbals, initially produced in İstanbul, became worldwide known as a result of his uncle's invitation letter that requested him to move from İstanbul to Boston to take over the Zildjian legacy in 1920s (Pinsterboer, n.d.).

Figure 2.9 Gene Krupa with Avedis Zildjian (Pinksterboer, n.d.)

When the origin of the multiple use of drum kit's components is considered, it is possible to see these instances in military bands in the early 19th century. However, such percussion instruments were not used in a static setup (see Figure 2.10).

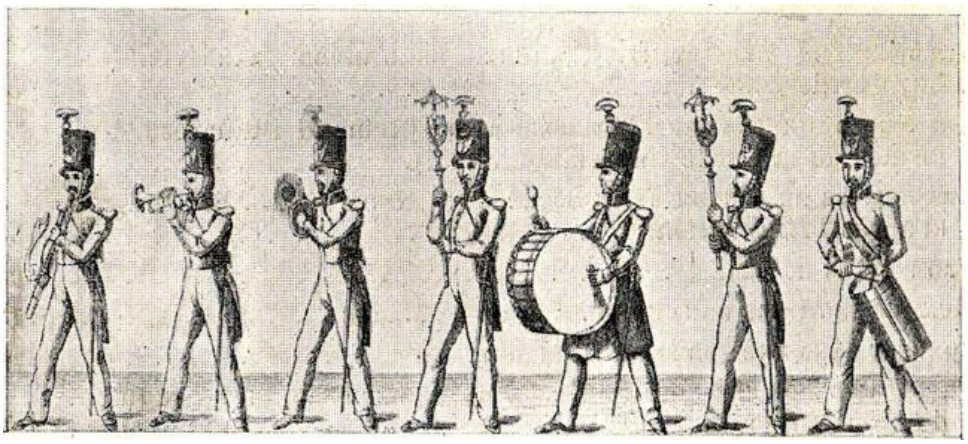


Figure 2.10 An image of multiple use of percussion instrument in military band (Burchell, 2019)

On the contrary, the percussion instruments were separated, with each instrument played individually. Initial performances with a setup can be seen in jazz music in the 20th century of the United States (Dorman, 2022). In the end of the 19th century, bands tended toward experimental trials to implement multiple percussion instruments, called ‘trap set’ (Burchell, 2019). In 1909, a new design was formed by William and Theodor Ludwig (see Figure 2.11), which allowed rhythms to be played faster.

Figure 2.11 William & Theodor Ludwig's drum kit design (Wikitree, n.d.)

In 1930, Ben Duncan designed a drum kit consisting of four pieces (See Figure 2.12). Then, the evolution of the drum kit continued with Louise Bellson's design and then improved by Gene Krupa, who gave the current look of a modern drum kit (Dorman, 2022).

Figure 2.12 Ben Duncan's four-piece drum kit design (Timetoast, n.d.)

In the 1960s, thanks to the increasing popularity of Rock'n'Roll music, drum setups grew larger and included an increased number of components in order to create sound across a wide scope of pitches (Butchell, 2019). Despite the humongous drum kits and electronic drums, that began to take part in the industry starting from the 1980s (Dorman, 2022), the modern acoustic drum kit, consisting of seven pieces, is still commonly used by learners and professionals (see Figure 2.13).

Figure 2.13 Modern drum kit (Jowett, 2023)

2.2.2.1 The Instrument and Technique

The standard seven-piece acoustic drum kit consists of a snare drum, bass drum, tom-toms, floor tom, hi-hat cymbal, crash cymbal and ride cymbal (Jowett, 2023). The snare drum is the component located in the centre of the setup and has the most remarkable voice among the components. It is the component on which a drumming student learns to read notation and practices stick control. A rim is placed on the top perimeter of the snare drum and actively used in songs. The bass drum, also named as the kick drum, is the largest component in the setup and is played via a foot pedal. While the snare drum resembles a ‘crack’ sound, the bass drum evokes the feeling of a ‘boom’ sound that embodies the key aspect of a repetitive musical pattern and makes the listener to become engaged in a groove (The Pocket Queen on Soundfly, 2023). Tom-toms, also known as tom1 and tom 2, are the components mounted onto the bass drum. Two toms are differentiated from each other by their pitch. Tom-toms are generally used to bridge the main parts of a rhythm by means of fills and solos (Etoroma, 2023). A third tom, having a lower pitch compared to tom1 and tom 2, is the floor tom. It has a direct contact with the ground and is generally placed on the

right side of the musician. The hi-hat cymbal comprises two cymbals on top of each other. They are played when they are close to each other or opened. The gap determines the character of the sound and is controlled by a foot pedal, similar to the bass drum. Two other cymbals are present. The crash cymbal has the highest pitch in the drum kit and is generally used simultaneously with the bass drum. In this respect, it is mostly used to emphasize a rhythm section (Jowett, 2023). The ride cymbal, compared to the crash cymbal, is thicker and makes a 'wash-like' sound when played. It is effective for keeping the time: in other words, as the musician 'rides' on for time keeping (The Pocket Queen on Soundfly, 2023).

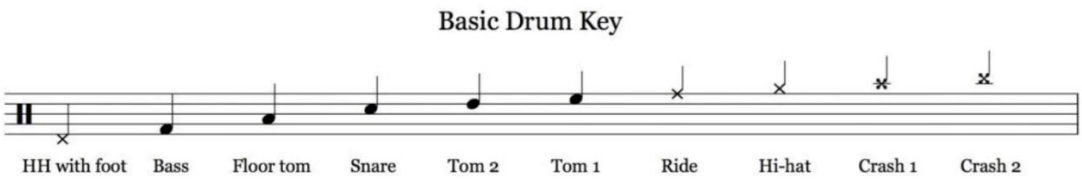


Figure 2.14 Drum notation (Onlinedrummer, n.d.)

Even though equipment including mallets and brushes can be used, the main interaction between a drum and a musician is via sticks (and pedals). Stick grip is crucial in the learning stage. Jowett (2023) highlights the importance of grip by saying that the way the drummer holds the grip affects the strength of physical condition, speed, power and control. He also points out that embracing a proper technique prevents injuries. As it can be seen in Figure 2.15, there are two main gripping techniques: traditional grip and matched grip.

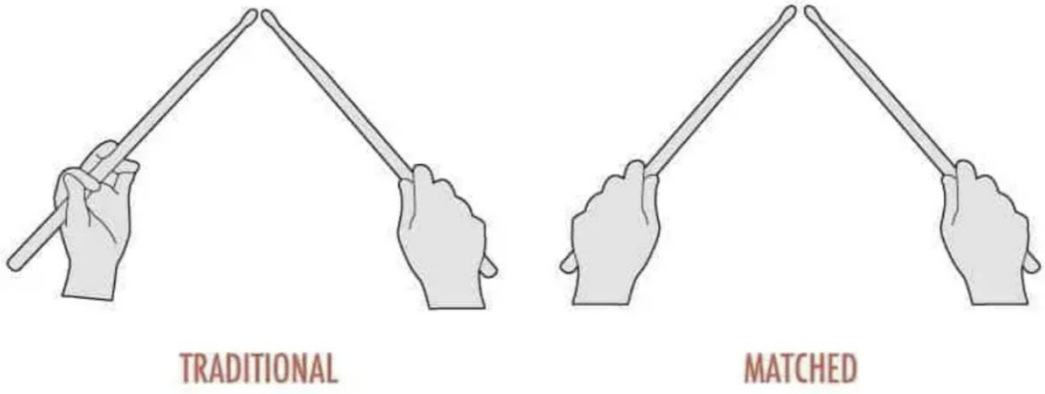


Figure 2.15 Traditional and matched grip (Jowett, 2023)

Traditional grip dates back to drum playing in military bands. Since the snare drum's angular placement on the sling, position of the left grip prevents the hand to strike on the drum, while the right hand holds the stick in matched grip. While the stick rests between the thumb and ring finger, support is between the thumb and index finger. Traditional grip is also widely used in jazz music (Jowett, 2023).

Unlike the traditional grip, both hands' positions are the same and mirrored in matched grip. Thumb and index finger are on the opposite sides while holding. As it can be seen in Figure 2.16 there are three different techniques in matched grip.

Figure 2.16 Matched grip types (Jowett, 2023)

Three grips differentiate from each other with respect to the positioning of the palms. In French grip, the palms are opposite to each other and the majority of performance is operated via fingers while moving the stick. With this grip, it can be easier to play

at higher tempos. Unlike the French grip, in the German grip the palms are parallel to drumkit at an angular position. The majority of the work is done by wrists. Since the grip enables the full use of thr arm, it opens a wide dynamic range to the musician. While the French and German grips have distinct characteristics, the American grip is a combination of both techniques. Palms neither point to the ground nor look opposite to each other. They are positioned at a 45 degrees angle, to enable the drummer to deal with intricate passages by using the wrist power (Jowett, 2023).

2.2.2.2 Drum Practice

Technique, including the grip, is crucial in drum practicing. Toews (2018) claims that other factors, besides the technique, that should be considered in drum practice are vocabulary, independence (coordination) and musicality.

Vocabulary mainly involves rudiments and stylistic elements. Rudiments refer to fundamental stick control exercises that will be covered in detail in the 'Drum Practice Tool – Concept Design & Evaluation' chapter. Even when a drummer becomes competent, rudiment exercises are still recommended to be studied frequently and regularly. Stylistic elements correspond to fills, grooves and other sorts of characteristic features specific to a genre such as Rock, Latin, Jazz, etc. Toews (2018) exemplifies this condition by saying that a drummer in a local rock band may experience difficulties when playing in a Latin band in case of unfamiliarity with the Latin grooves including samba, mambo or guaguanco. Therefore, embracing a rich knowledge of genre-based features will improve the drummer's ability to accompany different styles of music.

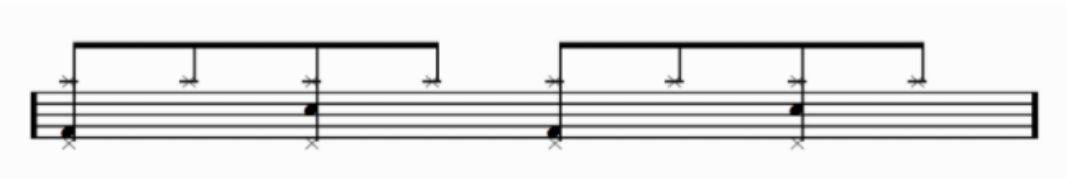


Figure 2.17 Basic rock groove (Toews, 2018)

Independence, or coordination, refers to being able to play different rhythms and patterns through the effective use of four limbs. Independence is a tool for drummers to express their ideas on the drum kit (Toews, 2018). For instance, a well-established independence enables the musician to play a groove with wide variation. As it can be seen in the Figure 2.18, a single groove can alternate with respect to each limb's pattern. Toews (2018) defines this ability as 'groove independence'.

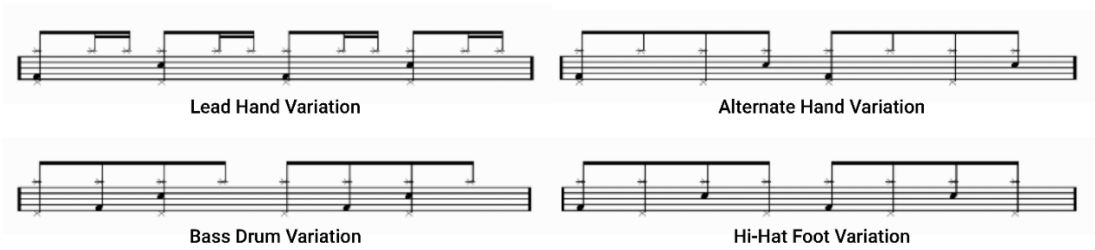


Figure 2.18 Groove variations with respect to coordination (Toews, 2018)

Getting better in 'ostinato' is crucial in practicing groove independence. 'Ostinato' means continuously repeating a phrase or rhythm (Toews, 2018). As it can be seen in the Figure 2.19, each style of music including swing, samba and baiao is based on these repeating patterns. Once the ostinato is internalized, the drummer can get better in developing groove independence. Although ostinato exercises are not directly practical for musical context, they significantly improve the technical ability and increase the freedom on the drum kit.

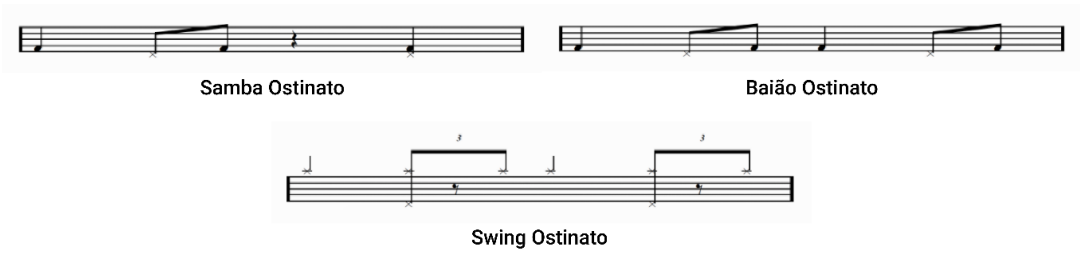


Figure 2.19 Samba, Baiao and Swing ostinatos (Toews, 2018)

Musicality is the last focal point emphasized by Toews (2018). It is based on implementing technical studies and coordination exercises into a musical context by means of play along tracks or exercising solely with the drum kit. Musicality is as important as technical studies, since it has a significant driving force to increase the student's motivation in the learning stage.

2.2.2.3 Drum Kit Practice Tools

Drum kit practice tools will be reviewed as generic tools and the drums-specific tools respectively. For each section, instances of hardware and digital solutions will be introduced briefly.

2.2.2.3.1 Generic Practice Tools (Hardware Solutions)

A crucial and widespread component involved in drumming exercises is the metronome. Since counting, subdividing and sustaining time is extremely important for a drummer, a metronome, as an assisting product, is highly recommended for drum practice. Based on technological developments, the traditional pyramid formed metronome has been through various improvements. As well as physical products, there are many web-based sources providing metronomes that can be accessed in any tempi. Physical metronomes are now predominantly electronic products (see Figure 2.23), used widely by drummers.

Figure 2.20 KORG MA-1 Solo Digital Metronome (n.d.)

2.2.2.3.2 Generic Practice Tools (Software Solutions)

As mobile device applications became an inseparable part of our life, so app-based metronomes started to become available (see Figure 2.24). Also, the smartphone applications are widely used for musical education and training context. Currently, there is a wide variety of digital products targeting the tuition of a specific musical instrument.

Figure 2.21 Pro Metronome (Apps.apple, n.d.)

2.2.2.3.3 The Drums-specific Practice Tools (Hardware Solutions)

Unlike the other musical instruments, practicing with the drum kit at home can be problematic because of the kit's size and sound. To overcome this problem, small-sized products are available on the marketplace as an alternative to a drum kit setup, enabling musicians to improve technical abilities. Practice pads are the most outstanding and common example of a drum kit practice tool. They promote a focus on technique development, by excluding some of the sounds of a full drum kit (Toews, 2018). Also, practice pads enable the musician to practice stick control, rudiment exercises and dynamics. Generally, such pads are made of elastic materials such as rubber to simulate the rebound effect on the acoustic setup as realistically as possible. The majority of the pads have a surface that replicates a single component on the drum kit (see Figure 2.20).

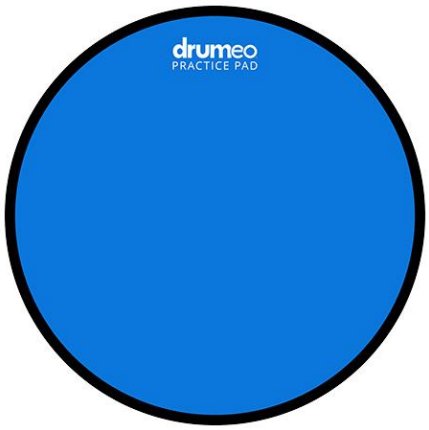


Figure 2.22 Drumeo Quiet Pad (Drummersreview, 2020)

However, there also different practice pad designs that mimic different components of the drum kit setup. (See Figure 2.21). To illustrate, the 'Drumeo P4' practice pad includes areas of different materials that represent different areas of the kit. Another example that approaches the issue with a different solution can be seen in 'Prologix ALLN1', which involves multiple modular surfaces.

Figure 2.23 Drumeo P4 and Prologix ALLN1 (Drummersreview, 2020)

Some practice pad solutions involve integrated electronic sound-generating components. Alesis E-Practice Pad is an example of a software embedded practice pad (see Figure 2.22). The digital functionality provides different drum sounds, a built-in metronome with respect to different tempi and exercise options. Such technological implementations are intended to improve stick control, consistency, dynamics and so forth.

Figure 2.24 Alesis E-Practice Pad (Alesis, n.d.)

2.2.2.3.4 The Drums-specific Practice Tools (Digital Solutions)

For the case of drumming, five application examples available on iOS and/or Android platforms will be introduced briefly: ‘Drumeo’, ‘Learn Drums’, ‘Loopz – Best Drum Loops’, ‘Drumeo Kids’ and ‘Drum pad Machine’.

‘Drumeo’, an application available on both iOS and Android, is the most outstanding example among the drum learning or practicing applications. The application includes over a thousand songs to play along, a scaffolded curriculum and exercise tools for practicing. The scaffolded curriculum is based on video lessons. Also, it involves a live support and mentorship that enables the user to get in contact with competent musicians.

Figure 2.25 Drumeo (Play.google, n.d.)

Similar to ‘Drumeo’, ‘Learn Drums’, an application available on Android, also includes lessons. However, the scope excludes a live support. On the other hand, it involves play along songs, video tutorials that teach the basics including grip, notation and so forth. Also, it involves a drum tuner for beginners.

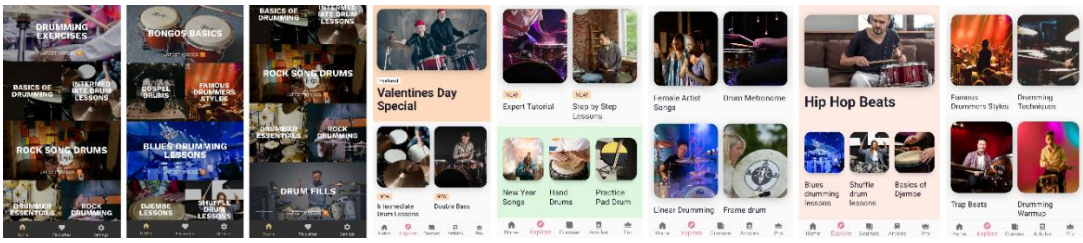


Figure 2.26 Learn Drums (Play.google, n.d.)

‘Loopz – Best Drum Loops!’, an application available on both iOS and Android, excludes the learning materials such as video lessons. In other words, it is directed towards practice. It includes a metronome and a speed changer to be implemented on songs or grooves. Peculiarly, the application enables the user to write drum partitions.

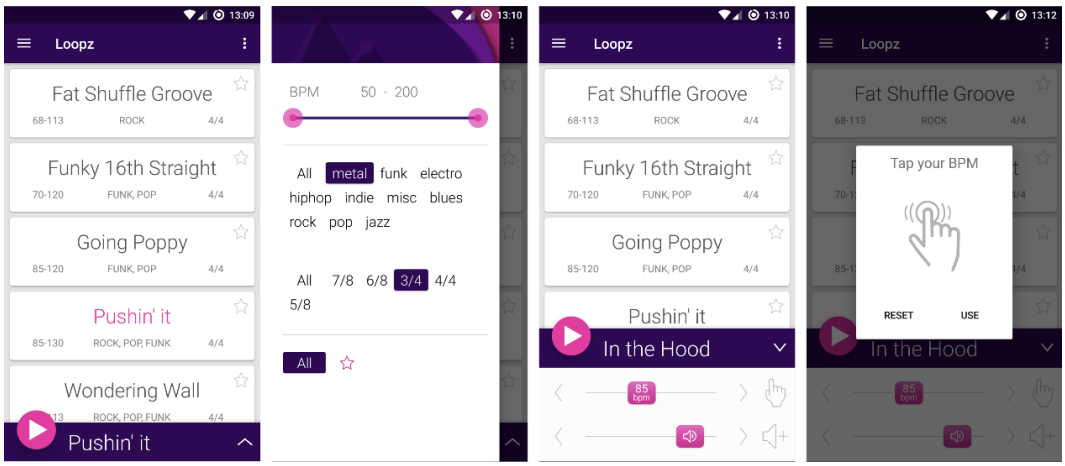


Figure 2.27 Loopz - Best Drum Loops! (Play.google, n.d.)

‘Drumeo’s application specifically designed for younger learners, named ‘Drumeo Kids’, is available on both iOS and Android and has a narrower scope. It includes solely educational videos based on a plot. The story involves a character called Captain Carson and his two close friends adventures. Thus, the educational context including drumming, basics, grooves and musical genres, is storified.

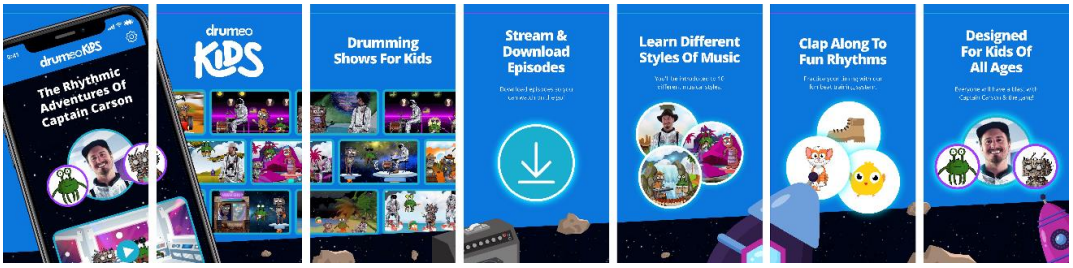


Figure 2.28 Drumeo kids (Play.google, n.d.)

‘Drum pad Machine’, available on both iOS and Android, is based on beat making instead of tuition or guidance for practice. Even though it involves tutorials, the focal point is generating music. Additional functions of the product include recording and sharing the produced track. Sound creation is made by buttons on launchpads. Similar to ‘Loopz’, it includes a speed changer. Also, there are samples for guiding the user while beat making.

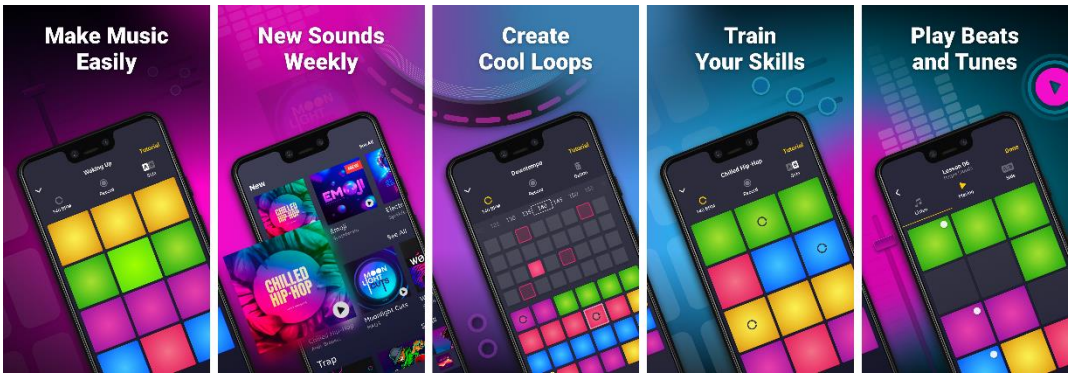


Figure 2.29 Drum pad Machine (Play.google, n.d.)

The last example of drumming examples mentioned for this chapter is ‘DrumKnee 3D Drums’ available on both iOS and Android. The major difference from the other application examples is that it takes the form of a drumming simulation. A remarkable feature is that the kick sound can be made by moving the foot while the phone or the tablet is placed on the user’s knee. For the other drum kit components, the fingers are used. Apart from playing, the application has recording and sharing functions similar to ‘Drum pad Machine’. Also, it has a repertoire of play along songs and customizability options offering various drum set simulations with different tunes to play and a drum kit visual stylization feature that can alter colour and form.

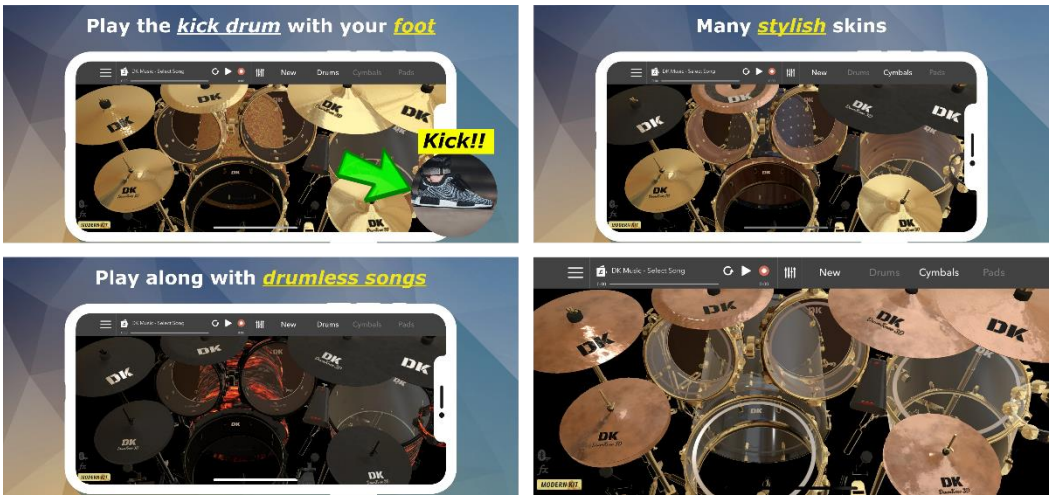


Figure 2.30 DrumKnee 3D Drums (Play.google, n.d.)

In summary, existing drum kit practice tools have a wide scope ranging from physical products for stick control exercises to smart technology-based solutions including applications that have features listed as: video tutorials, live support, play along exercises, tuner, metronome, speed changer, simulation sharing with the community, groove or partition generator and simulation. However, none of the existing tools integrate gamification as a practice strategy and motivator.

2.3 Gamification

2.3.1 Learner and Teaching Material Interaction

Pedagogy-oriented didactic educational model has been through revisions, thanks to emerging information technologies and a wide range of multimedia-based products (Gomes et al., 2014). Such products that started to take part in education, beginning from the first half of the 21st century, enable learners' self-directed learning and socialization, in addition to tutors' instructions. These artefacts with interactive characteristics and portable structures include a humongous technological complexity that can be exemplified by augmented-reality (Gomes et al., 2014).

Furthermore, these technological artefacts have great potentials to reinforce the learning scenarios by supporting the user interaction. As it can be seen in Figure 2.31, theories of education, regardless of high-technological artefacts' involvement, is classified as 'contents', 'interactions', 'subject' and 'society' (Bertrand, 2001).

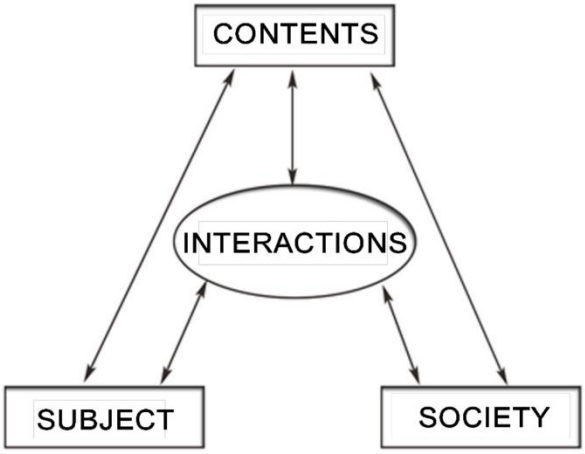


Figure 2.31 The four elements of education polarizers. (Bertrand, 2001)

Bertrand (2001) classifies theories of education into three main groups listed as: the subject, contents and society. The subject is constituted by learners or students, while the contents refer to disciplinary programs and society refers to surroundings including the environment and other people. The key concept that interconnects the three crucial aspects is the interaction operated by means of teachers or communication technologies. For the latter, the term 'technology' is elaborated as 'the teaching materials of communication of information: computers, television, video, CD, DVD, etc.,' and 'the later trend is for hypermedia, internet sites, the means of communication between people, the computerized learning environments and interactive software' (Bertrand, 2001, p.17). Bertrand (2001) also points out that the related technologies shall be 'appropriate technologies' to successfully transmit the educational content to learners.

It's possible to say that rapidly growing gaming industry has benefitted a lot from the latest technological capabilities including AR, VR and so forth. By enhancing the

players' experience, engagement and interactivity are significantly supported for the gamers. However, games' enhanced sphere of influence is not solely restricted by fun and entertainment, but with more serious tasks including education. Thus, such technological developments resulted in improvement in game-based learning systems as well. The approach for education, emerged as an alternative to didactic method, is named as 'ludic' technique supported by the new forms of digital mediums (Gomes et al., 2014). Even though Gomes et al. (2014) point out a prejudice on the ludic approach due to being considered as unimportant and less serious tasks, Eck (2006) claims that games are gaining interest as educational mediums in the last decade. Furthermore, a number of studies are still carried out to discover the gamified solutions' potentials for their implementation on educational scope by combining them with educational applications and videogames (Eck, 2006).

2.3.2 From Games to Game-Based Learning Systems

The word 'ludic' is derived from the Latin word 'ludus' which means game. Such approach is also named as 'gamification'. Gamification can be defined as using game elements for non-game context. Before elaborating the term 'gamification' and its implementations, the game notion will be discussed. Additionally, the distinct characteristics of games transmitted to gamification will be clarified.

Besides the technological artefacts, the major element that distinguishes the 'ludic' approach from the 'didactic' is the 'playful activity' (Gomes et al., 2014). Snyder (1989) emphasizes the significance of playful activity by stating that it's the most effective way for internalizing educational tasks meanwhile supporting the personal development. Gomes et al. (2014) list the key aspects of playful activity as follows: spontaneous, natural, excluding space and time limits and developing cognitive and effective capacities.

The sole embodiment of the playful activity can directly be seen in games. Game is an activity primarily based on actions, driven by the feeling of fun and comprised of challenges that result in authentic pleasure (Gomes et al., 2014). The characteristics that make an activity game are listed as play, rule, goal and pretend (Hogenhaug, 2012).

2.3.2.1 Play

Unlike books and films, playing requires active involvement (Hogenhaug, 2012). Hence, it's a participatory way of entertainment rather than presentational. Hogenhaug (2012) elaborates the term 'play' by referring to its etymological aspects in Danish language that are 'lege' and 'spille'. While 'lege' is playing without a goal or rule like a child, 'spille' refers to literally 'playing' that involves goals, rules, challenges and so forth. Therefore, the study attempts to take the latter term into consideration while implementing the gameplay aspects into learning task.

2.3.2.2 Goal

Schank et al. (1994) emphasizes the importance of the 'goal' by stating that it enhances the players' interest, learning motivation and learning outcomes by means of aspects such as solving a problem, exploring the surroundings, developing strategies, completing a puzzle, overcoming an obstacle, competing against time constraint and so forth. A quite simple gamified application of the 'goal' can be illustrated by the registration, filling out profiles, signing up for a newsletter stage on websites which gives user a sense of task completion and success (Hogenhaug, 2012). All in all, the notion of 'goal' is crucial since even a small goal brings a considerable satisfaction.

2.3.2.3 Rule

They determine what players can and cannot do. Rollings & Adams (2003) point out several components related to 'rule' including 'semiotics', 'sequence' and 'termination condition' besides 'play' and 'goal'. 'Semiotics' refer to symbols in a game and the way they are interpreted such as icons in a website (Hogenhaug, 2012). 'Sequence' is the elements that embody the events of progression in a game which resembles the stages that customer experience during online shopping searching, reviewing the comments and buying. 'Termination condition' determines the end of a game such as a task completion.

2.3.2.4 Pretend

Manipulating the reality and freedom of acting as a different entity are the possibilities that games offer to players. The elasticity is evidence of an intensive communication that takes place in the chat rooms and social networks of interactive games (Hogenhaug, 2012).

The degree of aforementioned game characteristics' adaptability varies from context to context. To illustrate to 'pretend' may not be essential if interactivity is not combined with the gamified system, since it won't require involvement of other players. However, there are widespread game mechanics implemented to serious or mundane non-game tasks in order to improve the user experience (Tubik, 2017). Challenge, points, badges (or stickers), leader boards, journey and constraints are widely applied instances of these mechanics. Thus, gamification should not be considered as an implementation on a finished design but as a component of the design process itself (Hogenhaug, 2012).

2.3.3 Gamified Solutions for Non-game Contexts

The term 'gamification' was initially used in documents in 2008 and it has been widely adopted starting from the second half of 2010 (Deterding et al., 2011). There are several aspects that created the base for its popularization by industry practitioners and conferences. Robson et al. (2015) list the driving forces of the widespread adoption of gamified solutions by stating three major factors. The initial factor is that researchers and game designers have made considerable investments to create engaging and successful computer games thanks to the growing computer game industry. The second factor is the alteration of people and organizations' way of participation, sharing, co-creation, discussion and modification of experiences with the help of adoption of social media, mobile and web-based technologies (Kietzmann et al., 2011). The last factor is that firms are seeking effective and innovative strategies for connecting with, learning from, and influencing the behaviours of employees and customers. After the commercial sector started embracing gamification, HCI and gameful system researchers started developing strategies for implementing the gamified solutions to the fields including health informatics, e-learning, computer-supported collaborative work, persuasive technology for pro-environmental behaviour, participatory science and so forth (Deterding et al., 2013).

Deterding et al. (2011) define gamification in broad terms as the usage of game design components for non-game contexts. Robson et al. (2015) elaborate the term 'gamification' by claiming that it is the way of implementing lessons from the gaming field by aiming for a behavioural change in a non-game context. Also, De Freitas (2008) makes a similar definition for ‘serious games’, stating that they are digital games played for specific goals excluding entertainment and fun.

Figure 2.32 Serious games, gamification and playful interaction (Deterding et al., 2011)

The term 'serious game' is used for training, simulation or education activities that are operated by means of hardware such as personal computers and video game consoles (Antonova, Stefanov & Grigorov, 2011). The crucial aspect that differs a 'serious game' from a 'playful interaction' is its inclusion of purpose-oriented learning. Such purpose-oriented learning is embodied by the learner's abilities such as making decisions, dealing with complicated choices, forecasting actions in the future and overcoming difficult situations (Antonova et al., 2011). All in all, a serious game evokes the ideas of a game in terms of its appearance and feel. However, it actually is a simulation of real-world events or processes (Addis, 2005). In other words, it is also called 'edutainment' which refers to entertainment's usage as an intermediary aspect for education rather than considering entertainment as the focal point. Egenfeldt-Nielsen (2007) defines the term 'edutainment', similar to the term 'serious game' by saying ‘a subset of educational computer games that is easily recognizable with a clear reward structure in the game separate from the educational experience’. Additionally, Addis (2005) highlights the purpose of edutainment as an interpretation of art and culture consumption which involves enjoyment and learning simultaneously. Also, a similar approach is called ‘game-based learning’, but Espinosa (2020) juxtaposes the concept with gamification and points out their differences by the motivational driver they involve. Game-based learning relies on using ready-made games for non-game context (Presk, 2001), while gamification

uses game elements for non-game context. Former is driven by intrinsic motivation that can be exemplified by focusing on receiving points and feeling accomplished by completing the difficult levels (Espinosa, 2020). However, extrinsic motivation is a crucial aspect in gamification that is supported by the reward system including badges, trophies, stickers and so forth. In other words, extrinsic motivators are generally based on rewarding the player after the task's completion, unlike intrinsic motivation that targets the feeling of accomplishment and satisfaction regardless of seeking a separable reward (Ryan & Deci, 2000). All in all, gamification's mission can be regarded as reinforcing the player's intrinsic motivation by means of enhanced extrinsic motivation.

Another difference between concepts is juxtaposed by Deterding et al. (2011). Although the aforementioned concepts, 'gamification' and 'serious games', are quite close to each other, Deterding et al. (2011) highlight their difference by asserting that serious games are implementations of games as a whole into non-game contexts, while gamification is the application of game elements for non-entertainment purposes. By elements, Deterding et al. (2011) refer to components including goals, rules and so forth, which will be discussed in detail in further chapters. Since Deterding et al. (2011) also point out that the boundary between a game and something with game elements is not clear, these concepts will not be considered as diverse terms in the study.

2.3.3.1 Principles of Gamification and Applicative Examples

There are a number of approaches in terms of classifying the major gamifications components. Antonova et al. (2011) clarify the fundamental components of a serious game as back story, game mechanics, rules, immersive environment, interactivity and challenge. Back story is related to the game's story line; mechanics correspond to physical functions or actions; rules are concerned with constraints; immersive

environment is inclusion of 2D or 3D animations; interactivity is directly linked to the action of a player's effect on the game; and challenge is linked to competing against the game or other players. In addition to these components, players also receive instructions and feedback with respect to their gameplay performances and are guided by means of included learning materials. On the other hand, Robson et al. (2015) set the principles of gamification as: mechanics, dynamics and emotions which are directly derived from the 'game' itself.

Hence, the aforementioned game characteristics' reflections can be seen in different concepts comprehensively in Figure 2.33. The concepts are classified as user types, mechanisms, motivation (which will be discussed in the further chapter) and reward.

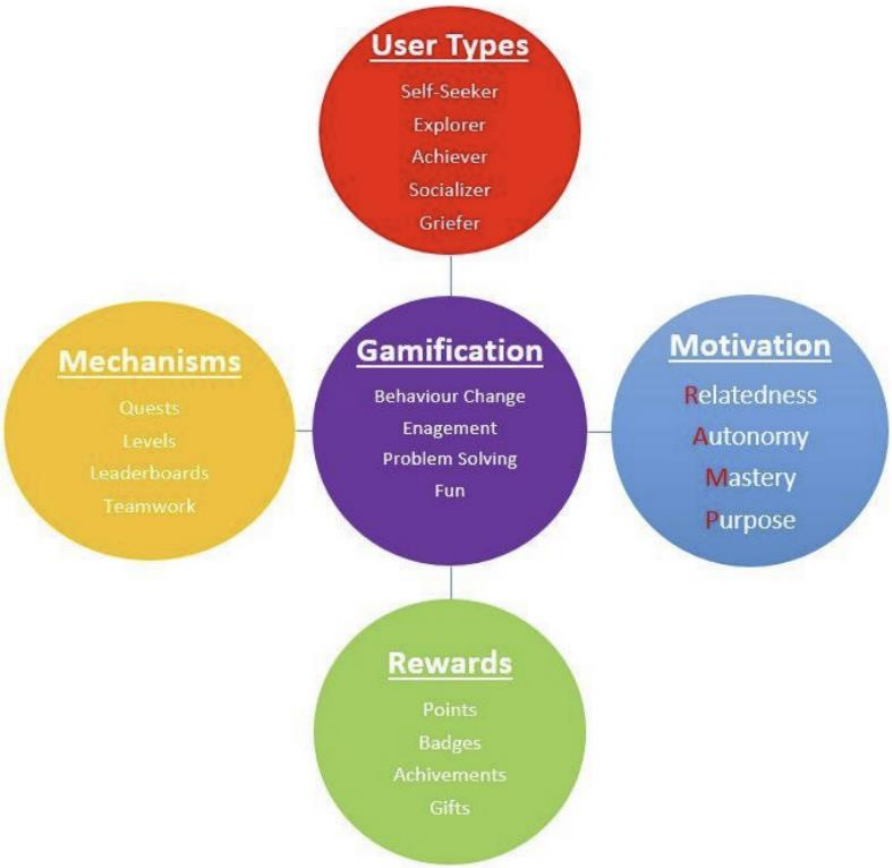


Figure 2.33 Components of Gamification Theory and Applicative Examples (Espinosa, 2020)

2.3.3.1.1 User Types

According to 'Richard Bartle Hierarchy of Player Types' (Sangkyun et al., 2017), there are five types of players. 'Self-seekers' or 'philanthropists' are the new players who try to figure out the game's parameters and limits. They are tended to focus on the gameplay's competitive aspects. Hence, such tendency may result in a disruptive player behaviour. The other player type is defined as 'explorer' or 'free spirit'. Unlike the former type, they are more likely to engage in the activity deeper by discovering new gameplay aspects to accomplish their goals. The third player type is 'achiever' or 'consumer'. They act more fun-oriented rather being determined to accomplish a task. Thus, they are inclined to cruise in the gameplay's environment and seek for the most difficult challenges. Another type of player is 'socializer' or 'networker' who are willing to bring other players together to enhance the social interaction. In other words, their focal point is the component underlies beneath the gameplay layer rather than the gameplay itself. The last player is 'griefer' who are considered unfavourable people, since they distract the gameplay experience by verbal provocation or destroying items.

All in all, it's possible to assume that 'achiever' or 'socializer' players can be considered as a player model while designing a gamified system for the context of drum kit learning. Since, seeking for the most challenging musical exercises can contribute a lot to their playing capability. Moreover, being notified about their peers' or other learners' status can reinforce the competitive aspect. Hence, such competition can significantly increase their musical practice skills.

2.3.3.1.2 Mechanism

Espinosa (2020) lists the prominent mechanisms of gamification as quests, levels, leaderboards and teamwork. Among the mechanisms, the game elements that can be transmitted to gamified learning systems are levels, quests (or challenges) and

leaderboards. Quests are the transitional tasks in order to gain player experiences. In some cases, the experience can materialize by means of XP (experience point). Quests are generally supported with narration for enhancing the intensity of gameplay (Sheldon, 2012). In case the quests are not compatible with the game context, it's possible to replace them by intermediary challenges (Espinosa, 2020). Another element of mechanism are the levels, which are comprised of more inclusive stages that involve intermediate goals (Sheldon, 2012). Espinosa (2020) explains the levels' context by stating that players' accumulated experience by means of intermediate tasks enable them to move on with the next level, if the required points are collected. Leaderboards are the other mechanisms that displays the scores and ranking among the players. The overall ranking is listed in relation to each other and it's primarily based on an evaluation system (Gilbert, 2015). Furthermore, displaying the achievements of students adds the competition and element which has a significant contribution in learning experience (Frazier-Roberts & Peoples, 2019).

For the case of designing a gamified musical learning experience levels shall have an increasing difficulty for the learner's progression. Also, the intermediary tasks shall be supported by challenges in order to push the learner's limits for an enhanced experience. Lastly, the aforementioned social interaction aspect shall be depicted on a leaderboard to notify the learner about the other's status and progress.

2.3.3.1.3 Rewards

Points, badges, achievements and gifts are the prominent rewards that can be used in gamification. Point system can be based on rewarding the users with respect to their daily practice and accomplishing the assigned tasks (Frazier-Roberts et al., 2019). Hence, students who complete difficult tasks can receive more points. Also, similar to leaderboards, a point system can enhance the competition (Sangkyun et al. 2017). Another aspect of rewards is the achievement and generally it's embodied via

achievement badges. Likewise the point system, badges have a considerable influence on motivating the learner. On the other hand, they encourage the 'autonomy'. Frazier-Roberts et al. (2019) exemplify this autonomy by saying that a badge can be awarded when the student accomplished performing a set of musical pieces by a specific musician. Lastly, the gifts, which can be illustrated by gold starts, trophies and so forth., are the other reward components. However, unlike points and achievement badges, it's not considered as a fundamental element in gamified experiences (Espinosa, 2020).

In a gamified musical learning experience point system shall be included with respect to increasing difficulties in levels. Also, badges' autonomic characteristic shall be taken into consideration.

All in all, the aforementioned applicative examples result in gamification as behaviour change, engagement, problem solving and fun (Espinosa, 2020). Effective use of extrinsic rewards can become a driving force to make the user internally and sincerely embrace the learning task. In other words, extrinsic motivation enhances the intrinsic motivation and as a result, it enables a behavioural change. During this transition, engagement of the user increases and the quality of participation within the game systems gets effected positively. Problem solving capabilities are reinforced by means of dealing with complex and difficult challenges or levels. The notion that makes such difficulties appealing for the learner is fun. A well-balanced involvement of fun aspect in gamified learning system contributes to user engagement. However, it shall be constructed with respect to learning context harmoniously. Otherwise, it may lead to reluctance or prejudice.

2.3.3.2 Reluctance on Gamification

Levels, quests, challenges, leaderboards, badges and points are the outstanding game elements implemented on gamified systems. However, the application of these components may lead to overshadowing the learning context. Thus, gamification

comes under criticisms related to that imbalance. The major criticism that has been brought to gamified learning systems is primarily based upon lack of balance and misconception. Neglected balance occurs between 'fun factor' and the 'tone of subject matter' (Interaction Design Foundation, n.d.). Applying the game elements more than necessity can result in that the gameplay can overshadow the user engagement with the product, service or learning system. To illustrate, a leaderboard design that aims to motivate user with the help of challenges can lead to demotivation of people due to high ranks of others (Tubik, 2017). Also, Hogenhaud (2012) highlights that 'gamification' should not be used as an intermediary tool for increasing the sell rates of a product but as a design element for improving the user experience. Hence such misconception is based on contradiction in terms 'game' and 'gamification'. Gamification is the application of gameplay components into non-game context by aiming to increase the user engagement to related product or service (Interaction Design Foundation, n.d.) while the game is a 'series of interesting choices' which involves four crucial characteristics which are 'play', 'goal', 'rules' and 'pretend' (Hogenhaug, 2012).

Another reluctance is related to prejudice on impact of videogames (Gomes et al., 2014). For instance, fun factor is underestimated by many people. Koester (2014) illustrates his criticism by stating that fun component cannot be involved in a learning stage. Hence, due to this perception schools hesitate to replace conventional didactic approach with gamification (Gomes et al., 2014). Also, economic conditions create a gap between institutions and gamification as well. High development costs and low marketing appeal is an instance that creates this gap. In terms of schools, difficulty of accessing the technology in some regions is another fact results in reluctance of gamified learning systems.

2.3.4 Applications of Gamification

Although prejudices on gamification still valid by a number of people, there are considerable amount of gamified system implementations for serious tasks. These applications areas will be exemplified as follows: ‘health and well-being’, ‘finance and banking’, ‘education’ and ‘music’.

2.3.4.1 Health & Well-being

As a strategy gamification is applied in health and well-being, especially in the area of digital health. The main attempt for its implementation is to enhance the clinical results. Gamification techniques and principles are constituted by means of applications for coping with diseases, reinforcing self-management, tracking medication and so forth (Digital Health, n.d.). Patients or users who actively use the applications can increase the engagement with the help of participating challenges and receiving rewards. Also in some apps, competition element is enabled by challenging with themselves or with other users which results in increase in motivation. The outstanding healthcare mobile applications, aiming to gather detailed and comprehensive health data, involve gamification to specifically enhance users’ wellbeing which can be illustrated by using personalized health plans. Besides the applications some companies also use wearable healtchare devices like smart watches including Fitbit, Apple and Android for the purposes of wellness and fitness (Digital Health, n.d.).

A prominent application that can be used with the smart watches is ‘Nike Run’. The application mainly considers users’ fitness and in order to increase their motivations it uses gamification elements including challenges, leaderboards, badges and trophies. Also, it provides competition against all users using the application (See Figure 2.34). Besides the gamified solutions, it includes training schedules, fitness recommendations and personal improvement records (Valamis, 2022).

Figure 2.34 Nike Run Mobile Application UI

Mango Health is another digital product, involving gamification, that focuses on patients’ medication tracking. Since the company is initiated by employees who have a game sector background, Schwartz (2013) states that gamification is successfully implemented on a serious task as medication adherence. As users enter their medications or supplements, they become enabled to interact with other users. They set time to take their medications, earn points, level up and earn rewards. The rewards involve gift cards from a partner brand, having opportunity to donate for charities. Also, element of competition is enabled via leaderboards (Scwartz, 2013).

Figure 2.35 Mango Health Mobile Application UI

2.3.4.2 Finance & Banking

Another area that gamification is considerably implemented in is finance and banking. Strizic (2022) points out that implementing gamification for the sector is a right decision, since banking tasks including creating account and depositing money are monotonous work for most people. Thus, harmonizing game elements with such mundane tasks can enable efficient outcomes. On the other hand, Beerda (n.d.) justifies the compatibility of gamification in finance and banking by claiming that users' tendency of dealing with numbers and tracking their progress make a ground a gamification technique. Implemented gamification strategies in finance and banking can contribute to marketing, sales, talent and innovation management (Oleksiuk, 2022).

An instance that makes ordinary financial tasks enjoyable by means of gamification is the mobile application of Monobank, a Ukrainian virtual bank (Strizic, 2022). The element of fun is supported by actively using a mascot which is depicted intensively on the application. To illustrate, mascot is illustrated on the achievement badges as it can be seen in the Figure 2.36. The tasks that are rewarded with badges are

illustrated as using the card abroad, dividing bills with friends and so forth (Nikonenko, 2023).

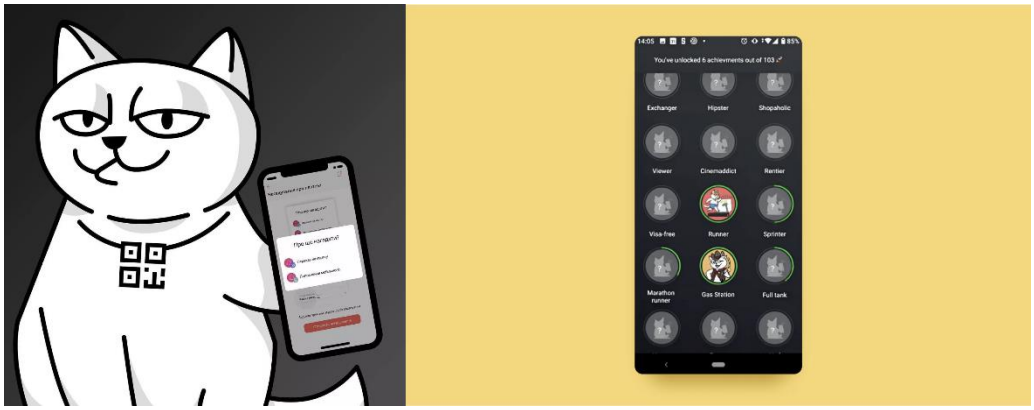


Figure 2.36 MonoBank's mascot cat and achievement badges UI (Nikonenko, 2023)

A similar approach in the sector can be seen on the game launched by the Spanish bank BBVA. The game includes video tutorials on the web application showing how to operate tasks including money transactions, mobile banking usage and paying taxes. Similar to MonoBank's gamified application, users earn points and rewarded by downloading music or movies by accomplishing the tasks (Oleksiuk, 2022).

Figure 2.37 BBVA game web app UI (Korsun, 2023)

2.3.4.3 Education

Increasing user engagement via gamification can considerably be seen in e-learning in the scope of education. Besides the schools, corporate learning programs implement game elements to their learning context for contributing learners' participation and increasing their performance (Aristek Systems, 2022). Similar to aforementioned examples, point system, achievement badges, competition element and progression displays play an intermediary role for internalizing the learning context.

One of the most outstanding e-learning examples that uses gamification effectively is 'Duolingo' (Espinosa, 2020). Gamification strategy is implemented in a way that as the players learn another language, they collect different badges, compete against time or their friends. With the help of badges, competition element, experience points, currency, leaderboards and depiction of progress (see Figure 2.38), players' learning sessions can become a meaningful learning experience (Espinosa, 2020).

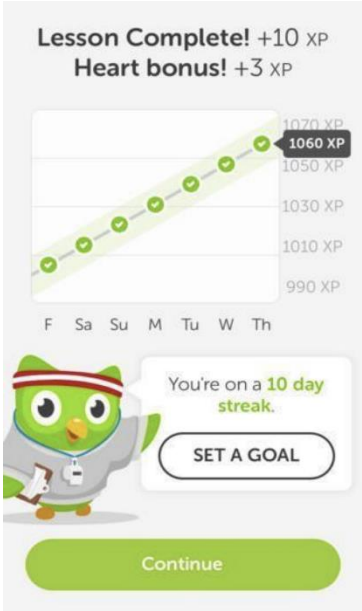


Figure 2.38 Duolingo mobile application's level progression display

Besides the level progression diagrams, the application effectively uses achievement badges to motivate the students (see Figure 2.39). One of the unique characteristics of Duolingo is that the application rewards its users with respect to their usage consistency. When the learner actively uses the app continuously for three days they get rewarded with 'Wildfire badge'. The second badge is rewarded after 7 days of consistency and the third one is given after 14 days of continuity. After they reach the tenth, the highest level, with consistency of a year their profile become recognizable among other users. Thus, this enables the element of competition and social interaction with other users (Aristek Systems, 2022).

Figure 2.39 Aristek Systems (2022)

Khan academy, a widely known e-learning website, also started using gamification in 2010 (Beerda, n.d.). The game elements that the website has implemented to learning materials are listed as experience points, achievement badges and avatar. Learners initially select an avatar before starting their learning journey (see Figure 2.40). Enabling a choice among avatar options enables the autonomy and agency during the learning experience.

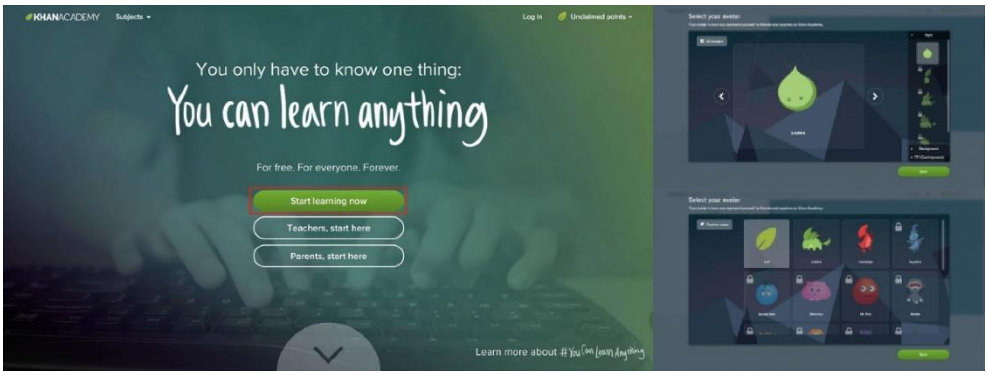


Figure 2.40 Khan Academy - Opening page and avatar selection UI

Also, the avatar accompanies with the user during their learning experience by giving them recommendations via reminding that they can make changes in their choices if they use a wrong learning subject (see Figure 2.41). Besides the avatar, tutorials' progression displays creates the sense of accomplishments (Beerda, n.d.).

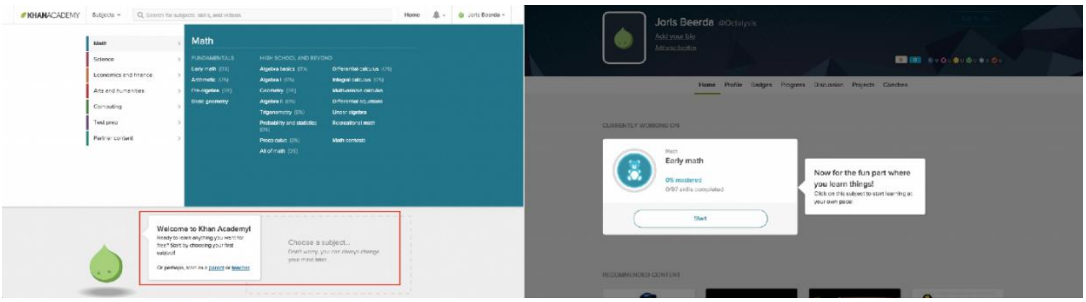


Figure 2.41 Khan Academy - Avatar's guidance and tutorial progression UI (Beerda, n.d.)

Increasing difficulty of levels to enhance the gradual feeling of self-accomplishment is provided by warm-up sections. As the learner becomes successful in tasks, they receive feedback and get rewarded by points and badges. Also, their performance is depicted on a progress bar in order to give them visual feedback as it can be seen in Figure 2.42 (Beerda, 2.36.).

Figure 2.42 Khan Academy - Warm-up exercises, progression bar and achievement badges UI (Beerda, n.d.)

2.3.4.4 Music

Even though most of the examples of gamified solutions are realized in digital media, Deterding et al. (2011) argue that limiting the gamification medium to digital products should be avoided. However, Bergomi et al. (2013) assert that electronic devices are suitable for operating gamified solutions in the case of representing music information thanks to its 'multi-layered' structure. Therefore, digital media can be considered suitable and desirable for enhancing musical learning.

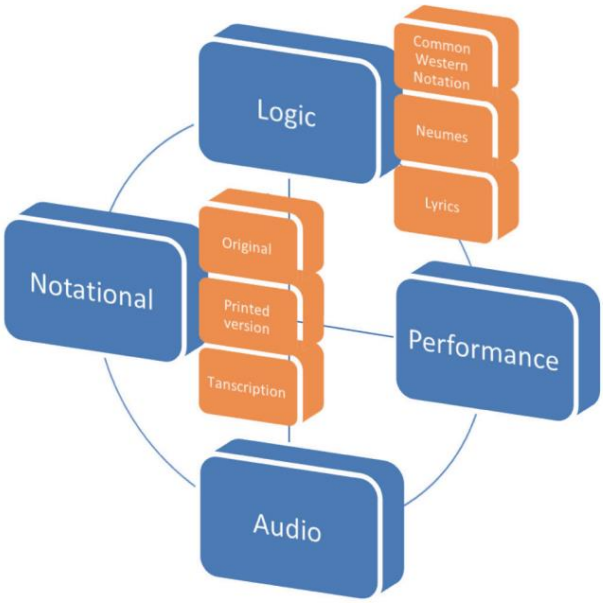


Figure 2.43 Multilayered structure of musical information (Bergomi et al., 2013)

Bergomi el al. (2013) list the 'multilayered structure' of musical information as follows.

- General layer: containing metadata of the music such as catalogue information
- Logic layer: corresponding to score symbol descriptions including chords, rests and so forth.
- Notational layer: addresses the graphical depiction of the music data by means of printed or hand-written scores.
- Performance layer: links to descriptions operated via computer and musical performance by means of performance languages.
- Audio layer: includes audio tracks and videos of the related musical piece.

There are several instances that implement game elements into musical learning by means of aforementioned layers. 'iClef' (Figure 2.44) is one the serious game examples in the context of musical learning (Bergomi et al., 2013). The game aims to enhance reading note pitches with respect to treble and bass clefs. Clefs appear on the screen randomly with an increasing tempo. Small sized noteheads attempt to guide the learner for the upcoming note. The rule of the game is choosing the right note on the keyboard as quickly as possible.

Figure 2.44 i-Clef UI (Bergomi et al., 2013)

FollowingPuccini (Figure 2.45) is another serious game example that combines game elements with musical learning. The purpose of the game is to encourage the player to learn how to follow musical scores, i.e. reading and listening to music (Bergomi et al., 2013). The cursor sweeps the measures on the sheet music with respect to the audio track's tempo. Hence, both the computer and learner track the score of the musical piece by following the graphical representations of the sheet music while the music is played as an audio track. The game's aim is to facilitate music students to become knowledgeable about issues including solfege, harmony, composition, musical forms and timbre of instruments. This is achieved via several levels, as follows: detecting the related score on the screen with respect to the currently playing audio, identifying the right segment on the waveform with respect to the graphically represented score, and highlighting the correct score with respect to randomly played parts of the audio. Hence the difficulty level increases in a hierarchical manner.

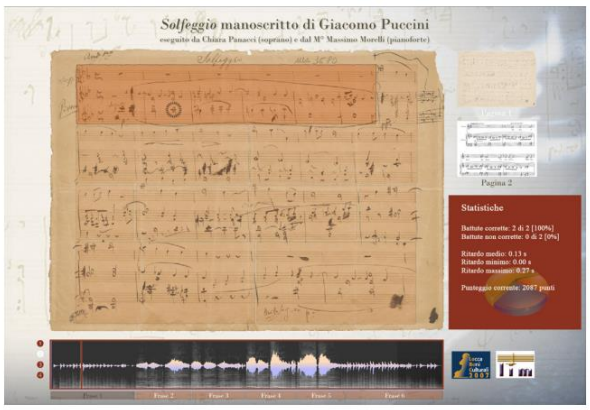


Figure 2.45 - FollowingPuccini (Bergomi et al., 2013)

In addition to its multilayer aspects, Bergomi et al. (2013) elaborate the fundamental components of a serious game, asserted by Antonova et al. (2011), with respect to their correspondence in a musical context. Movable notes on the sheet music and key changes are linked to an immersive environment, player's recognition of the notes via touching the screen refers to interactivity and increasing difficulty level is related to competition.

Serious game examples including 'iClef' and 'FollowingPuccini' are considerable instances in terms of combining game design with musical learning. However, their main attempt is to target learning fundamental musical elements rather than contributing the learner to practice a specific musical instrument. In this respect, the gamified example that guides the learner towards increased competency through practicing a musical instrument is called "Computer-Assisted Musical Instrument Training" (CAMIT) (Margoudi, Oliveira & Waddell, 2016). Margoudi et al. (2016) point out the other type of game-based approaches in a musical context as 'Audio-Based Games' (ABG). Unlike 'CAMIT', 'ABG's major focus is entertainment, including the widely known games such as "Guitar Hero" and "Rock Band", which are not created to combine entertainment with education. Hence, 'ABG's are excluded from this literature review since they do not consider the gameplay as an intermediary tool or a 'learning object' but rather as the major purpose for use.

However, 'Yousician' differentiates from 'i-Clef' and 'Following Puccini' by targeting specific performance areas listed as: guitar, piano, ukulele, bass guitar and singing. The technology of the web- based application requires an input device (e.g. a built-in microphone) for analysing the notation that the learner performs and then giving feedback to them for enhancing practices (Wang, 2021). After establishing the audio interface, learners start experiencing the gamification elements in the application starting from getting involved in gradually increasing difficulty of levels. Learners accomplish the tasks presented by the application, receives real-time feedback and gets rewarded with stars and points after they accomplish the task (see Figure 2.46).

Figure 2.46 Yousician - Home page and levels display UI (Wang, 2021)

Apart from the given missions, learners can benefit from practice mode. The application provides a wide range of practice library divided into subsections. Practice mode gives the learner control by making changes on a musical piece in terms of speed (see Figure 2.47). Also, learners are able to receive real-time feedback during practice sessions.

Figure 2.47 Yousician - Practice Mode UI (Wang, 2021)

Besides the speed changer, the application also provides tuner, sound mixer and different sorts of exercise materials including notes, tablature, frets and sheet music as it can be seen in the Figure 2.48 (Wang, 2021).

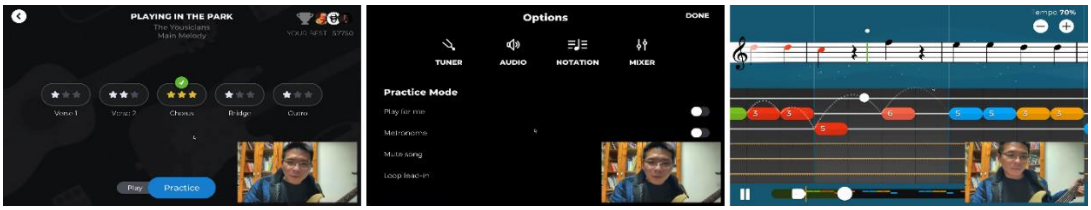


Figure 2.48 Yousician - Practice modes UI

Another product feature is the ear trainer which is quite important issue for the musicians. The main aim is to enhance the learners' sense of pitch by means of the exercises. The ear training experience is gamified by designing the exercises in a puzzle form. The ear training concept increases the fun element as well (Wang, 2021).

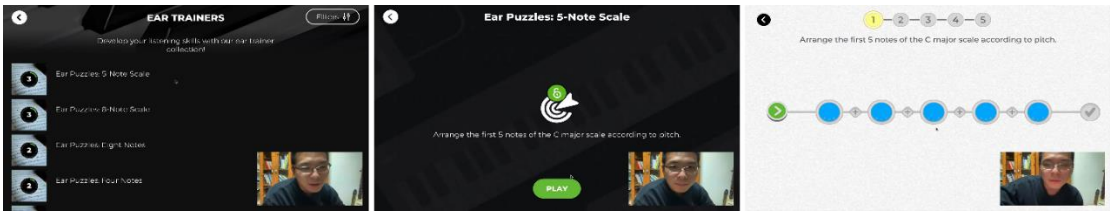


Figure 2.49 Yousician - Ear training UI

Learners can view their overall performance in their profile page. The page consists of total and Daily practice time, level, competency on related fields and detailed display of the activity as it can be seen in the Figure 2.50. Moreover, if the user logins with their Facebook account they can share their status with their friends which contributes to competition and social interaction (Wang, 2021).

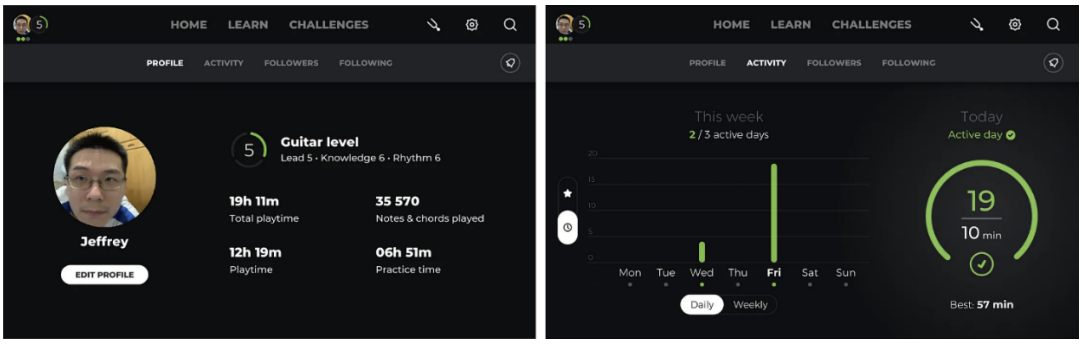


Figure 2.50 Yousician - Profile page UI

2.4 Learning & Motivational Theories

2.4.1 Learning Theories

2.4.1.1 Behaviourism

The theory is primarily based on conversion of an observable action to stimuli or a response. The major driving force of the learning process is practicing skills. The

approach assumes that a group of learners include a similar level of stimuli in terms of interest on the task. If the performer practices a skill enough, learning is inevitable. The overstated application of behaviorism resembles a teacher who aims to take control of a music classroom by shaping the student by taking their responses to instructions into consideration rather than focusing on individual decisions (Isbell, 2012). Since the performer is not stimulated by the joy of the task itself, they are motivated by rewards, feedback and so forth. Isbell (2012) highlights that rewards don't work equally on performers. Hence the learning is overwhelmingly based on extrinsic motivation rather than intrinsic motivation (Egenfeldt-Nielsen, 2007).

2.4.1.2 Cognitivism

The approach is focused on the cognitive base where the responses are constructed. Egenfeldt-Nielsen (2007) emphasizes that these cognitive structures are crucial for gaining intrinsic motivations and lists the intermediary tools of learning as scaffolding information, chunking information, multimedia information and present material. The learning process is operated with the help of categorization, organization, storage and retrieval (Phillips & Soltis, 2009 as cited in Isbell, 2012).

2.4.1.3 Constructivism

The theory's main focus is the learner himself or herself by considering the settings. The artifacts and the social environment around the learner can be the intermediary force that aids the performer in the learning process. A platform that enables learning experiences for learning both individually and collaboratively is beneficial (Egenfeldt-Nielsen, 2007). Contrary to the behaviorist approach, the teacher is a facilitator rather than an instructor. The teacher is aware that the knowledge can be transmitted from one learner to another with the help of social interaction. The learners can freely interact with content and each other in a manner that they regard meaningful (Isbel, 2012). Gilbert (2015) asserts that gamification is an

implementation of constructivist approach, since the theory suggests that learners are more efficient when they become capable of producing and organizing new knowledge by means constructing their own learning model.

2.4.2 Motivational Theories

2.4.2.1 Expectancy-Value Theory

Expectancy refers to a person's possibility that behavior's accessibility to its aim while value determines the importance of the related aim (Burak,2014). The student makes his or her choice among various tasks in accordance with the probability of accomplishing it since s/he believes that it can be realized s/he will also be encouraged to perform it. Burak (2014) highlights that the activity should be attractive, easy and logical based. Expectancy-value theory has four subtopics.

2.4.2.2 Attainment Value

It is the importance attributed to the task in case of accomplishment (O'Neill & McPherson, 2002 as cited in Burak, 2014). For a drumming student it can be exemplified as being known as a talented young musician by others.

2.4.2.3 Extrinsic Motivation

O'Neill et al. (2002) defines the term as the extrinsic utility value of learning. It is about motivations that originate outside one's own personal satisfactions. Ryan et al. (2000) define the extrinsic motivation as an effort that is applied on activity in response to receive separable outcome. Burak (2014) mentions the instances of extrinsic motivation as playing the musical instruments for the purpose of receiving a high grade, winning awards and getting compliments from the environment,

regardless of the player's inner joy of the musical performance. However, she also highlights that the motivations solely depending on extrinsic driving forces does not sustain for a long period and leads to reducing interest as well. Egenfeldt-Nielsen (2007) highlights that activities combining education with entertainment are overwhelmingly based on extrinsic motivations rather intrinsic motivation with the help of rewards, points, badges, gifts, trophies, gold stars, stickers and so forth (Espinosa, 2020). In gamification, extrinsic motivators are rewarded to users after accomplishing a task (Espinosa, 2020).

All in all, rewards are the major drivers of extrinsic motivation in a gamified learning system. Espinosa (2020) emphasize the importance of reward system by suggesting that instructors shall consider the ideal reward type to motivate the student in order to achieve the learning outcome. Gilbert (2015) classifies the rewards in three types as follows: task contingent rewards, engagement contingent rewards and performance contingent rewards. Task contingent rewards are given to a learner after accomplishes an objective. In such rewards learners' autonomy is not present, since the task choices aren't based on their choices. Engagement contingent rewards are given when learners get involved in a task. These rewards include a surprise element, since they aren't aware of the reward while participating. Gilbert (2015) points out that performance contingent rewards are the most effective type among them, since the reward is given to learners when they reach a certain competent in a specific objective.

2.4.2.4 Intrinsic Motivation

It refers to personal pleasure and satisfaction felt by the related activity, without the need to be encouraged by others. For a drumming student it refers to practicing and enjoying playing the drums regardless of the instructors', friends' or family's opinions. Even though intrinsic motivation sounds like a inherited driver regardless of an external influence, amotivation can turn to a self-determined intrinsic willingness to an activity by means extrinsic motivators (see Figure 2.51).

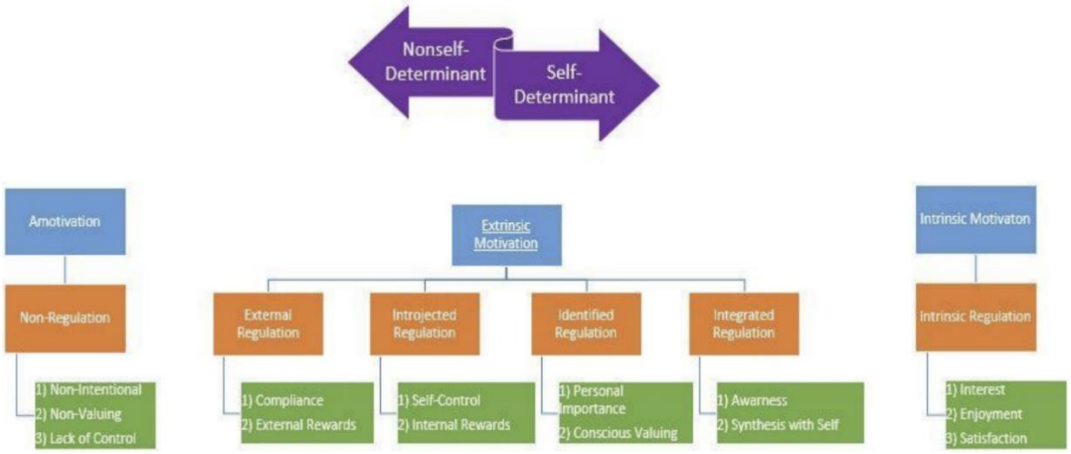


Figure 2.51 Taxonomy of the Human Motivation Continuum (Espinosa, 2020)

Motivation is one of the applicative examples of gamification. Espinosa (2020) names the related motivational elements as 'The R.A.M.P. Model of Intrinsic Motivation' which consists of 'relatedness', 'autonomy', 'mastery' and 'purpose'. 'Relatedness' corresponds to bounds between people who share the similar things in common and the enthusiasm to become a part of a social network. The term is valid for the 'socializer' or 'networker' user types who are demanding social status, belonging or connection. The term 'autonomy' is related to self-directed learning or governance. Espinosa (2020) exemplifies the term with making choices on different paths. The term is connected to 'explorer' or 'free spirit' player type that cares about creativity, responsibility and agency. The third term 'mastery' refers to becoming skillful on tasks or having a considerable knowledge on an objective. In the scope of gamification, 'mastery' is constituted by levels that have an increasing difficulty. Espinosa (2020) relates the term with 'achiever' or 'consumer' user types who pay attention on learning and personal development. The last term 'purpose', is based on helping the other users and empathize with them to understand the action they took (Grant, 2008). The term is valid for 'philanthropist' or 'self-seeker' user type who consider altruistic manner important.

Among the motivational elements in gamification, 'relatedness', 'autonomy' and 'mastery' can be taken into consideration while designing a gamified learning system for a musical context. It's because becoming a part of a social community of

musicians, being able to choose tasks or exercises among the provided alternatives and increasing the capability of performing with respect to having success on levels can be adapted to a gamified musical learning system.

2.4.2.5 Perceived Cost

The term refers to the sum of the obstacles on the destination of the activity's desired outcome. For drumming tuition, it can be exemplified by the amount of time spared for practicing that can also replace the other daily activities. O'Neill et al. (2002) emphasized that it can be disincentive for the children since they may sacrifice their leisure time.

2.4.2.6 Self-Efficacy Theory

The theory defines self-efficacy as the opinion of performing the behavior by aiming to meet its related consequences (Bandura, 1977 as cited in Bernabé-Valero, Blasco-Magraner & Moret-Tatay, 2019). Bandura (1977) clarifies the distinction between the outcome expectancy and expectation apart from the expectancy-value theory. Outcome expectancy is the prediction regarding the outcomes of the behavior while expectation is the conviction that the person can accomplish the activity for its outcomes. The aforementioned expectancy-value theory is more related to outcome expectancy rather than expectations (Bandura, 1997 as cited in Burak,2014). In terms of musical learning, Bernabé-Valero et al. (2019) point out that musicians' way they appraise for their skills and effort spared for the musical activity and their satisfaction regarding the improvement they managed are included in the theory.

2.4.2.7 Flow Theory

Csikszentmihayli (1990) asserts that having control over the conscious is the key element of the happiness of life. The status of control is defined as optimal experience. Csikszentmihayli (1990) regards the optimal experience as the most crucial part of the flow theory. It is maintained by achieving the balance between a task's level of difficulty and the individual's efficacy of skill in achieving the task. The harmony between the tasks and skill's status enables motivation for the individual and keeps his or her mood pleasant to accomplish it. Thus, it results in pleasure and enjoyment. Csikszentmihayli (1990) lists the key components of pleasure and enjoyment as tasks that enables completion, clarified goals, rapid feedback, motivation deeply felt without the requirement of any effort which will prevent anxiety, frustration, apathy and so forth., sense of control over the behavior, getting rid of the concerns and transformation of time that corresponds to minutes can be felt like hours or hours can be felt like minutes.

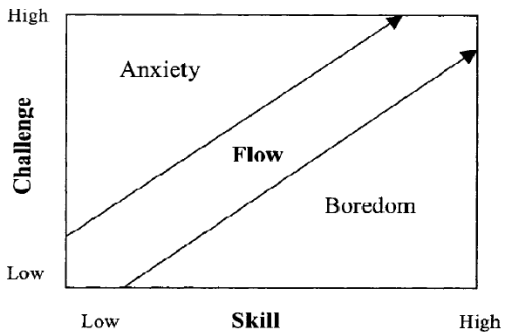


Figure 2.52 Theory of Flow (Csikszentmihayli, 1990)

When the students encounter a difficult task with a level of skill, pleasure is derived from the task and thoughts flow without encountering any obstacle. However, in the cases that the task's level of difficulty does not embody a balance between the student's skill flow experience is disrupted. When the task is relatively easy compared to a student's high level of skill, boredom arises. When the task is too

difficult and the student's skill is too low, it results in anxiety. When both the task's difficulty level and student's efficacy are too low, apathy is inevitable. However, the aforementioned stages are not permanent. The status can shift from one to another. To illustrate, the level of boredom can turn to the experience of flow with the help of practicing. Flow process is the one of the most related learning environment based on the theory (Burak, 2014). Also, the ‘theory of flow’ suggests that learners who are successful in musical learning show greater capability to enjoy the tasks intrinsically, become more determined in coping with difficulties and turn them into new areas for learning (Cskszentmihalyi, Abuhamdeh & Nakamura, 2005).

2.4.2.8 Theory of Attribution

Weiner (1991) claims that people are inclined to attribute causes for the consequences of their activities whether they have positive or negative outcomes. Such a tendency is quite widespread applied in the tasks of people's daily lives. It is suggested that the person himself or herself should be the one who decides if the result of the performance is positive or not instead of expecting and external assessment. To illustrate, being rewarded in return for accomplishing an easy task may influence the motivation in a bad manner since it can evoke the feeling of having low skills (Weiner, 1991). In that aspect it also justifies Csikszentmihayli's Flow Theory by considering the balance between the task's difficulty level and the performer's ability.

Weiner (1991) classifies the attribution inclinations as intrapersonal and interpersonal. Former tendency resembles a scientist searching for the background of his or her actions by referring to his or her knowledge. Actions are shaped solely by feelings which are formed thanks to another outcome of a task including success and failure of the past experiences, then embodies the intrapersonal attribution. The latter inclinations are based on assessments, feedback, comments and so forth from

the environment including family members, friends and instructors who witness the performance of the task (Weiner,1985). Analogously to the sun aspects of experience-value theory, intrapersonal attributions trigger the intrinsic motivations while interpersonal attributions trigger the extrinsic motivations. Gomes et al. (2014) assert that 'Theory of Attribution' is the most related theory that can be applied to musical context, since it bridges a direct connection interpretation, fulfillment, motivation and musical performance.

2.5 Design Insights from the Literature Review

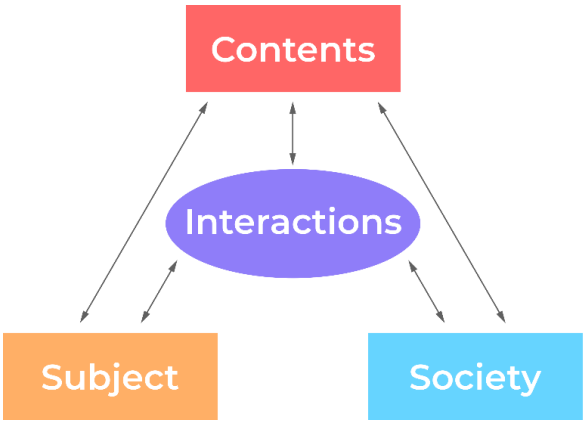
- Understanding and internalizing the rhythm is a fundamental theoretical aspect for a beginner to learn the drum kit. Counting the time, being knowledgeable about the musical meter and having a well-structured perception of the beats and tempi are the most outstanding skills that shall be gained apart from practicing.
- Another theoretical aspect is the notation. The values and basics of the drum kit key shall be embraced.
- Besides the theoretical aspects, practical aspects are important. Stick control exercises have a crucial role for a learner to practice the rudiment exercises, tempi and dynamics when they don't interact with the drum set.
- Coordination exercises are the other fundamental elements for practicing the drum kit in order to gain independency across the learners' four limbs. Coordination exercises shall be improved by playing different grooves and ostinatos.
- The last practice-oriented aspect for a learner is to play along with songs/recordings. Besides enhancing the coordination skills, playing along with songs/recordings has a significant driving force that contributes to a feeling of improvement and learners enjoy the musical activity.

- By taking ‘Richard Bartle Hierarchy of Player Types’ into consideration, there are two user profiles that match with the scope of design scenarios: ‘achiever’ and ‘socializer’. For the user type ‘achiever’, intermediary tasks including challenges shall be involved in design. Another aspect that shall be contained in design is the leaderboard by considering the socializer user type for an enhanced social interaction and competition.
- The gamified system design shall include gradual increasing levels of difficulty. The gradual increase shall take Csikszentmihayli’s ‘Theory of Flow’ into consideration by keeping a balance between the difficulty and applicability of learners’ skills.
- Among the learning theories, ‘gamification’ stands on a point between the ‘behaviorist’ and ‘constructivist’ approaches. As an extrinsic motivation-oriented theory, ‘behaviorism’ suggests that practicing a determined skill is the efficient way to learn. However, constructivist theory’s focal point is to encourage learners to construct their own knowledge model by providing them with autonomy. Therefore, the game system design shall consider the degree of the autonomy as well.
- A reward system is significant as the fundamental element of extrinsic motivation in a gamified learning system. The components of a performance contingent reward system, which will also be considered in design, are points and badges.
- Since extrinsic motivators are also drivers for evoking learners’ intrinsic motivation, the reward system shall be well-designed. The design considerations shall be based on a balanced distribution of points among consistency, succession in levels and challenges. The other consideration shall be defining the visual characteristics and semiotics of the badges well.
- As the primary means of interaction, the product that the user will interact with shall be well-defined, regardless of being digital or physical. In other

words, ‘appropriate technologies’ (Bertrand, 2001) shall be implemented, by taking today’s technological possibilities into consideration.

- In terms of the practice tools, practice pads are the most prominent physical products for a learner to practice stick control exercises. They are useful when the learner cannot interact with the full drum kit setup. They benefit from the pads in terms of their portable structure and material aspects that mimics the rebound of the drum kit components. Also, there are digital practice pads that include an embedded metronome inside the product for enabling a more embodied exercise experience.
- Current prominent drum practice tools for beginners include features listed as video tutorials, live support, play along exercises, tuner, metronome, speed changer, social interaction, groove/partition generator. However, they exclude characteristics that can be seen in successful implementations of gamified e-learning and other musical learning systems as follows: personalized and customizable avatar designs, feedback mechanisms, and ear-training exercises.
- The element of ‘fun’ is essential – it shall be considered within the game system, rewards and avatars’ designs.

Design considerations are classified by taking the ‘4 elements of Education Polarizers’ in consideration (see Figure 2.53). The aforementioned design insights are categorized with respect to contents, interactions, society and subject.



Practical	Stick control Tempo accuracy Play along	Ear-training Coordination
Theoretical	Rhythm	Notation
Player Actions /Areas of Autonomy	Levels Consistency	Challenges Avatar
Technology	Physical product	Digital product
Extrinsic Motivators	Points Badges	Feedback
Subject	Learners between the ages of 15-19	
Society	Leaderboard	

Figure 2.53 Design insights with respect to '4 Elements of Education Polarizers'

There are several points remaining unclear for design specifications in terms of contents and interactions. Also, the decision on subject shall be tested. The next step of the research aims to make the related points clear.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology consists of in-depth interviews conducted with 6 drumming tutors, research then design phase resulted in two diverse design proposals and a focus group conducted with participation of 4 drumming tutors in order to assess the design proposals as shown in the Figure 3.1.

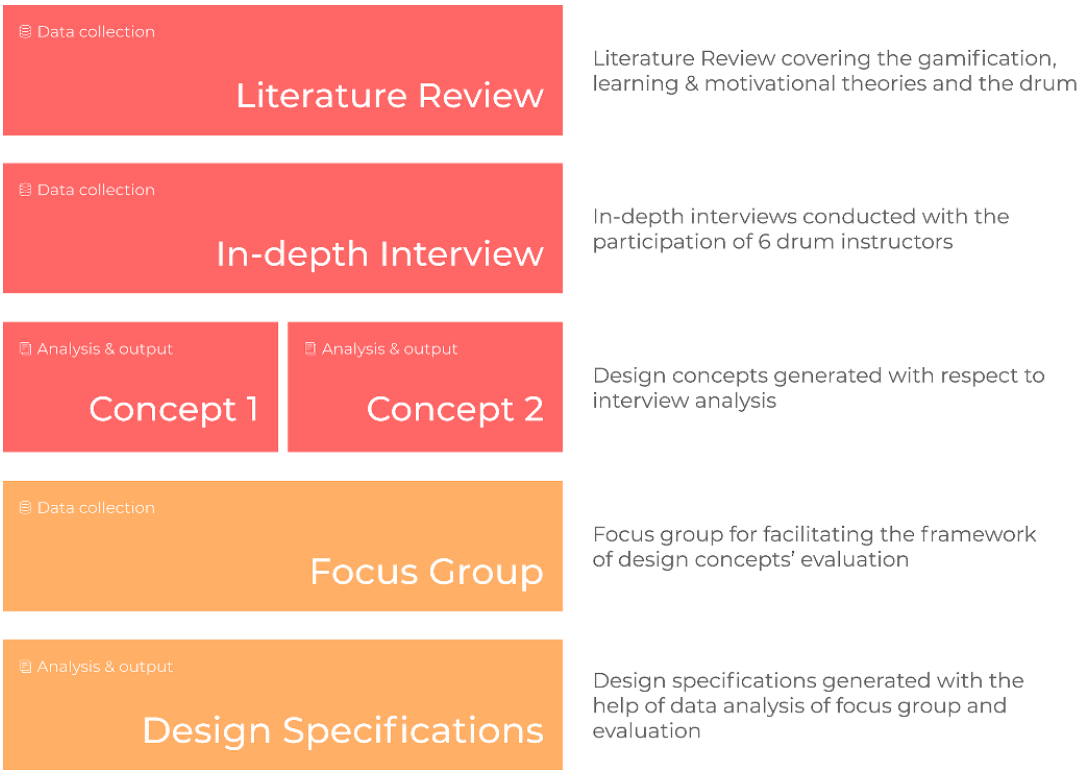


Figure 3.1 Overview of the study

The fieldwork attempts to uncover experiences of drum learning and teaching with the help of data gathered from instructors in order to form design solutions. The study consists of in-depth interviews, research then design phase and a focus group respectively. The interviews are carried out to collect data from drumming tutors, focusing on their experiences in the learning stage, teaching and practicing. Then, two design concepts are formed with respect to interview outcomes. Finally, a focus group study is organized with another group of instructors in order to learn their assessment on design concepts with respect to their teaching.

3.2 In-depth Interview

Similarly, to whole learning processes, serious games should involve expert knowledge while developing the learning scenario and learning path (Antonova et al., 2011). Hence expert knowledge is essential for a learner in order to create learning simulations useful and meaningful and enhance the learning and developing new skills. Also, Clark, Feldon, van Merrienboer, Yates and Early (2007) emphasize that learners guided by means of experts have better performance on related tasks than learners who are guided by non-experts because experts' explanations are more abstract and theoretically-oriented. Moreover, they highlight that when identification of experts' cognitive processes are adapted into training materials result in more effective consequences compared to those adapted by other means. Additionally, learners receiving guidance from experts are able to solve problems rapidly and effectively (Hinds, Patterson & Pfeffer, 2001).

By taking the substantiality into consideration, Seager, Ruskov, Sasse and Fradinho (2010) divide the serious game design process into three phases as follows: knowledge elicitation, knowledge representation and game design. The knowledge elicitation phase attempts to reveal the cognitive process of the experts in terms of the related learning task. The knowledge representation aims involves codification of the data derived from knowledge elicitation for adapting them into game design.

The purpose of the game design includes scenario building, identifying critical incidents and learning cases and non-playing characters, if included.

The fieldwork aims to follow a similar structure in terms of eliciting and representing the expert knowledge. For this purpose, in-depth interviews are made with drum teachers/instructors to collect data in terms of their professional background, enthusiasm to the instrument, learning and teaching experiences, practicing habits and overall recommendations for novice drummers. During the in-depth interviews' analysis transcriptions are coded with respect to participants' statements as shown in the Figure 3.2. Codes are categorized as level 1 and level 2 codes. While level 1 codes classify the responses in detail, level 2 codes sort the codes in more general terms.

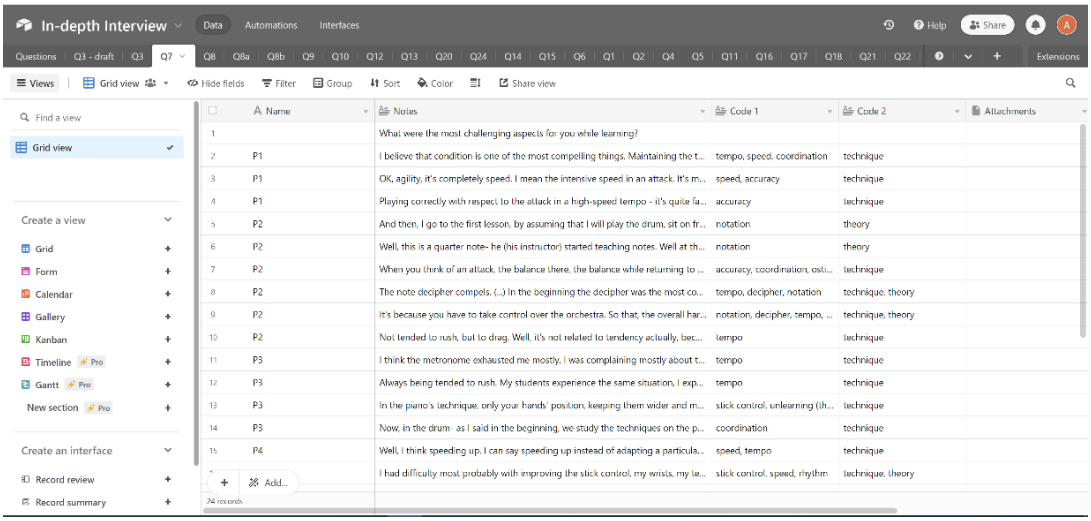


Figure 3.2 Screenshot of the coding on AirTable

3.3 Research then Design

The first phase of the study consists of literature survey and in-depth interviews respectively, while the second stage is initiated by 'research then design' stage (see Figure 3.3). Friedman (2000) juxtaposes the design's definition as a 'field of thinking

and pure research' and 'field of practice and applied research'. Also, Archer (1999) points out that the practitioner activity requires research. Therefore, two design proposals are formed with respect to the interviews' outcomes.

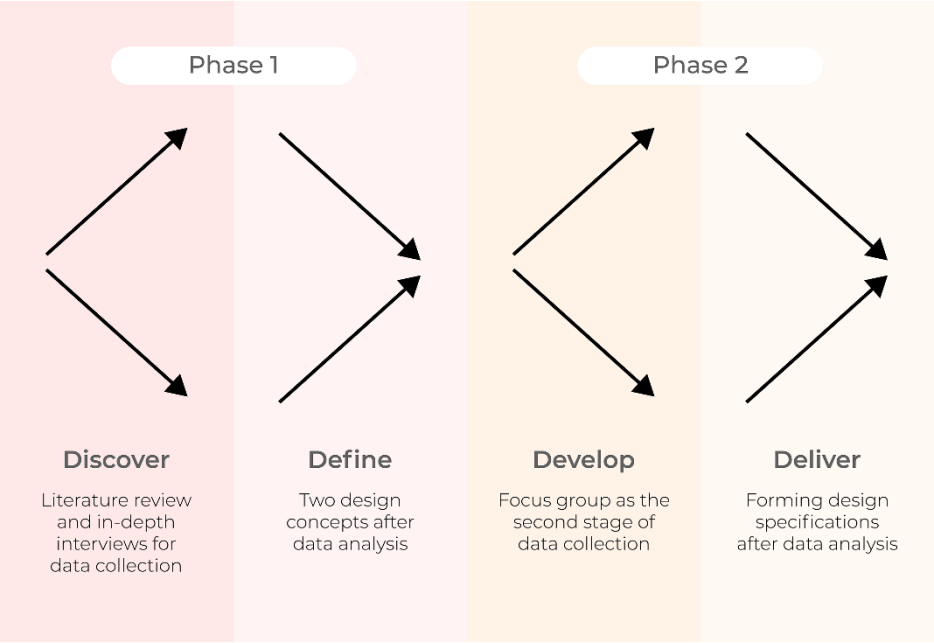


Figure 3.3 Double Diamond Model of the Design Process

In the literature review the relationship between human and rhythm is analyzed and the drum kit's fundamental notions including the basic musical terms are investigated. Additionally, the concept of 'gamification' is analyzed by taking its implementations in the field and relationship between the significant learning and motivational theories into consideration. As a result of the initial data collection phase, a number of design insights are listed and classified according to '4 elements of education polarizers'. The insights required clarification in terms of forming the design specifications. Therefore, in-depth interviews are conducted with drum kit instructors to clarify these points.

In-depth interviews responded significantly the objectives, while several points still remained uncertain. Thus, two design alternatives approaching the unclear specifications from different perspectives are formed for the evaluation stage. Hence,

design, as a creative practitioner activity, is considered as an assisting medium for research activity in the scope of the study (Archer, 1999).

As a research medium for the evaluation phase two concepts are designed and both concepts include hardware and software elements. Hardware element corresponds to physical product itself and during the preparation the material aspects and connection details are considered. The software elements are the user interfaces that embody the medium of the gamification. Common aspect of both designs is also a user interface as an assisting product which is a mobile application. The gamification is reinforced via badges, leader boards and challenges in design proposals. Each design concepts include onboarding process, pairing scenarios, protocols and widgets' introduction.

After the generation of two design concepts, the process is followed by focus groups for facilitating the design evaluation's framework. As a qualitative research method, focus groups' main objective is to collect detailed data about participants' thoughts, beliefs, tendencies and ideas about a certain topic (Then et al., 2014). The process is based on presentation of two design concepts to participants and collecting their overall opinions, feedbacks and potential recommendations for the iteration. The purpose of determining the focus group instead of an interview form is to enable participants to express themselves more freely (Beck et al., 1986), since the group enables a communication including interactions, jokes, anecdotes and so forth. which enables an unlimited way of self-expression (Kitzinger, 1995). Also, focus group has an ice-breaking effect for shyer participants (Kitzinger, 1995) and provide an atmosphere that reinforces participants' previous thoughts or encourage them to utter a new opinion (Hillebrandt, 1979).

Design proposals' target group is limited with age range 15-19. However, the focus group was conducted with drumming instructors, rather than learner drummers, who are the intended end-users of the drum practice tools, likewise the in-depth interviews. The primary reason for this was the relative ease of access to the instructor group, and also the assertion that instructors have a wide range of

experiences spanning their own learning processes through their expertise in education. In this way, instructors could provide feedback from multiple perspectives. Since larger group settings lead to expressing opinions more difficult, the participant number is constrained by 4 (Morris, Hargreaves McIntyre, n.d.).

3.4 Ethical Conduct Approval

Ethical conduct approval was granted by the METU Human Research Ethics Committee, under the approval numbers 106-ODTU-2021 (in-depth interviews) and 0098-ODTU-AEK2023 (focus group). The approval letters are contained in Appendices G and H.

CHAPTER 4

DRUM KIT INSTRUCTOR EXPERIENCES

4.1 Aim and Scope of the In-depth Interviews

The data collection phase consisted of in-depth interviews conducted with drumming instructors. Even though design insights are classified with respect to '4 Elements of Education Polarizers', there are several points that shall be clarified in order to generate a design concept. The aim of the interviews is to seek an answer for the points remaining unclear. Since the clarification of the points are planned to be determined by means of drum kit instructors' own opinions, insights and experiences, these unclear points aren't pointed as direct questions in order to gather enriched data and prevent limiting their answers' scope (Questions can be seen in the Appendix B). The aspects aimed to be clarified via the in-depth interviews are listed as:

Content

- How shall the game system design be planned? How shall the balance between practical and theoretical aspects be provided?
- What will be the order and hierarchy between the educational contents while designing the curriculum?

Interactions

- Shall there be challenge options provided to learners to choose among or shall there be a predetermined curriculum of challenges to follow?
- Which points shall be taken in terms of semantics, styling and so forth as a reference while designing the achievement badges?

- Shall the badges be based on learners' autonomy? Shall the achievement badges be given with respect to learners' task accomplishments related to their own choices or shall they include a predetermined/hierarchical order?
- Shall consistency be rewarded?
- How shall the distribution of points be planned among levels and challenge accomplishments?
- In case of designing a physical product, which 'appropriate technologies' shall be considered?
- Through which means the 'fun' element can be enhanced?
- Shall the overall system be behaviorist-oriented or constructivist-oriented? To what extent shall the learners' autonomy on choices be provided?

Subject

- Is the age group of 15-19 an appropriate choice as a user group?

4.2 Coding Process

During the interviews, an improvised order has been followed according to the flow of the conversation, allowing the question arrangement in Appendix B to be adapted spontaneously. Initial ice-breaking questions were posed for the purpose of getting to know the participants better and to warm up them in order to get in-depth outcomes for the other questions which enabled rich data for the research questions. The in-depth interview outcomes were divided in level 1 and 2 codes that correspond to subcode and category (Saldana, 2015).

Before analyzing the interview transcriptions, six level 2 codes are determined by taking '4 elements of education polarizers' into consideration (see Figure 4.1). Initial level 1 and 2 codes are based on the design insights derived from the literature review. The contents are coded as 'technique' and 'theory'. Rudiment exercises, dynamics, tempo accuracy while performing, capability of playing a along with a

musical piece, coordination and independency of four limbs are involved in ‘technique’. Being knowledgeable about rhythmic structure, musical meter, having a sense of different tempi, time counting, note values, durations and pitches and their order of learning are included in code ‘theory’. Interactions are coded as ‘practice sessions’ and ‘medium’. Since involving consistency is uncertain, gathering instructors’ insights are crucial. Thus, ‘practice sessions’ code is considered that involves the frequency of practicing and a time spared in a single practice session. Since another unclear point is the appropriate technology to be used in design concept, ‘medium’ code is determined which involves ‘practice pad’ which is a common medium used in practice sessions. ‘Maturity’ code is used for to compare the predetermined age group and ideal age range for the user group in instructors’ point of view, which is related to subject element. The last predetermined code, related to society element’, is ‘surroundings’ which is directly related to social interaction aspect that will get involved in design concept.

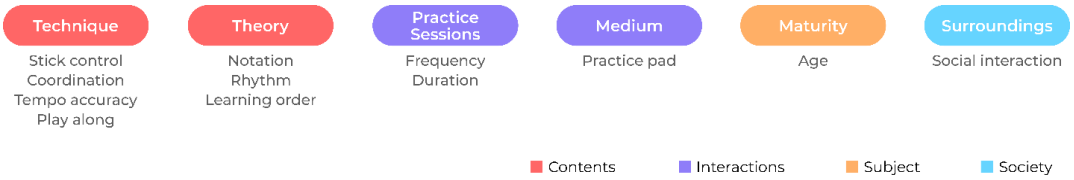


Figure 4.1 Initial level 2 codes determined by the design insights gathered from the literature review

- During the analysis of transcription, related statements are coded to the relevant level 2 code and then collected under those level 2 codes. During the codes’ taxonomy, previously determined codes haven’t been changed except the ‘play along’ code. It’s relocated under the level 2 code ‘joy’ (generated during the interviews’ analysis), since interviewees’ statements regarding with playing along a song is a motivational driver and enjoyable activity for a drum kit student.

- Except the ‘practice sessions’ code, other predetermined level 2 codes’ scopes are expanded with respect to transcriptions’ analysis. The relative difficulty to forget a previously learned fault compared to learning from the beginning is classified under the code ‘technique’. Related subcodes for playing the drum kit accurately with respect to increasing pace of music, accompanying a musical piece correctly, being able to play a repeating musical phrase continuously, the feeling of stamina after a long break of practicing, being able to turn back to main rhythm right after an attack, implementation of exercises on the acoustic setup, gripping the sticks correctly and keeping the body position right while playing are added to ‘technique’.
- The codes related to seeking for an instructorship that shows what to or not to do while learning, having a stronger theoretical basis before starting to play and being knowledgeable about different music styles are the additions to the code ‘theory’.
- Codes for the mediums of practicing ranging from affordable options to technologies are attached under the code ‘medium’.
- Gender as a criteria of learning performance among interviewees’ students is another additional code to ‘maturity’.
- Acquaintances, friends or networks’ effect on participants’ motivation to play the drum kit, family’s contributions and support and being able to access the sufficient physical conditions to practice are the additions to level 2 code ‘surroundings’.

In addition to previously determined codes, six additional level 2 codes are also formed in relation to participants’ responses. Full set of level 1 codes with their corresponding level 2 codes can be seen in Figure 4.2. Subcodes determined before the in-depth interviews are highlighted green in the figure.

- The code ‘appeal’ refers to drummer’s charismatic imagery formed in participants’ minds, considering the drum kit as a contrarian instrument

compared to musical instruments in Classical Western Music, impression of famous musicians or family members that motivate them to start playing the drum kit, being appreciated by others, the look of limbs' dynamism while playing, appearing on the stage, pleasure derived from the rhythm and drum kit's toy-like visual characteristics that draws a child's interest.

- Another level 2 code is 'ambition' that involves the feeling of struggle triggered by arguing with family members, considering the drum kit as a chance for self-actualization, being interested in playing the drum kit starting from very young ages, urge to strive due to perceiving the drum kit as a male-dominant instrument and valuing the practice sessions spent with the drum kit due to limited accessibility of appropriate conditions.
- The level 2 code 'psychological' refers to making alterations on learning program in case feeling stuck on a particular task, being impatient to improve musical skills, being afraid of making mistakes while playing and getting satisfied in a short period of time.
- Familiarity with self-discipline or rhythm due to formerly being involved in sports or another branch of art, being aware of own talent and embracing the drum kit as means of profession constitute the level 2 code 'confidence'.
- Prominently highlighted musical styles are classified under the code 'genre'.
- The subcode related to avoiding technical restrictions in music is added to level 2 code 'joy', besides the subcode 'play along'.

Figure 4.2 Level 1&2 Codes

4.3 Analysis

The questions were divided into categories as follows: 'Motivational drivers', 'practice mediums', 'challenges of learning', 'starting as a fresh learner today', 'differences between personal learning experience and teaching', 'criteria of learning performance', 'cruces of learning', 'challenges of learning and teaching', 'out of condition' and 'cruces of practicing'. Each category includes a single question with coded responses while some of them are also supported with ice-breaking questions. In each category, the codes mentioned at least by three participants are taken into consideration. Besides participants' demographic data, their responses for ice-breaking questions are organized in Table 4.1.

Table 4.1 Demographics and general information of participants

Participants	Age	Gender	Years of experience in tuition (years)	Occupation	Musical Background
P1	39	f	17	Private lessons + Music lectures in primary school	Conservatory (percussion) + Private lessons
P2	44	m	15	Music lectures in primary school	Conservatory (percussion) + Private lessons
P3	27	m	11	Private lessons + Music lectures in primary school	Private lessons
P4	26	m	10	Private lessons + Private music school	Department of Musicology
P5	53	m	4	Private music school	MA in Music + Private lessons
P6	33	m	27	Private lessons + Private music school	Private lessons

Table 4.2 Categories& Questions

Categories	Ice-breaking questions	Coded Questions
Motivational Drivers	When did you start playing drums? (Q2)	What were the driving forces that motivated you to learn? (Q3)
Practice Mediums	Were you practicing with a drum setup all the time? (Q5)	Which methods did you use as an alternative to drum setup? What were the pros and cons of that method? (Q6)
	Did you use mechanical or electronic products in order to support your learning process? (Q10)	
Challenges of Learning	How did you start learning? (Q4)	What were the most challenging aspects for you while learning? (Q7)
Starting as a Fresh Learner Today	Can you briefly summarize the periods of your learning progress? (Q8)	How would you channelize yourself supposing that you will start drumming today as a fresh learner? (Q9)
	How long did you consider yourself novice? (Q8a)	
	How long did it take for you to become competent? (Q8b)	
Differences between personal learning experience and teaching	–	Why do you follow a different method with your student compared to the method you have followed when you were a drumming student? (Q12)
Criteria of Learning Performance	How do you track your students' performances? (Q16)	Are all of your students' learning progress are similar? What's the criteria of diversity? (Q13)
Cruces of Learning	–	What are the aspects that you consider crucial while teaching? (Q14)
Challenges of Learning & Teaching	–	What is the most challenging part for you as a teacher and for your student as a learner? (Q15)
Out of Condition	How often do you practice? (Q17)	In which aspects do you feel out of condition when there's a time gap between your practice sessions? (Q19)
	How many hours do you spare for drumming in a single session? (Q18)	
Cruces of Practicing	Where do you practice? (Q21)	What are the crucial points that a beginner should consider while practicing? (Q24)
	Do you always practice with a drum setup? (Q22)	
	Did you use mechanical or electronic products in order to support your practice sessions? (Q23)	
	How many hours should they spare time while practicing alone? (Q25)	
	Do you recommend any assisting software that can guide them or enhance their practicing experience such as computer software, smartphone application, wearable devices and so forth? (Q26)	

4.4 Categories

4.4.1 Motivational Drivers

The common motivational driver, as a level 1 code, that has been mentioned by all 6 participants was the 'childhood enthusiasm' in relation to the level 2 code: 'ambition'. Even though the 'childhood enthusiasm' was a common driver among all participants due to their age they felt enthusiastic about the drum kit, each participant had additional motivations. Participant 1 expressed her 'childhood enthusiasm' with respect to feminist tendencies, while participant 2 highlighted his childhood enthusiasm as an outcome of the drum kit and drummer's appealing image. Participant 2 exemplified his arguments by also emphasizing the notion of admiration and being appreciated. Similar to participant 3, participant 2 also combined his childhood enthusiasm with 'being admired' by relating the notion with 'the stage'. Since participant 4 used to play several different instruments and participant 6 used to dance during his childhood, their 'childhood enthusiasm' is more related to 'similarity between past practices'. Participant 4 relates his tendency with self-realization. Participant 6's tendency is mostly focused on the 'appeal of rhythm'. The 'childhood enthusiasm' of participant 5 is predominantly linked to 'protest attitude'. Also, the other argument specified by participant 5 in relation to 'protest attitude' is linked to 'rock-oriented' genre.

Table 4.3 Motivatonal drivers - Level 1&2 Codes

Level 2 - code	Level 1 - code	P1	P2	P3	P4	P5	P6
genre	rock-oriented	✓			✓	✓	✓
	pop-oriented				✓	✓	
	latin-oriented						✓
appeal	appearance	✓	✓	✓	✓		✓
	protest attitude	✓				✓	✓
	role model	✓		✓			✓
	being admired	✓	✓	✓			
	aggressive look		✓	✓	✓		
	the stage		✓	✓			✓
	appeal of rhythm			✓	✓	✓	✓
	playfulness		✓	✓	✓	✓	✓
confidence	similarity btw. past practices		✓		✓		✓
	talent			✓	✓	✓	✓
	predestinairinism						✓
surroundings	adequate conditions			✓			✓
	family effect		✓	✓			
	social environment				✓	✓	✓
ambition	family conflict					✓	✓
	professionalism			✓	✓	✓	✓
	self-realization	✓			✓	✓	✓
	childhood enthusiasm	✓	✓	✓	✓	✓	✓
	feminism	✓					
	inadequate conditions				✓	✓	✓

Apart from ‘childhood enthusiasm’, ‘appearance’, as a sub-code of ‘appeal’, was overwhelmingly emphasized by all participants, excluding participant 5. The code ‘appearance’ can be considered as a binary notion. The first aspect was the ‘appearance’ of the instrument which the object is personalized in participants’ minds. The aspects were mentioned in relation to aspects including: ‘self-realization’, ‘aggressive look’, ‘being admired’ and ‘the stage’, which varies among participants. The latter was the ‘appearance’ of the musician which the person is idealized by the participants which was mentioned by participant 1, 2, 4 and 6. The responses were partially linked to the code ‘playfulness’ which was mentioned by all participants excluding participant 1. Participant 2 related ‘playfulness’ with the feeling of game, while the other participants linked the term with self-expression. Another code that has majorly been mentioned by participant 1, 4, 5 and 6 is ‘rock-oriented’. Participants’ responses are linked to their taste of music at the age they started to decide drumming which have been exemplified with the bands and

musicians (see Appendix C). The other outstanding codes, that reinforced the motivation, are as follows: ‘talent’, mentioned by participant 3, 4, 5 and 6, ‘professionalism’, mentioned by participant 3, 4, 5, and 6 and ‘self-realization’, mentioned by participant 1, 4, 5 and 6 and ‘inadequate conditions’ mentioned by participant 4, 5, 6.

4.4.2 Practice Mediums

Mediums alternative to acoustic drum kit, which were preferred by the participants during their learning stage, were discussed. The participants were asked to mention their practicing mediums, they used as a drumming student, as an alternative to acoustic drum kit. Additionally, pros and cons of the related mediums were asked for gathering participants’ in-depth insights of their practice sessions. According to answers, practicing pads had overwhelmingly been preferred as a practice medium by five over six participants. The other medium, which embodied the second major choice, was the pillow that had been preferred by three participants. The other practicing mediums were mentioned for once during the interviews as follows: notebook, mousepad, sofa, air drumming and electronic drum kit.

Since practice pads and pillows respectively comprise the major practicing medium alternatives, the statements and codes related to those mediums are considered for the analysis. Hence, an additional coding process isn’t implemented for the category. The criteria of pros and cons have been classified by taking the aesthetical experience into consideration with respect to proprioceptional and auditorial interactions (see Figure 4.3)

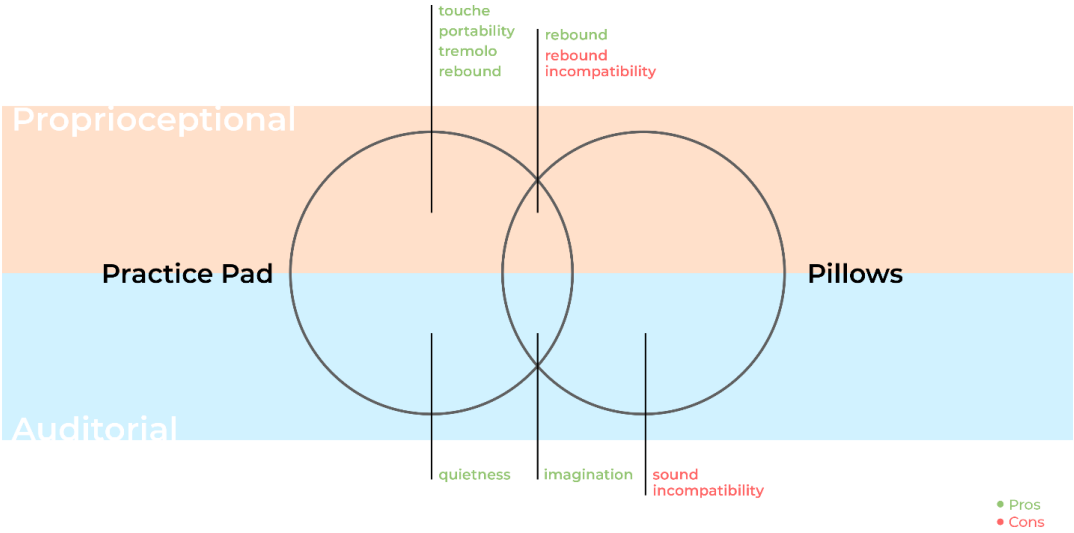


Figure 4.3 Pros and cons of physical practice mediums in relation to aesthetical experiences

‘Rebound’ is the most prominent proprioceptional interaction aspect, apart from ‘touché’ and ‘tremolo’ highlighted by participant 1, not only as a pro but also as a con of practice pads and pillows. The pros of the ‘rebound’ have been emphasized by participant 1, 3 and 5 via emphasizing the wrist improvement since the pads and pillows’ material leads to less bounce compared to acoustic kit. The con of the ‘rebound’ aspect has commonly been emphasized by participant 1, 3, 5 and 6 by referring to its ‘incompatibility’ with the acoustic drum setup. The second prominent proprioceptional aspect is ‘portability’ in terms of practice pads, commonly declared by participant 1, 3 and 6.

‘Quietness’ is the outstanding aspect of auditorial interactions’ pros that have been emphasized by participant 1 and participant 3 with respect to practice pads. Participant 5 and 6, unlike participant 1, and 2 and 3, state the ‘incompatibility’ of the practice pads with the acoustic drum kit in relation to its sound.

4.4.3 Challenges of Learning

The most challenging aspects of their learning stage was asked. The common level 2 code repeated by all participants was the 'technique'. Among the level 1 codes of 'technique', 'tempo accuracy' was overwhelmingly emphasized by all participants, excluding participant 6. Participants highlighted the tempo accuracy related to aspects as follows: practicing in accordance with the metronome, maintaining and gradually increasing a particular tempo.

Table 4.4 Challenges of learning (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
theory	notation		✓				✓
	rhythm		✓		✓		✓
	lacking guidance					✓	
technique	unlearning (previous faults)			✓		✓	
	speed	✓		✓	✓		
	tempo accuracy	✓	✓	✓	✓	✓	
	coordination	✓	✓	✓			✓
	play along accuracy	✓	✓				
	stick control		✓	✓	✓	✓	✓
	groove/ostinato		✓				

The other prominent level 1 code of 'technique' was the 'stick control' mentioned by all participants, excluding participant 1. While Participant 2, 3 and 4 solely stated that they had difficulties with stick control, participant 5 and 6 emphasized their importance by referring to their implementations on the songs. The second outstanding level 1 code of the 'technique' was the 'coordination' stated by participant 1, 2, 3 and 6. Participant 1 and 6 expressed the difficulties they had with coordination by mentioning the imbalance between right and left-hand strokes. Among the 'theory', the most common difficulty for the participant 2, 4 and 6, was the 'rhythm' related to understanding the musical meter and perceiving the rhythmic structure with respect to stressed/unstressed beats

4.4.4 Starting as a Fresh Learner Today

Initial ice-breaker questions are concerning with participants' learning order when they were a drum kit learner, the duration they considered themselves novice and period required to become a competent drummer. Participants' responses to questions can be seen in Appendix C. Since, their responses mainly serve the purpose of game system design, the outcomes of the questions will be discussed in 'Interactions' section.

Table 4.5 Starting as a fresh learner today (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
joy	play along	✓				✓	
	creativity			✓			✓
coordination	ergonomics (grip/posture)	✓			✓		
	implementing on the acoustic drum kit		✓				
	coordination						✓
theory	strengthening theoretical background				✓	✓	✓
	notation				✓		✓
	genres					✓	

The way the participants would guide themselves, supposing that they start drumming as a fresh learner today, was asked. The responses of participants resulted in a balanced distribution in two level 2 codes: 'joy' and 'technique'. Participant 1, 3, 5 and 6 mentioned 'joy' and participant 1, 2, 4 and 6 mentioned 'technique' in their responses. Since most emphasized level 1 codes of the aforementioned level 2 codes were pointed out by two participants, they won't be considered significant in this category. However, most emphasized level 1 code among all level 2 codes was 'strengthening theoretical background', a subcode of 'theory', by participant 4, 5 and 6.

4.4.5 Differences between Personal Learning Experiences and Teaching

During the interview sessions participants stated that they are following a different method with their students compared to the method they followed when they were a learner. The reason of their mindset's alteration was asked to each participant. According to responses, most repeated level 1 code was 'play along', as a subcode of 'joy' emphasized by participant 1, 2, 3 and 6. Participants preferred such variance for the purpose of motivating their students and avoiding boredom due to theoretical overload. The second predominant code was 'theory' as a level 2 code. Making alterations on the 'learning order' they followed as a learner is another level 1 code stated by participant 1 and 2.

Table 4.6 Differences between personal learning experiences and teaching (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
psychological	changing the learning order	✓	✓				
technique	implementing on the acoustic drum kit	✓					
	stick control		✓				
theory	learning order		✓		✓	✓	
	notation				✓		✓
	strengthening theoretical background				✓		
joy	play along	✓	✓	✓			✓
	creativity			✓	✓		

4.4.6 Criteria of Learning Performance

Participants stated that their students' learning progress are different from each other. Then, they were asked to make a generalization to specify a criterion of diversity. Among the level 1 codes 'age' is the most prominent aspect, as a subcode of 'maturity', pointed out by participant 1, 2, 5 and 6.

Table 4.7 Criteria of learning performance (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
maturity	age	✓	✓			✓	✓
	gender					✓	
ambition	childhood enthusiasm	✓	✓				
	self-realization		✓		✓		
	professionalism		✓				
confidence	talent		✓	✓			✓
appeal	the stage	✓					

Participant 1 and 6 point out that their adult students are capable of progressing faster compared to their younger students. However, both participants also point out that middle school children have higher enthusiasm than adults have. While adult student was considered as an extremity among the learners' profile, very young students were also regarded in the same way participant 5 and 6 due to undeveloped motor skills (for direct quotations, see Appendix C). Inherited musical tendency, apart from practicing, that involves having an internalized sense of rhythmic structure and adapting coordination skills rapidly and so forth is mentioned by participant 2, 3 and 6.

4.4.7 Cruces of Learning

Participants were asked to mention the aspects they consider crucial while teaching. All participants commonly mentioned 'tempo accuracy', as a subcode of technique. The common emphasis was on the metronome. To illustrate, participant 2 stated that the metronome should get involved in practices while participant 1 approached metronome more flexible when considering very young kids. The second prominent level 1 code was 'coordination', as a subcode of 'technique' mentioned by all participants excluding participant 3. Participants referred to importance of balance between hands and feet while implementing the practices on the drum kit. The other second prominent level 1 code was 'notation', as a subcode of 'theory' mentioned by all participants excluding participant 3. Participants commonly pointed out that

‘notation’ is a must for musical learning and should be adopted as early as possible in the beginning.

Table 4.8 Cruces of learning (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
theory	notation	✓	✓		✓	✓	✓
	rhythm	✓			✓	✓	
	genres					✓	
	learning order			✓	✓	✓	
	strengthening theoretical background				✓	✓	
technique	ergonomics (grip/posture)	✓	✓			✓	✓
	tempo accuracy	✓	✓	✓	✓	✓	✓
	coordination	✓	✓		✓	✓	✓
	implementing on the acoustic drum kit		✓			✓	✓
	attack/continuity				✓	✓	
	stick control		✓	✓	✓	✓	
	grove/ostinato				✓		
	speed	✓				✓	
joy	play along	✓				✓	
	creativity				✓		

Similar to ‘notation’, ‘stick control’ was also regarded as a crucial and fundamental aspect of learning by participant 2, 3, 4 and 5 as the third prominent level 1 code. The other third prominent level 1 code was ‘ergonomics’ as a subcode of ‘technique’. ‘ergonomics’ was highlighted by participant 1, 2, 5 and 6 and considered as a basic aspect that should be adopted in the beginning of learning. The other prominent codes mentioned by half of the participants are ’learning order’ as following a well-structured program, ‘rhythm’ as a theoretical aspect to be embraced and ‘implementation on the acoustic drum kit’ that targets application of individual exercises on the kit.

4.4.8 Challenges of Learning & Teaching

Table 4.9 Challenges of learning & teaching (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
theory	notation	✓	✓	✓	✓	✓	✓
	rhythm			✓	✓		✓
technique	coordination	✓	✓				
	ergonomics (grip/posture)	✓					
	implementing on the acoustic drum kit		✓	✓			
	tempo accuracy			✓		✓	✓
	attack/continuity				✓		
	stick control					✓	✓
	groove/ostinato				✓		✓
psychological	impatience	✓				✓	✓
	fear of making mistake				✓		✓

For gathering in-depth insights of participants' teaching experiences, the most challenging part for them to teach, in addition to most difficult part for their students to learn were asked. All participants commonly mentioned 'notation' as a subcode of 'theory', as a task they compelled while teaching and their students experienced difficulties while learning it. It was pointed out that due to mathematical aspect of note values, very young students hesitate at first glance. In order to overcome it, specifically participant 1 replaces the notes with numbers in the beginning (for direct quotation, see Appendix C). The second predominant code was 'rhythm' as a level 1 code mentioned by half of the participants, similar to 'tempo accuracy' and 'impatience' related to expecting rapid outcomes and boredom.

4.4.9 Out of Condition

The problems participants encounter when there's a time gap between their practice sessions was asked. According to responses the most prominent level 1 code was 'fatigue', as a subcode of 'technique', stated by participant 1, 2, 3 and 5. The fatigue

was exemplified by getting tired quickly, losing the capability of precise touché, loss of muscle memory and decrease in speed.

Table 4.10 Out of condition (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
technique	speed	✓		✓			
	fatigue	✓	✓	✓		✓	
	stick control			✓			
	coordination				✓		✓

4.4.10 Cruces of Practicing

Crucial aspects of practicing in terms of participants' responses will be discussed in this section. Before asking the participants' opinions about the important points to be considered for practicing, ice-breaking questions were pointed in order to learn about their current personal practicing habits and beginner advices. Ice-breaking questions involve the physical and digital tools that they use for practicing and advises for beginner learners regarding with practice duration and supporting practice tools. Findings of practice tools they use are provided in Table 4.11.

Table 4.11 Assisting tools participants use for practicing

Participants	Practice pad	Electronic drum kit	Acoustic drum kit	Metronome	Tuner	Recording	Speed Changer	Groove/Partition Generator
P1	✓			✓	✓			
P2	✓			✓	✓		✓	✓
P3		✓		✓		✓		
P4		✓	✓	✓				
P5		✓	✓	✓			✓	
P6		✓	✓	✓		✓		

For the ideal period of time that a beginner should spare for drumming practices, all participants' responses include periods ranging from 15 minutes to an hour, excluding participant 6 that suggests minimum 4 hours. Apart from that, participant 2 and 3 also pointed out the importance of practicing daily (for direct quotations, see Appendix C). The most common practice tool recommended for beginners is the practice pad mentioned by participant 1 and 2. Participant 5 mentioned websites

where learners can access play along versions of songs and speed changer software. Participant 4 and 6 suggested groove/partition generators.

Table 4.12 Cruces of practicing (level 1&2 codes)

Level 2 - Code	Level 1 - Code	P1	P2	P3	P4	P5	P6
theory	genres	✓		✓		✓	
	learning order		✓				
	rhythm		✓			✓	
technique	stick control	✓	✓		✓	✓	
	speed	✓			✓	✓	
	implementing on the acoustic drum kit		✓				
	tempo accuracy		✓		✓	✓	
	ergonomics (grip/posture)		✓		✓		
medium	practice pad		✓		✓		
	pillow		✓				
	roll-up drum				✓		
	heavy sticks				✓		
	internet					✓	
	recording			✓			
practice sessions	frequency			✓		✓	
	duration			✓		✓	
ambition	inadequate conditions		✓				
joy	play along	✓					
surroundings	social interactions		✓				

The most prominent aspect that the participants regard as crucial point, that a beginner should consider while practicing, was ‘stick control’ as a subcode of ‘technique’ stated by participant 1, 2, 4 and 5. Participant 1 and 2 pointed out that it should be done as a leisure time activity every day at home. Participant 4 made an addition to ‘stick control’ by stating that increasing the speed and dynamic exercises should be included in the practices. Participant 5 also stated that stick control exercises should be done in different tempi. The second predominant codes were ‘theory’ and ‘medium’ as a level 2 codes. Since most emphasized level 1 code of the of the aforementioned codes was pointed out by three participants, they won’t be considered significant in this category. Besides stick control, half of the participants consider being familiar with different musical styles, studying with changing paces in a musical piece and tempo accuracy important.

4.5 Interim Conclusions from In-depth Interviews

Formation of design concept is driven by the codes mentioned at least by three participants with respect to each category (See Figure 4.4). Since a subcode is mentioned in various categories with different context, a hierarchical order of quantity isn't considered. All in all, each code has an equivalent weight.

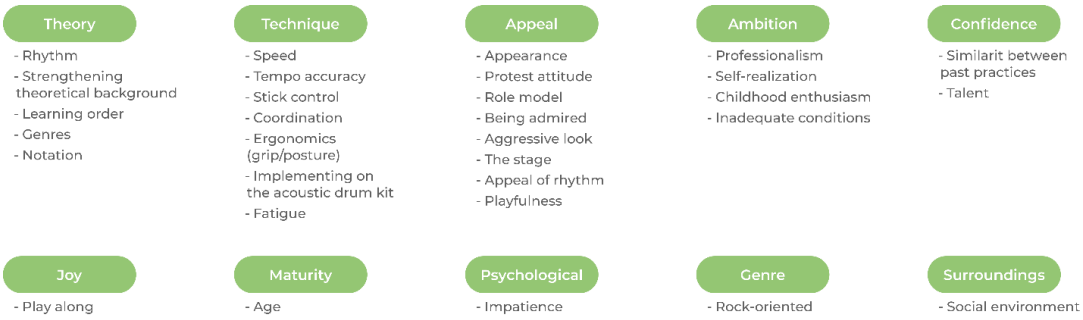


Figure 4.4 Codes to be considered in design specifications

Similar to design insights derived from the literature review, a taxonomy of design specifications by referring to '4 elements of education polarizers' are considered. Even though, there are significant findings for the elements, an additional analyse for 'society' won't be involved in design specifications. It's because the purpose of 'Criteria of Learning Performance' category is related to testifying the predetermined user group's age range and as a result, the outcome justifies the user group's profile is appropriate due to their tender age and tendency on adopting the technology. Also, there are not additional significant findings for the leaderboard feature, related to 'social interaction' code. Hence, the 'society' polarizers won't be discussed further as well.

4.5.1 Design Specifications

During the interview sessions, the need of new design solutions for encouraging novice players to practice drumming was partially implied by participant 1:

'A product that can directly fastened to calf, only a rubber thing, a connection. However, the part that the stick will directly come- people wear armlets you know. Like an arm-band, but think that it's on the leg but the part where the sticks strike is more thick-walled rubber. I totally designed a thing. It would be great. Why haven't anybody done such thing up till now? I have never seen it, there isn't any example of it I suppose'

In addition to hardware-oriented solutions, further elaborations were exemplified by taking smart technology into consideration. In order to enhance her students' practice sessions, a statement of wishful thinking was uttered:

'A crazy idea just came to my mind. You know there are songs that kids like, for instance, Bruno Mars, or a song of Beyonce. S/he wants to play it, I wish there was such a fully electronical program that, the drum track is muted when the kid hits the drum, but normally it should be heard. The track should be muted when s/he strikes'

Also, the importance of feedback, as an example of gamified learning system element, is highlighted by participant 3. Game-based learning instances implemented during their lessons are stated by participant 2. Another example is illustrated by participant 4 by referring to reward system (For related quotations, see Appendix C). The most outstanding example of leaderboard's implementation in lectures takes place in studio is stated by participant 2:

'I have a place like a mirror or a board. For instance, who's the best, to illustrate the best is B., he increased single stroke to 200 bpm, double stroke to 180 bpm and paradiddle is around at 150 bpm. For example, F. is the second. He managed to do single stroke at 190 bpm. He made the double stroke less than B. did. There's a kind

of visualized list there. Therefore, this encourages the kids to practice with metronome'

Therefore, it's possible to infer that participants have a tendency to implement gamification in their teaching context depending on the learner's profile, even if they cannot be considered as 'digital natives' due to their ages.

4.5.1.1 Contents

Similar to design insights derived from the literature survey, there are two main codes embody the spine of the contents listed as theoretical (related code: theory) and practical (related code: technique). Besides the category-based analysis, the overall repetition of codes in whole statements highlighted on transcriptions is also considered while deciding on the contents. The hierarchy of repeated codes shows a correlation between category-based analysis (see Figure 4.5).

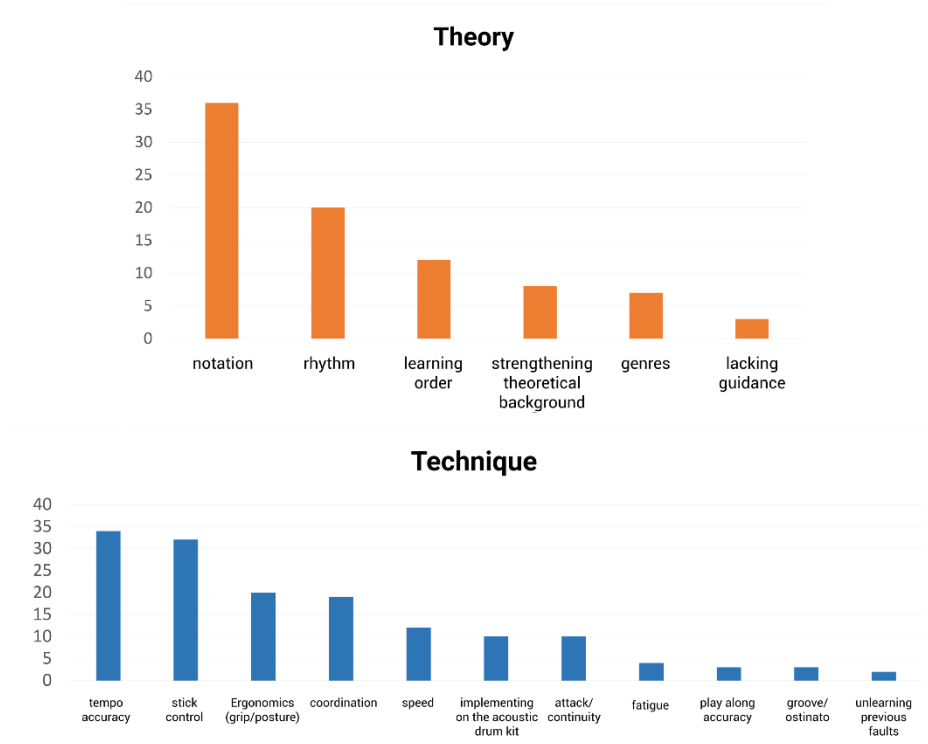


Figure 4.5 Subcodes' repetition of 'theory' and 'technique'

- The subcodes considered for the contents are ‘rhythm’ and ‘notation’ with respect to ‘theory’. For the ‘technique’, the subcodes ‘tempo accuracy’, ‘stick control’, ‘coordination’ and ‘implementing on the acoustic drum kit’. As a subcode of ‘joy’, ‘play along’ will be also considered for the contents.
- Also, familiarity with different musical styles is also highlighted by participants, the subcode ‘genres’ will be included in design specifications.
- Even though, challenges are linked to interactions as an outcome of the literature survey (since it can be an area for learners to apply their autonomy), after the in-depth interview analyses it’s relocated as intermediary tasks to implement theoretical and technical contents.
- Challenges will involve dynamics exercises, playing with respect to increasing paces and making improvisations on predetermined empty measures. The last challenge’s code is related to ‘creativity’. Even though it’s not considered in Figure 4.4 above, instructors’ recommendations for learners to avoid restricting themselves with technical limitations and enjoy the musical activity itself formed the related feature for ‘challenge’.

4.5.1.2 Interactions

Levels

Levels are the other crucial elements that embody the gamified system design. The order between levels and gradual increase of difficulty shall be arranged well in order to build motivation, make the learner understand difficult concepts and increase the learner’s engagement (Espinosa, 2020). The driver subcode related to levels is ‘learning order’.

In order to determine the levels, a curriculum that targets a period corresponding to ‘novice’ period was necessary. Thus, the duration which participants regard

themselves as ‘novice’ and the period required to become a competent musician was asked to participants (see Table 4.13). Since, all of the participants didn’t respond with concrete answers, an outcome couldn’t be derived.

Table 4.13 Participants' duration considered themselves as 'novice' and thier thoughts on period to become competent

Participants	Duration of their 'novice' period	Period required to become a competent drummer
P1	3 years	6 years
P2	2 years	8 years
P3		5 years
P4	2 years	
P5		
P6	1 year	

Also, their former learning order was asked to determine a hierarchy and priority between the contents of levels. As a result, participants grouped their learning order as learning the notation, doing stick control exercises and playing along with songs. The results show that each participants’ point of view and past learning experiences vary from each other. Hence, it’s not possible to determine a certain order of level with respect to mentioned outcomes.

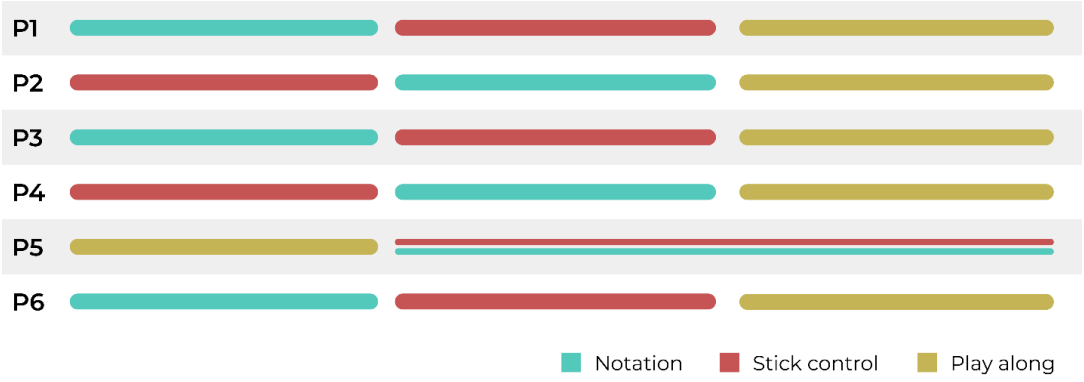


Figure 4.6 Participants' former learning orders

However, participant 6 emphasized a drum kit method called ‘D-52’ written by Gerçek Dorman and he stated that he recommends the book to all of his students (see Appendix C). The required duration of being novice is regarded as a year and the curriculum is planned to be last for 52 weeks. Hence, for the level design ‘D52’

method will be considered. The level design will be explained in detail in ‘Design & Evaluation Chapter’.

Consistency

Doing stick control and coordination exercises is strongly recommended by participants. Also, doing these practices every day is highlighted (see Appendix C). Another point that indicates the importance of consistency is the emphasis on fatigue, felt at most when there’s a time gap between their practice sessions. The related codes are ‘frequency’ and ‘fatigue’. Thus, the learner’s daily engagement will be rewarded by means of points and badges in designs.

Appropriate Technology

Practice tools are the main aspects that form the design decisions on appropriate technologies. The most outstanding tools used for practicing is the practice pad and smartphone applications. Hence, ‘technology’ will be considered as physical and digital products for enhanced user interaction. Combining digital aspects (UI) with physical product will be elaborated in ‘Design & Evaluation Chapter’. Besides the tools, the emphasis on individual exercises also affects the decision on physical product design.

- Codes including ‘speed’, ‘tempo accuracy’ and ‘stick control’ directly support the use of practice pad. Also, practice pad is useful when users cannot interact with the drum kit. In other words, practice pad can be regarded as an assistant product in cases of limited conditions. In-depth interview analyses shows that limited circumstances can play a crucial role for motivating the learner, since the time spent with the drum kit becomes more valuable in learners’ perspective. Therefore, ‘inadequate conditions’ is another subcode that corresponds to use of practice pad as a technology.

- Another highlighted individual exercise is practicing on the independency of four limbs while performing. Also, applying the stick control exercises on the whole kit is another highlighted point. All in all, the codes ‘coordination’ and ‘implementing on the acoustic drum kit’ has a significant role in that scope. Therefore, an accompanying product that can be used while performing with the acoustic or electronic drum kit is considered. A music stand is another physical product to be considered, since it’s essential while practicing with the drum kit.

Figure 4.7 Music stands examples (Mitzner, 2021)

- Since the tools including metronome, tuner, recording, speed changer and groove/partition generators can be embodied in smartphones, a smartphone application will be considered as a sole digital product.

Points/Badges

The major extrinsic motivators are points and badges. The main considerations are the distribution of points with respect to learners’ performance on related tasks and the degree of autonomy implemented on badges. Another essential point is determining the visual aspects of the badges.

- The point system will be related to performance on levels, challenges and consistency based on the codes ‘stick control’, ‘tempo accuracy’, ‘speed’, ‘implementation on the acoustic drum kit’, ‘coordination’ and ‘frequency’.
- The level 2 code ‘appeal’ is a major driver while determining the semantics of the badges.
- Participants mentioned that they get influenced by musicians in rock bands while starting the instrument. Also, the rebellious manner, adopting the drum kit as a means of job and being appreciated by audiences played a crucial role for them. Therefore, the codes ‘protest attitude’, ‘professionalism’, ‘the stage’ and ‘rock-oriented’ are the most prominent drivers in badge design.
- Since ‘childhood enthusiasm’ is an outstanding subcode, the styling can be implemented via childish and cartoon-like images to evoke the feeling embraced by participants’ in their past time.

Progression Display/Feedback

A graphic or an image depicting the overall progress of the learner shall be considered in design phase. Showing learners’ conditions with uncompleted levels make the learners to infer that the musical learning is a long-lasting journey. Thus, it can overcome the problems, that participants experience with their students, including getting bored rapidly and feeling satisfied in a short period of time (related subcode: impatience).

Avatar

Avatar will be considered as a sole area of learners’ autonomy. Building up a personalized character getting it involved in the gamified learning experience can contribute as an extrinsic motivator. Similar to badge designs, avatars’ design specifications are shaped by the codes ‘childhood enthusiasm’, ‘protest attitude’,

‘professionalism’, ‘the stage’ and ‘rock-oriented’. Also, the case of learners’ depictions of themselves as avatars can simulate the code ‘self-realization’.

Fun

The fun element isn’t considered in design insights derived from the literature review. However, the richness in codes derived from the in-depth interviews enable implementing an enhanced fun element. The fun element can be transmitted by means of animations depicted on the UI. In that scope, the codes serve to the purpose of styling of badges and avatars can be the supporting elements.

4.5.2 Formation of Design Proposals

In terms of the contents and technologies, there are plenty of elements to be considered. For the contents, it’s possible to generate two distinct focal points listed as stick exercises and coordination practices. Also, two diverse physical product concepts, including the practice pad and music stand, shall be considered to mediate the purposes of contents.

Besides the wide range of processed data to be embodied as a design concept, there are points couldn’t be clarified by means of interview outcomes. Participants’ responses didn’t give a concrete answer to define leaners’ degree of autonomy while using the products. Thus, the question related to locating gamified system’s approach between a behaviourist and constructivist method couldn’t be answered. As a result, two design concepts are generated with respect to clarify aforementioned uncertainties.

4.5.2.1 Design Concept 1

- The first concept will be based on stick exercises mediated by a practice pad design and limited by lower degree of autonomy.
- Gamified system will be behaviourist-oriented. In other words, the product will act like an instructor.
- Challenges will consist of doing stick control exercises by increasing paces of music and implementing changing dynamics.
- Consistency will be rewarded with badges. Hence, predetermined badge designs will have a hierarchical order and it won't be based on learners' autonomy
- Points will be based on performance on stick control exercises with respect to tempo accuracy and success in challenges.
- Physical product will be a practice pad with an embedded screen.
- Mobile application will include features as leader board and progression display.

Table 4.14 Design Specifications linked to related codes for Concept 1

Practical	Stick control	Stick control / Speed
	Tempo accuracy	Tempo accuracy
Player Actions /Areas of Autonomy	Levels	Learning order
	Challenges (inreasing paces, dynamics)	Speed / Tempo accuracy
	Consistency	Frequency / Fatigue
Technology	Practice pad with embedded UI	Practice pad / Inadequate conditions
	Mobile app	Internet / Social Interaction
Extrinsic Motivators	Points	Stick control / Tempo accuracy / Speed / Frequency
	Badges	Protest attitude / Professionalism / The stage / Childhood enthusiasm / Rock - oriented
	Progression display/feedback	Impatience
Subject	Learners between the ages of 15-19	Age
Society	Leaderboard	Social interaction

4.5.2.2 Design Concept 2

- The second concept will be based on coordination practices and playing along with songs in a range of repertoire mediated by a music stand design, supported by higher degree of autonomy.
- Gamified system will be constructivist-oriented. In other words, product will act like a facilitator.
- Challenges will consist of improvisations applied on empty measures of play along songs.
- Learners will be able to make a choice among the repertoire for play along exercises and as a result of their success they will receive a badge of the song's drummer. Hence, exercise choice and badge rewarding will be based on learners' autonomy.
- Points will be based on success in coordination exercises, consistency, accuracy on play along songs and challenges.
- Physical product will be a music stand with a monitor.
- Mobile application will include features as leaderboard, progression, display and personalized avatar design page.
- Additionally, the element of fun will be enhanced by means of avatar animations depicted on a stage with audiences.

Table 4.15 Design Specifications linked to related codes for Concept 2

Practical	Tempo accuracy	Tempo accuracy
	Coordination	Coordination / Implementing on the acoustic drum kit
	Play along	Play along / Implementing on the acoustic drum kit / Genres / Coordination
Theoretical	Rhythm	Rhythm / Strengthening theoretical background / Appeal of rhythm
	Notation	Notation / Strengthening theoretical background
Player Actions	Levels	Learning order
	Consistency	Frequency / Fatigue
Areas of Autonomy	Play along	Play along / Implementing on the acoustic drum kit / Genres / Coordination
	Avatar	Protest attitude / Professionalism / The stage / Childhood enthusiasm / Rock - oriented / Self-realization
	Challenges (Improvisation)	Creativity / Coordination / Implementing on the acoustic drum kit
Technology	Music stand with embedded UI	Implementing on the acoustic drum kit
	Mobile app	Internet / Social Interaction
Extrinsic Motivators	Points	Tempo accuracy / Coordination / Play along / Creativity
	Badges	Play along / Protest attitude / Professionalism / The stage / Childhood enthusiasm / Rock - oriented / Self-realization
	Progression display/feedback	Impatience
Subject	Learners between the ages of 15-19	Age
Society	Leaderboard	Social Interaction
Element of Fun	Animations	Protest attitude / Professionalism / The stage / Childhood enthusiasm / Rock - oriented / Self-realization

CHAPTER 5

DRUM PRACTICE TOOL-CONCEPT DESIGN & EVALUATION

5.1 Introduction

As a result of the in-depth interview outcomes, two design proposals are formed in accordance with the level 1 and 2 codes. The section involves the design concepts and the evaluation conducted with a focus group constituted by four drum kit instructors. Design concepts will be elaborated by features, physical product aspects and graphical user interfaces. Evaluation will include the possible suggestions of design improvements claimed by focus group participants.

5.2 Preparation of Design Concepts

Each design concept consists of a physical product with a graphical user interface and a mobile application. Products were visualized digitally and presented to participants during to focus group by screen sharing. The physical products were designed by using Rhinoceros, a 3D Modelling software (see Figure 5.1).

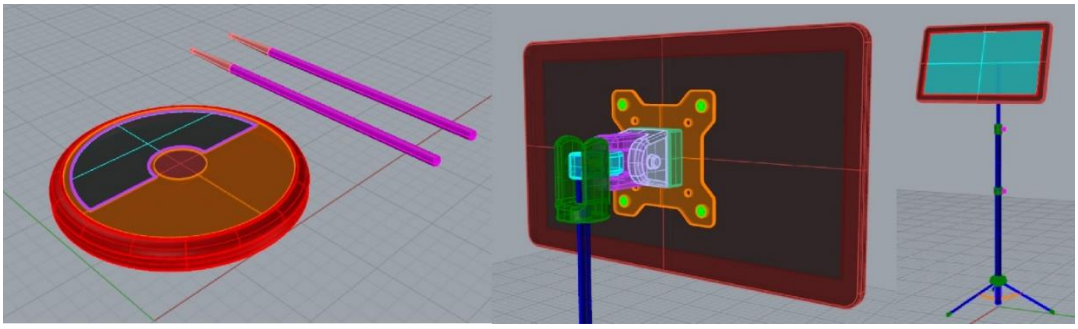


Figure 5.1 Screenshots of physical products' 3D modelling

Graphical user interfaces integrated with hardware components and mobile applications' user interfaces were designed on Adobe Illustrator (see Figure 5.2).

Figure 5.2 Screenshots of UI design process

Achievement badges and avatar visuals are illustrated by Procreate, a digital drawing software.

Figure 5.3 Screenshots of badge design process

5.3 Design Concepts

Two design proposals' will be introduced in terms of their physical and digital product aspects. Onboarding process, initialization of a session and mobile application features will be explained.

5.3.1 Design Concept 1

As a product that targets stick control practices, the hardware component is designed in the form of a practice pad as it can be seen in Figure 5.4. Likewise, most of the practice pads in the market, the material of the pad is made of rubber due to enable sticks' rebound. The embedded practice pad UI is displayed beneath a glass screen. The middle region of the pad, which user directly interact with, covers an embedded weight sensor. The weight sensor perceives the strikes and the strength or weakness of the beats, in other words, the dynamics. The shaft and butt of the sticks are made of polyurethane, a widespread composite material used in drumsticks. The tip and shoulder parts are coated with silicone rubber. Since an accidental strike on the glass may result in screen's fracture, the sticks are covered with a coated elastomer.

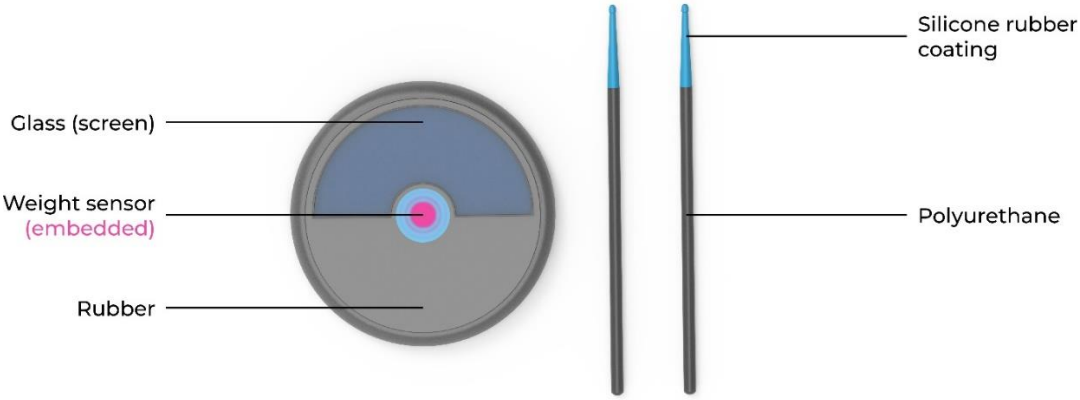


Figure 5.4 Material aspects of Concept 1

5.3.1.1 Onboarding

Initial interaction with the products starts by downloading the mobile application. After turning the app on, user signs up by typing his/her user's name and e-mail address. Then, for the confirmation stage s/he types the verification code sent to e-mail address. After signing up, the user is reminded to turn the Bluetooth on for pairing the application with the product.

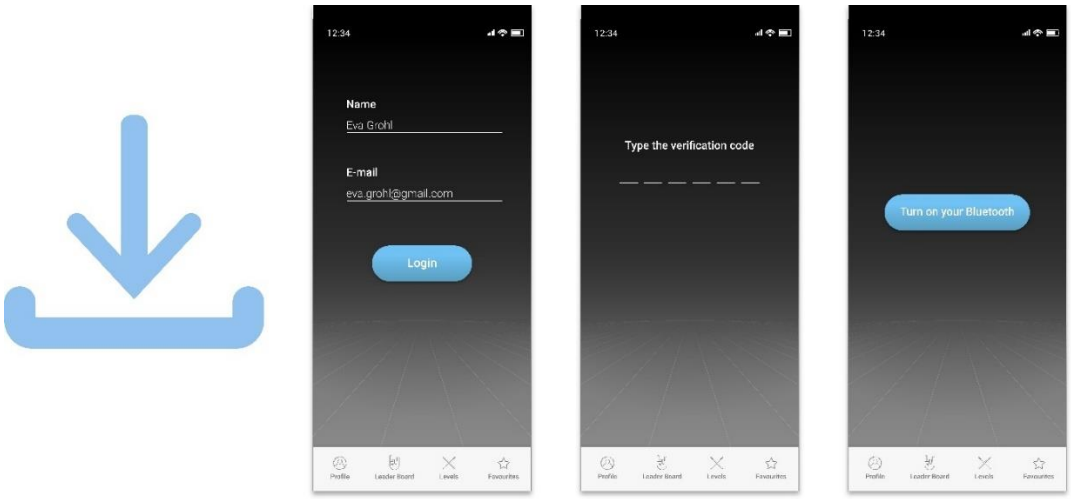


Figure 5.5 Onboarding of Concept 1

The user scans the product by overlapping the snare drum icon with the blue circle on the product's surface. After the product is paired with the app, user sees the home page. User can start the session by tapping the button on the mobile app (see Figure 5.6).

Figure 5.6 Pairing of Concept 1

After initializing the session by means of the mobile application, a UI is displayed on pad's screen. Hence, another interaction is required on the product to start the session (see Figure 5.7).

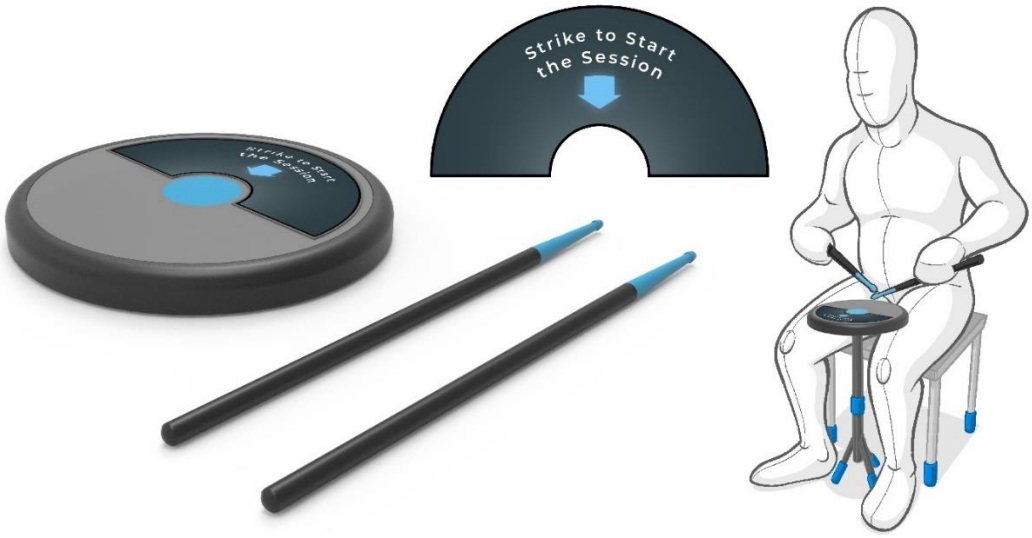


Figure 5.7 Starting the session of Concept 1

5.3.1.2 Levels

After striking on the blue circle, the session begins. Sessions consist of levels and challenges. Levels are based on visualization of fundamental stick control exercises; visualization of the rudiment examples can be seen in Figure 5.8.

Figure 5.8 Rudiment examples of Concept 1

Each strike is depicted with coloured circles motioning from edge towards the middle (see Figure 5.9). The beats pointed on the right indicates that that strikes shall be

made with right hand. The progression of time is displayed by a semi-circular bar. Also, the tempo is displayed as a semi-circular bar as well, placed close on the product's center.

Figure 5.9 Concept 1 session UI elements

The level design consists of rudiment studies and challenges. While determining the level's structure Gerçek Dorman's D-52 method was considered in terms of tempi and session durations. The curriculum and learning structure of the method can be seen in Appendix D. The regular exercises are based on striking on the blue circle with respect to tempo and right/left hand distinction while the challenges include two phases listed as playing with respect to increasing pace of music and dynamics (see Figure 5.11). Even though increasing level of difficulty is crucial in level design, D-52 method makes the student to replay the previous exercises including in further levels. Thus, such approach is also considered in level design. Two exemplary level designs can be seen in Figure 5.10. Also, recall of the previous exercises' adaptation of increasing level difficulty is illustrated in the same figure.

Figure 5.10 Recalling previous exercises by combining increasing difficulty

A regular exercise is followed by a challenge. Challenge is maintained until a mistake including rushing or dragging is detected. In case of a performance being sustained on time, the challenge lasts for a minute. Each level consists of regular and fixed exercises interrupted with challenges. Accomplishing the level is basically based on 60% performing on time regardless of performance showed in challenges. The point system will be elaborated in mobile application features.

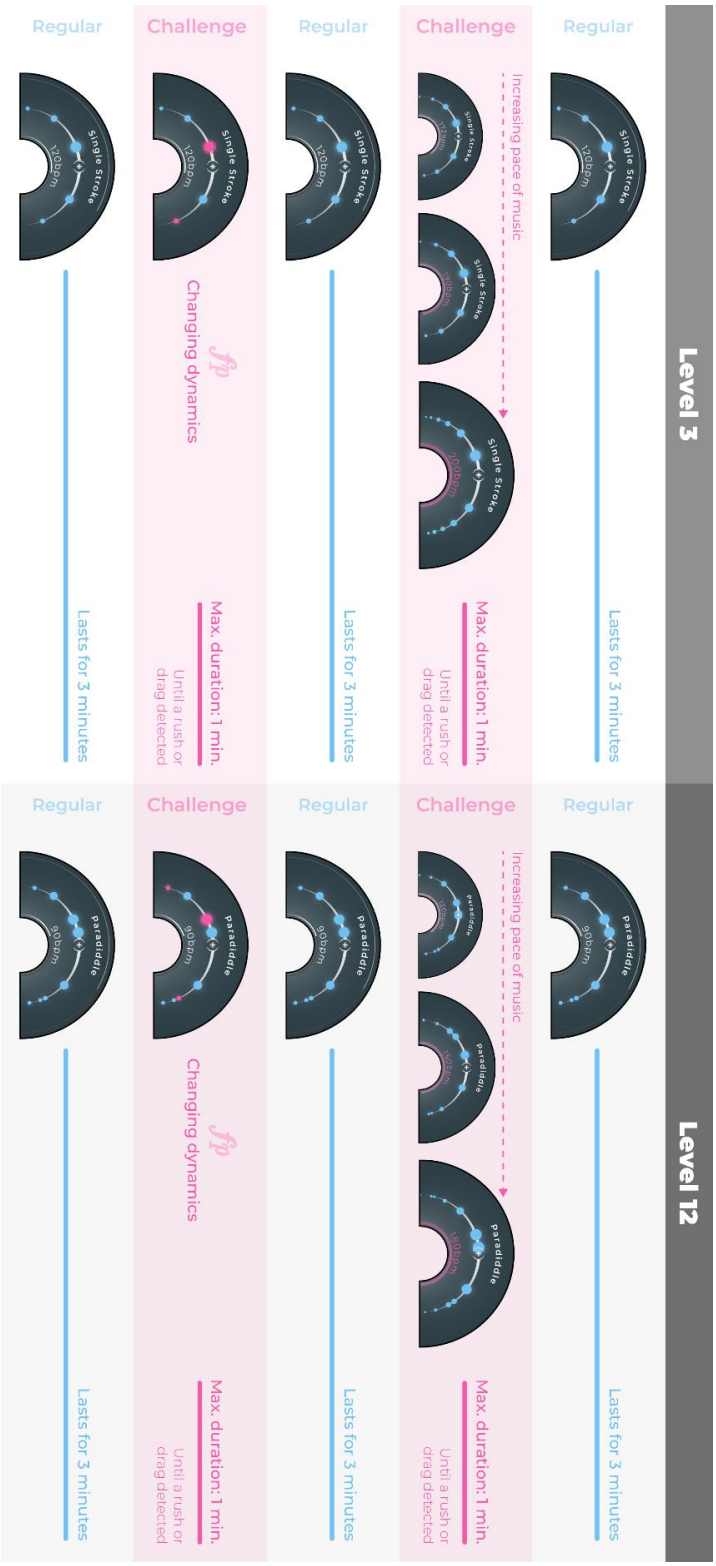


Figure 5.11 Two level design examples

If the user wants to end the session, s/he can tap on ‘Stop the Session’ button displayed on the mobile application UI, as it can be seen in Figure 5.12. If the user stops the session, his or her unfinished performance will not be evaluated. Also, the loose end session will not be involved in the duration calculated for consistency of product usage.

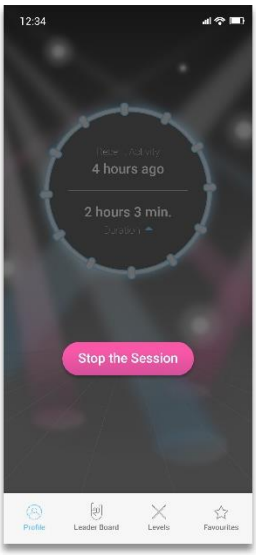


Figure 5.12 'Stop the Session' UI

5.3.1.3 Feedback & Reward

After accomplishing the level, a feedback screen is displayed that informs the user about the amount played slow, on time and fast. User also gets notified when s/he receives the sufficient point to unlock a new level by means of the mobile application (see Figure 5.13). In addition to feedback, achievement badges rewarded with respect to learner’s consistency is displayed both on pad and mobile application’s UI.

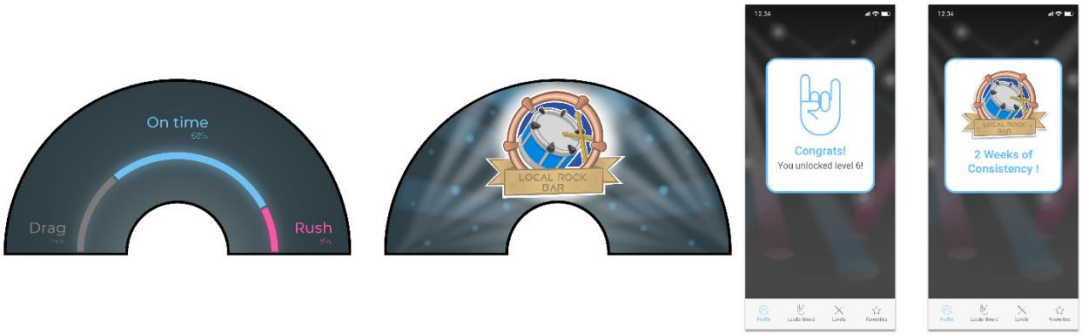


Figure 5.13 Feedback and achievement badge winning UIs

Achievement badges of the first concept is based on the frequency of product usage. A session consisting of a completed level, without taking its degree of success into account, is involved in period of consistency. As it can be seen in Figure 5.14, achievement badges have a hierarchical order with respect to gradual increase of consistency period. The highest achievement badge is rewarded after a year of consistency in reference to D-52 method involving a curriculum lasting four fifty-two weeks. Badge frames take the snare drum's rim as a form reference. The progressive order of badges is based on storifying a popular rockstar's musical journey shaped by the codes 'protest attitude', 'professionalism', 'the stage' and 'rock-oriented'. Additionally, cartoon-like stylization of the badges is an outcome of the code 'childhood enthusiasm'.

Figure 5.14 Achievement badges of Concept 1

Abusing the consistency is prevented by automatic shutdown of the practice pad, in case lacking a product interaction, as it can be seen in Figure 5.15. Since the user may try to keep the product turned on to place the duration on record, a precaution is taken to avoid a misappropriation.

Figure 5.15 Automatic shutdown UI of Concept 1

5.3.1.4 Mobile Application Features

The section includes the mobile application features including the home page, leader board, levels' archive and favourites widgets. Home page displays the recent activity's history and duration by comparing it to its previous session. Besides the achievement badges, the home page gives visual feedback of user's consistency as well. As it can be seen in Figure 5.16, the stage lights' brightness is related to recent usage of the product. As the time gap between the last use increases, duller gets the stage lights.

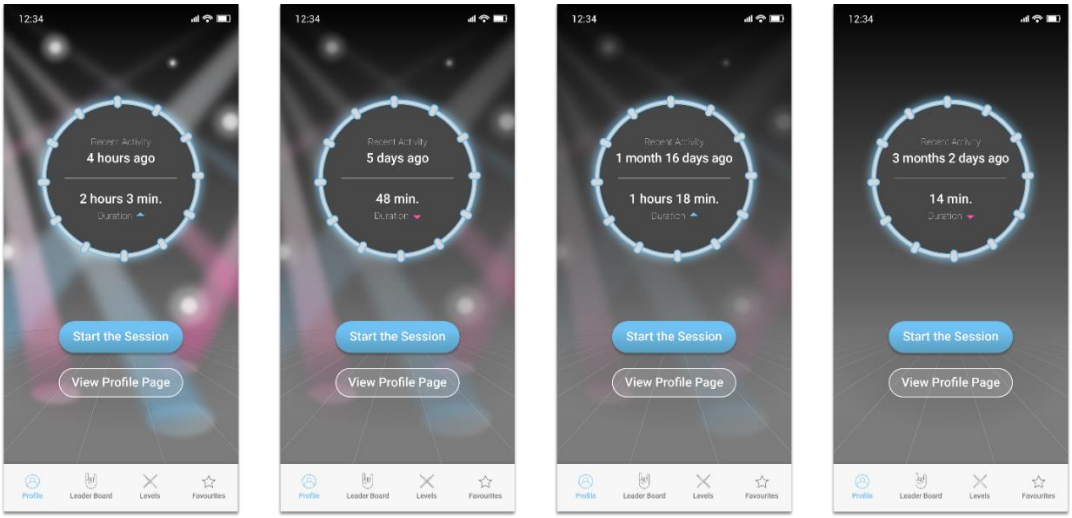


Figure 5.16 Mobile application home page of Concept 1

When the user taps on 'View Profile Page' button s/he can view his or her activity history in terms of date, rate of accuracy and duration (see Figure 5.17). Also, profile page displays the badges user has earned also by showing unlocked ones.

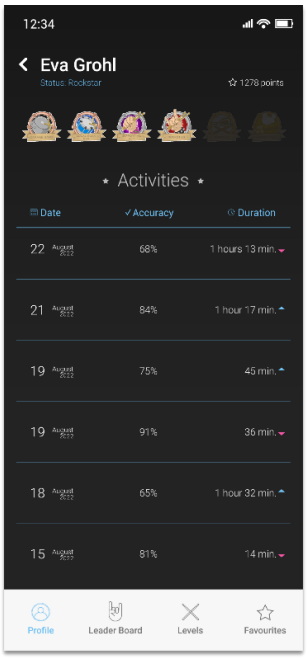


Figure 5.17 Profile page of Concept 1

Levels tab involves an archive of completed levels and display of unlocked levels. User can access the level records including the regular level task performance and challenge performance. User can replay the level as an exercise, but his/her performance is not evaluated. User point is recorded when s/he passes the level. Playing the same level for the second time is considered as a personal exercise. Also, user can access the level transcript that includes the trials made until unlocking a new level by displaying the regular level and challenge success (see Figure 5.18)

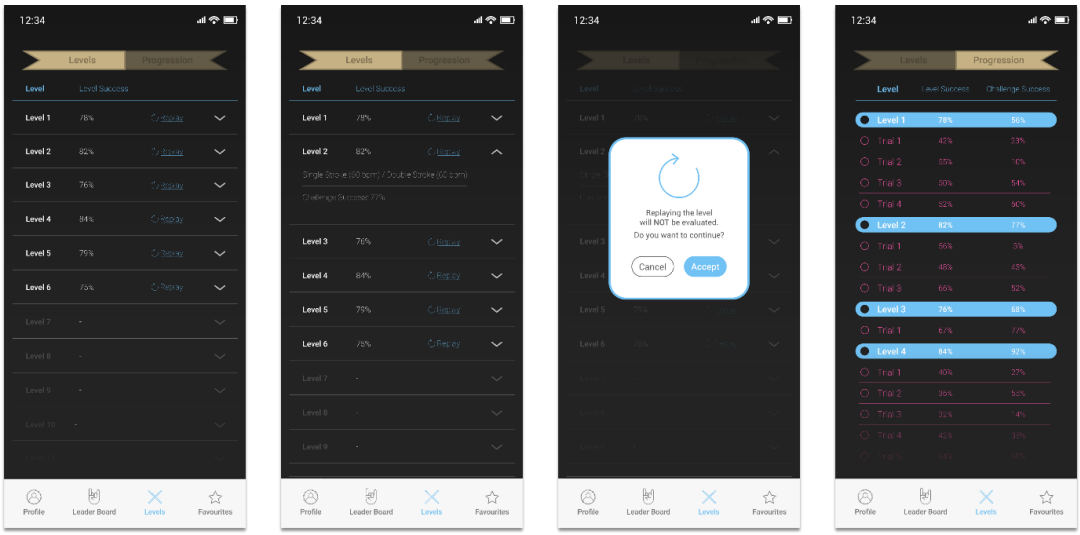


Figure 5.18 Levels tab of Concept 1

Leaderboard includes user's ranking among the other user who use the product (see Figure 5.19). First tab of the widget displays the ranking among the users who have a common frequency of product usage, while the second one displays among all the users. Thus, it enables a comparison in a community where an equivalent amount of effort is spared. Also, personal daily and weekly practice consistency is displayed under the first tab.

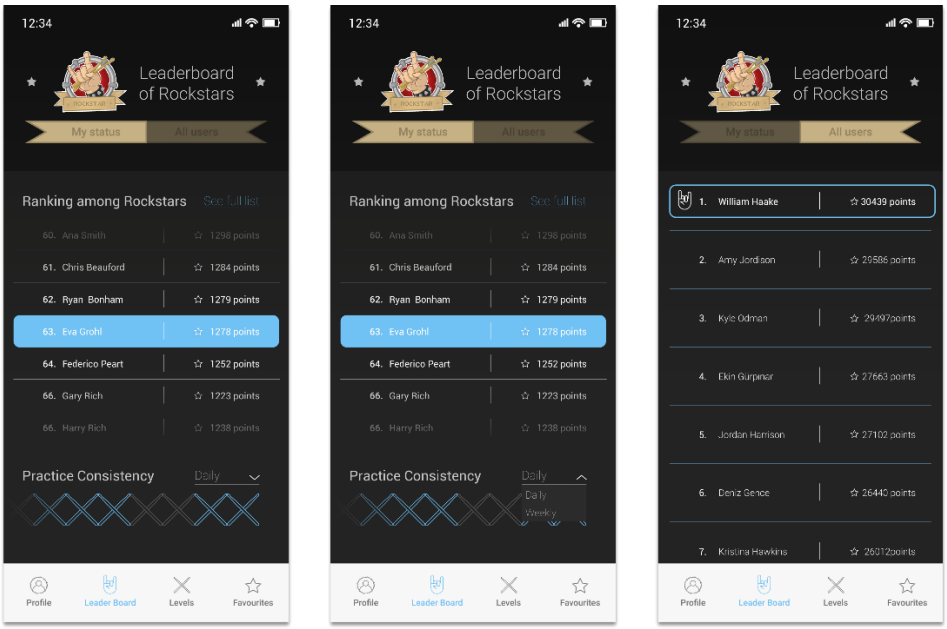


Figure 5.19 Leaderboard of Concept 1

The last widget of the first concept's mobile application is the 'favorites' tab. User can search for another user's name on the bar. To illustrate, s/he can be a friend or an acquaintance from the music class and can track his or her progress as it can be seen in Figure 5.20.

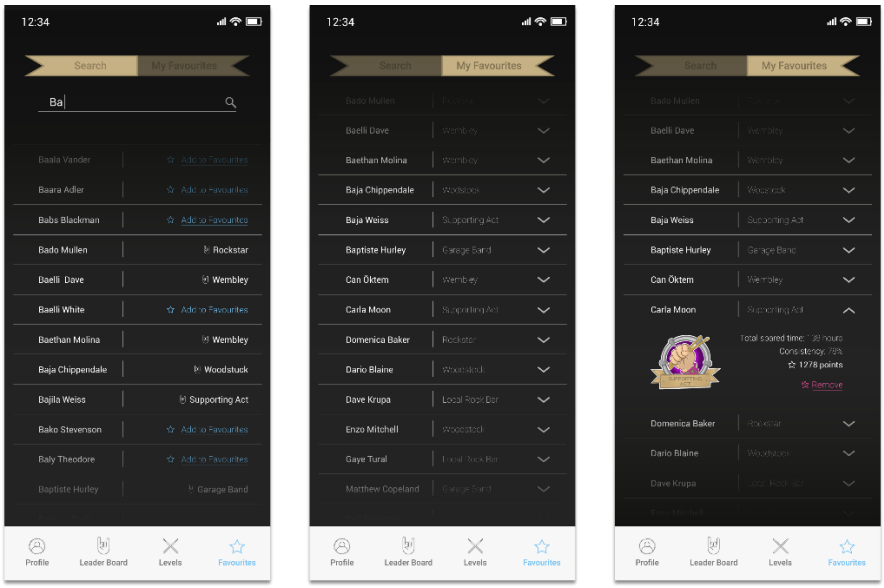


Figure 5.20 Favorites tab of Concept 1

5.3.2 Design Concept 2

The second design concept targets practicing coordination tasks with a drum kit also by including play along exercises. Similar to the previous concept, the design involves a mobile application and a physical product. The physical product consists of a music stand embodied with a monitor. As it can be seen in Figure 5.21, the monitor is attached to music stand according to VESA (Video Electronics Standards Association) mounting. The monitor's function is to track the user interface in larger dimensions during the drum kit practices. Hence, there is no user interaction implemented on the monitor.

Figure 5.21 Physical product of Concept 2

5.3.2.1 Onboarding

The onboarding scenario is similar to initial concept with a few nuances (see Figure 5.22). Firstly, user downloads the mobile application and types his/her name and mail address to sign up. After that, s/he types the verification code sent to e-mail address. After turning on the Bluetooth, s/he has to pair the headphones since the sound of the metronome and play along repertoire is not transmitted by means of

speakers. After pairing the headphones with Bluetooth, s/he connects his/her phone to monitor via cable to project the interface.

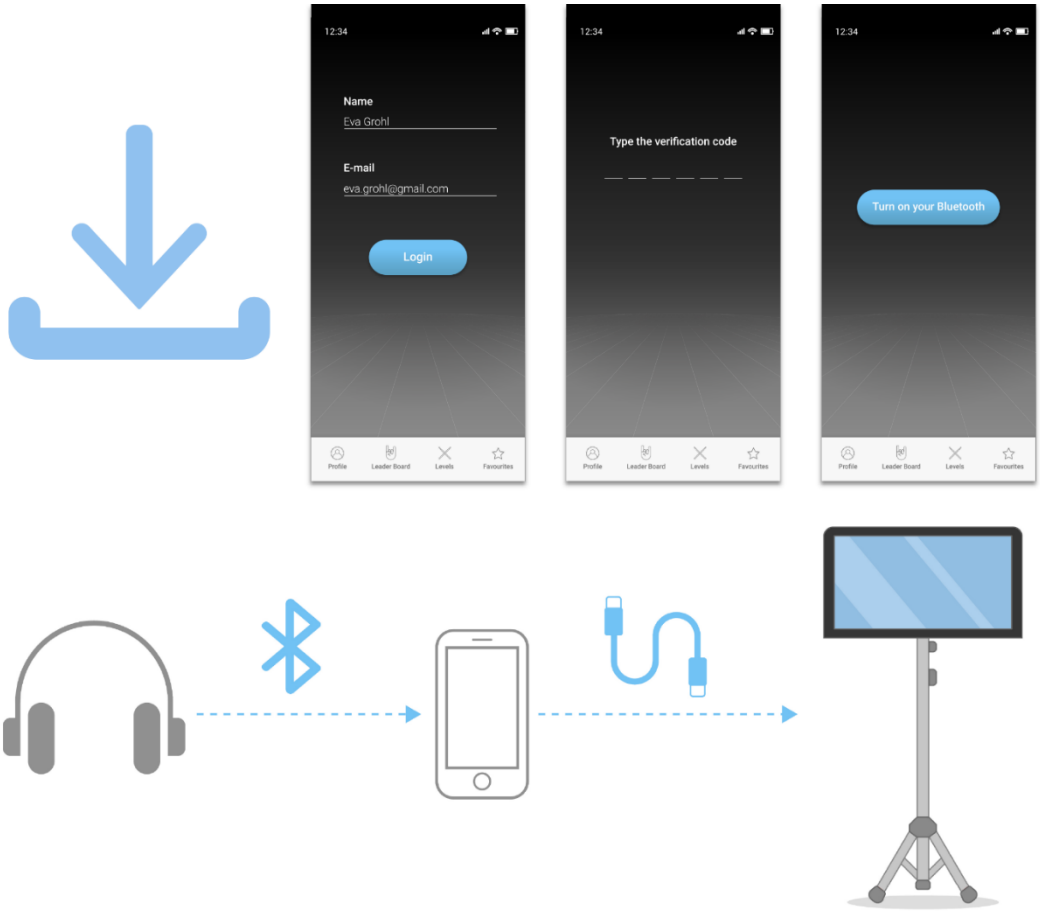


Figure 5.22 Onboarding and pairing of Concept 2

After onboarding is completed, the user selects his/her drum kit type in terms of acoustic or electronic. If the user's drum kit is electronic s/he can directly proceed to home page. However, if the drums are acoustic, s/he has to tune the drum kit for defining the sound set to application as it can be seen in Figure 5.23.

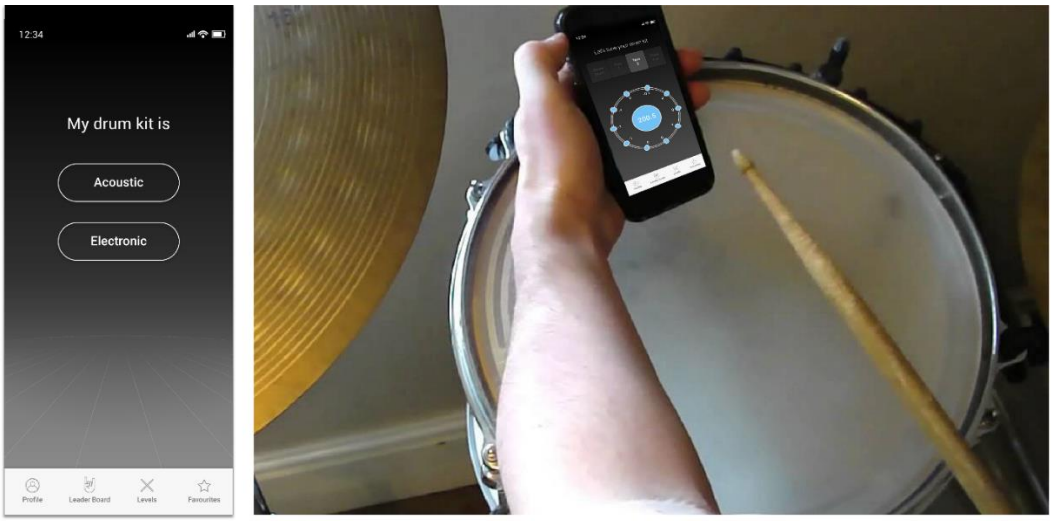


Figure 5.23 Drum kit selection UI and tuning for the acoustic drums

After the user completes the lug tuning of the drum kit for each component, s/he can move on with the home page (see Figure 5.24). Home page UI has the same features with the initial design concept.

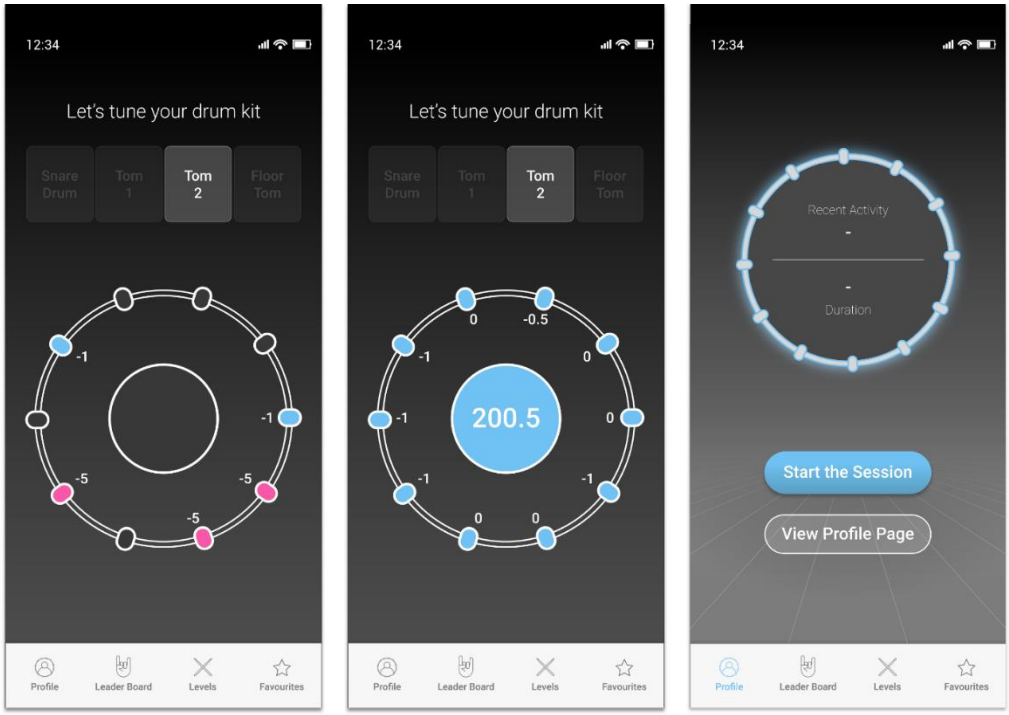


Figure 5.24 Tuning UI and home page of the Concept 2

After completing the onboarding and accomplishing the tuning, the user is ready to start the session. During the session, the smartphone is kept in a sufficient distance to sense the sound efficiently, while being plugged to the monitor (see Figure 5.25).

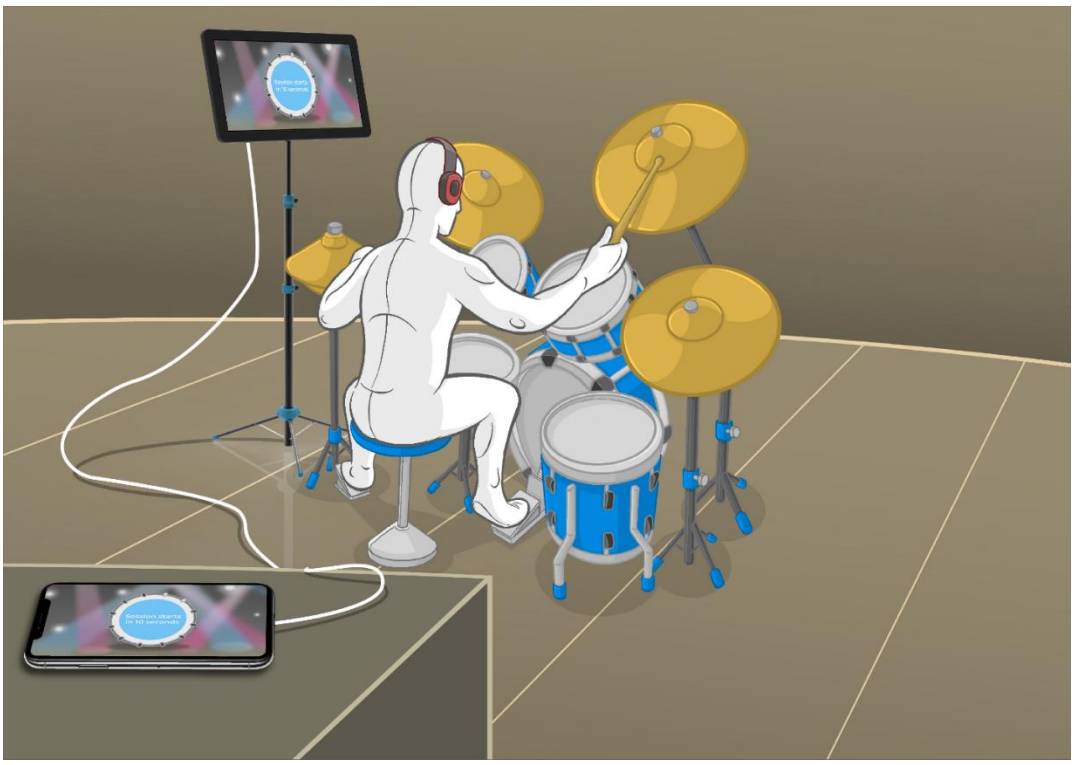


Figure 5.25 Session illustration of Concept 2

If the user prefers to view his/her profile rather than starting the session, s/he can tap on the 'View Profile Page' button on the home page. The same stage light metaphor related to product consistency is valid in this concept as well. User can see the activity history by including the date, accuracy and duration likewise in the concept 1. Additionally, s/he can view the badges earned also by seeing the unlocked ones (The badge designs for Concept 2 will be elaborated). Also, user will be able to create an avatar. S/he will be able to customize his/her avatar through the profile page as it can be seen in Figure 5.26. Implementation of avatar design is related to virtually depiction of themselves as a musician on the stage.

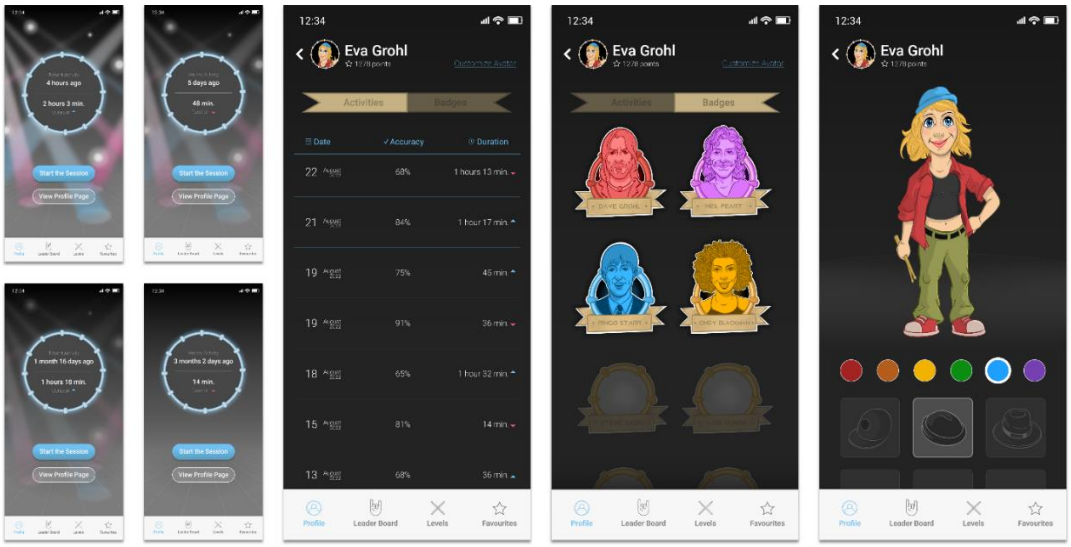


Figure 5.26 Profile page of Concept 2

Since the monitor's role is limited by the projection of mobile UI, all of the user interactions are done on the smartphone. After the user starts the session by tapping on 'Start the Session' button on the home page, the countdown starts to give a time to let the user get prepared on the drum kit (see Figure 5.27).

5.3.2.2 Levels

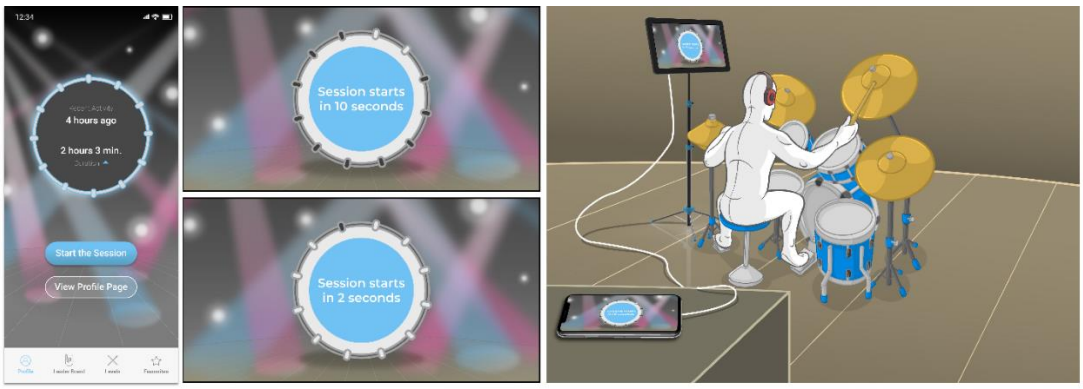


Figure 5.27 Countdown before the session

D-52 method is taken as a reference while considering the level structure (see Appendix D). Each level consists of two phases listed as coordination tasks and play

along exercises respectively. User follows the bar motioning from left to right while tracking the notation. For both exercises, the user is able to intervene the sessions in two ways. S/he can quit the session or can alter the tempo if the bpm is too high for him/her. In case the user attempts to quit the session s/he encounters with the UI in Figure 5.28, depicted with the customized avatar's image.

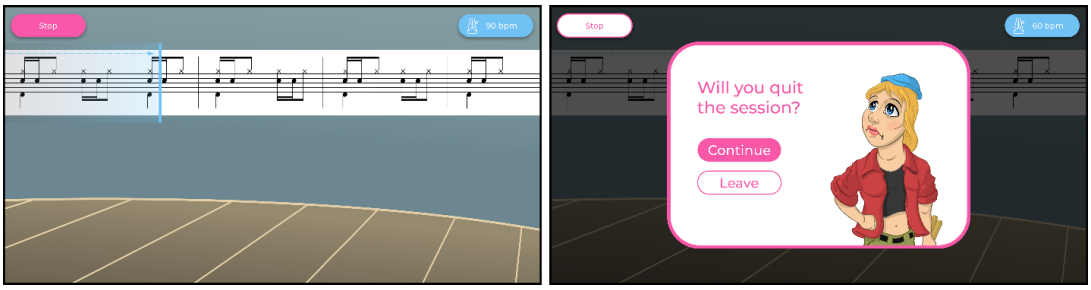


Figure 5.28 Quit the session UI

The other option is changing the bpm. Since the related task's tempo may be too high for the user to practice, s/he may want to study before proceeding. However, in case the user attempts to reduce the exercise's predetermined bpm, the session is not considered as a task to be evaluated. It will be more like an exercise mode as it can be seen in Figure 5.29.

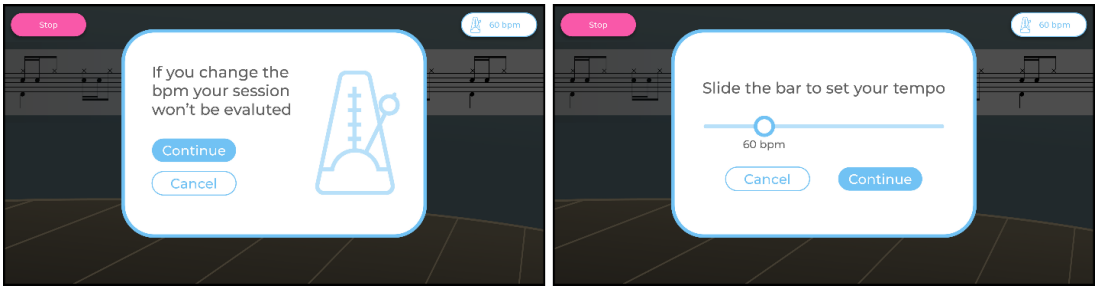


Figure 5.29 Changing the tempo UI

After the coordination task is completed, the user proceeds with the play along exercise. Each level includes multiple repertoires of play songs with muted drum kit tracks (see Figure 5.30). User selects a song among the alternatives by means of tapping it on the mobile app's UI and the time countdown starts before the play along exercise.

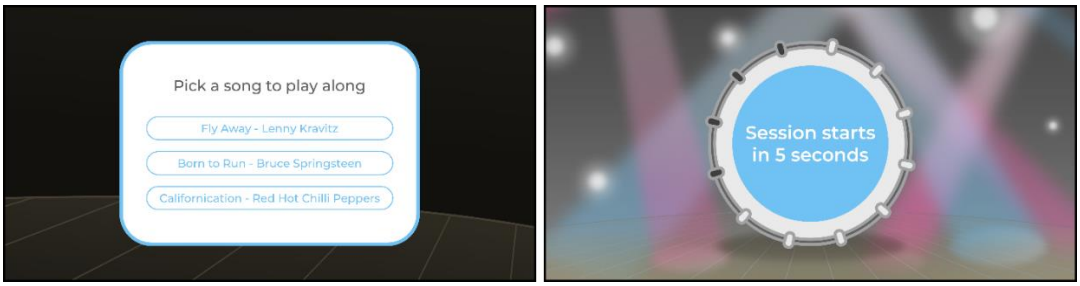


Figure 5.30 Starting the play along session

During the play along session, the customized avatar is animated with respect to user's strikes on the related drum kit component (see Figure 5.31). The animation aims to enhance the user's product engagement by means of the 'fun' element.

Figure 5.31 Animated avatar

The same interventions are possible in the play along session as well. Besides the animated avatar, a crowd animation is also depicted in the exercise as it can be seen in Figure 5.32. The major criteria of evaluation are playing on time and striking on the correct notes with exact values.

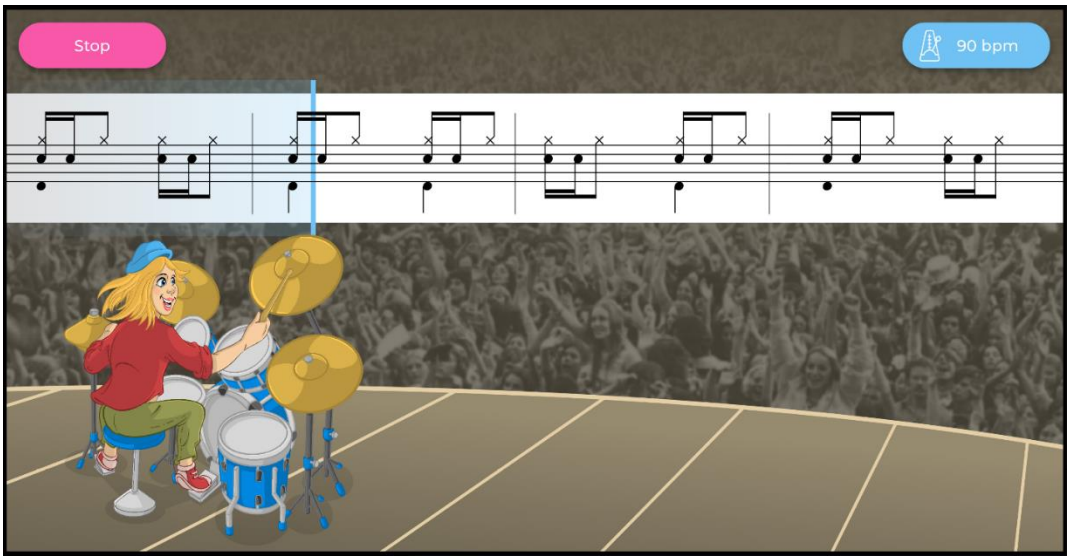


Figure 5.32 Play along exercise UI of Concept 2

While the initial concept's quest or challenge is to contribute the user to play in higher speeds and different accents, this concept's challenge is assessed by the improvisation performance shown in the song's empty measures. Even though applying improvisation on the level structure wasn't a direct interview outcome, since it wasn't mentioned by the majority, it's reconsidered with respect to code 'creativity'. Evaluation criteria of improvisation is assessed by two aspects listed as playing on time and compatible with the song's overall groove. For the latter, the technology can be implemented by machine learning algorithms supported by the song's overwhelming notation values, related genre's musical pattern and so forth. This feature will be discussed in the 'Evaluation' section. The notation played by the user is displayed real-time on the measure in blue (see Figure 5.33).

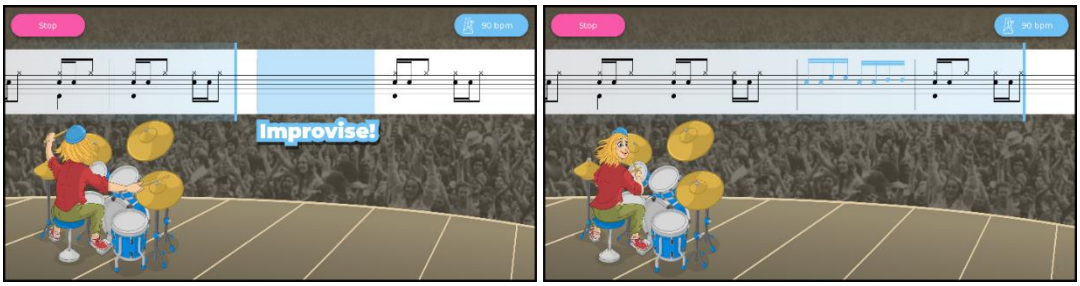


Figure 5.33 Improvisation challenge UI of Concept 2

5.3.2.3 Feedback & Reward

After the user completes the play along exercise with a minimum score of 75%, s/he earns a badge. The badge designs include an illustration of the song's drummer. To illustrate, if the user plays Lenny Kravitz's 'Fly Away' song successfully, s/he earns the badge of Cindy Blackman who is the drummer of the band (see Figure 5.34).

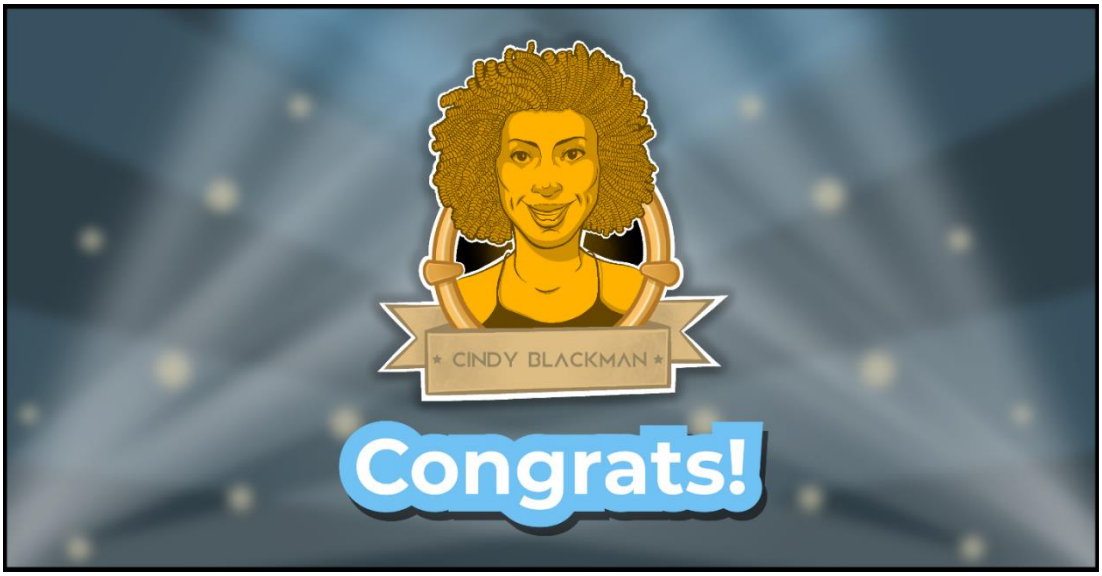


Figure 5.34 Badge winning UI of Concept 2

The other badge design examples can be seen in Figure 5.35. From left to right, the badges are given with respect to success shown in the songs of Nirvana, Rush and The Beatles. Overall design is similar to previous concept in terms of the frame inspired by the snare drum's rim except the portraits.

Figure 5.35 Drummer badge examples of Concept 2

After the level is finished a feedback screen is viewed as it can be seen in Figure 5.36. If the overall performance of the coordination or play along exercise is below 70%, user cannot unlock the next level. Hence, s/he can replay the level or quit the session.

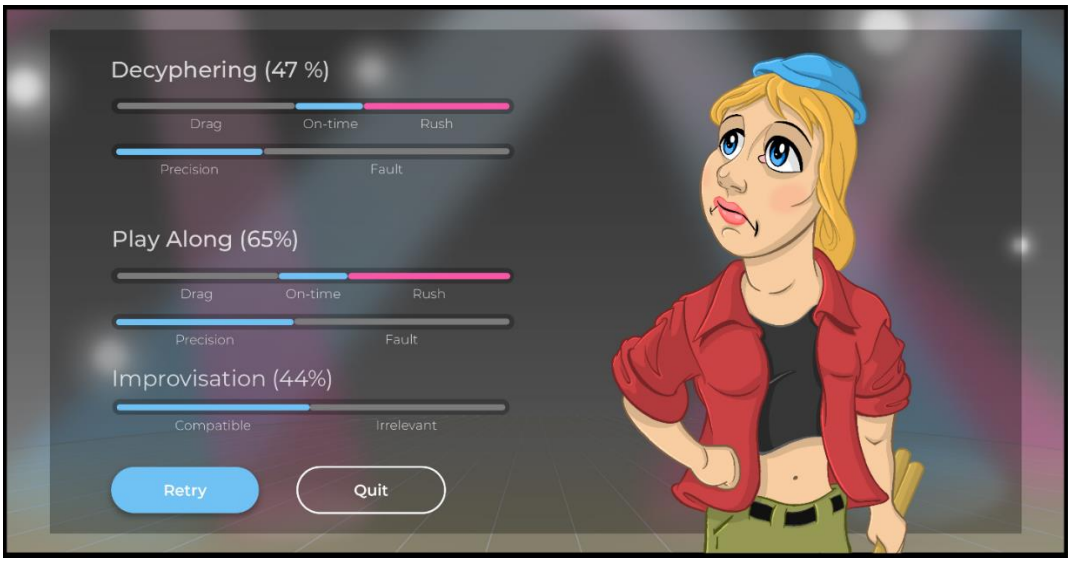


Figure 5.36 Feedback UI of insufficient score

For the reverse case, the user can unlock a new level. After s/he taps on ‘End the Session’ button, an additional feedback UI is viewed informing that the new level is unlocked (see Figure 5.37). Feedback screen is comprised of the performance’s percentages including playing on time and striking on the correct notes. The improvisation’s grading is based on timing and compatibility., Compatibility is

considered, if the related measure is played on time. However, if the user drags or rushes, user cannot receive a point from the related measure. Therefore, assessment of compatibility won't be applicable.

Figure 5.37 Feedback UI after a successful performance

5.3.2.4 Mobile Application Features

Similar to previous concept, mobile application features including the leader board, levels' archive and favourites widgets will be introduced. Since there isn't a reward system based on consistency, the leader board displays user's ranking among all the players. Consistency is reflected on scoring solely by points. User can view his/her daily or weekly consistency with the same graphical depiction.

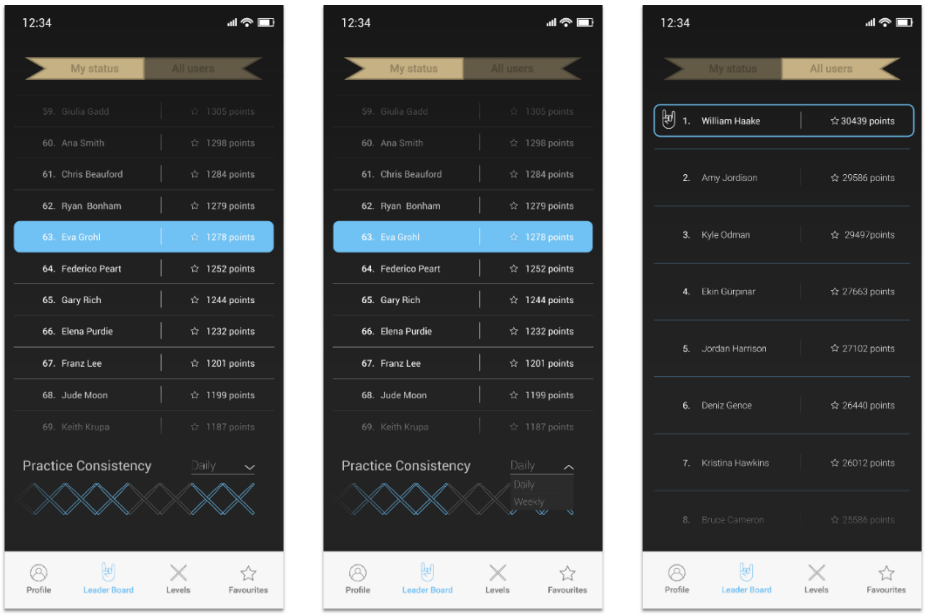


Figure 5.38 Leader board of Concept 2

User can access the levels' archive by viewing the overall performance and previous trials' record likewise the Concept 1. The difference is that, the user can replay a previous play along exercise or play a song from a previous level which s/he didn't practice. If the user becomes successful with the play along exercises s/he can earn a drummer badge regardless of practicing it again (see Figure 5.39).

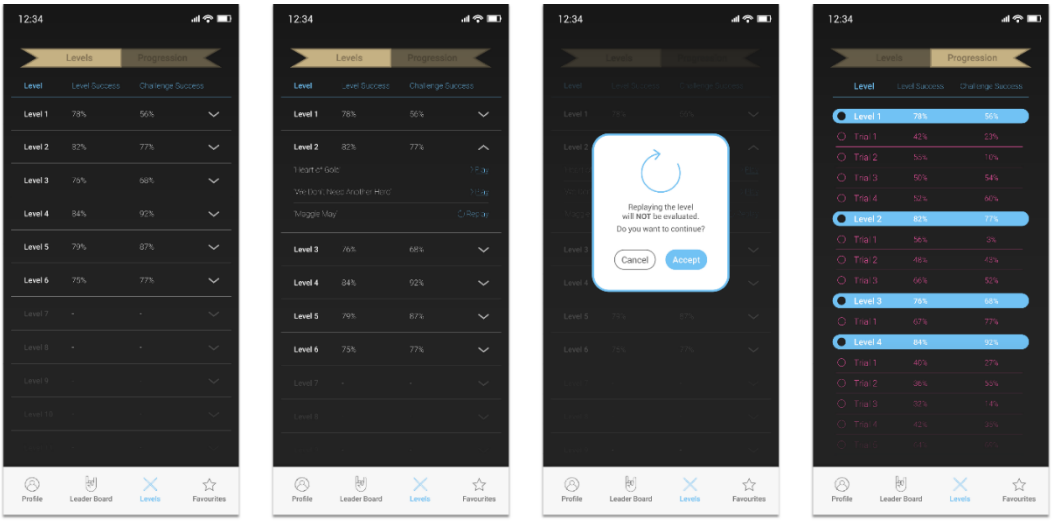


Figure 5.39 Leader board of Concept 2

‘Favourites’ tab functions the same way as the Concept 1. The user can search for a friend or acquaintance and follow him/her to see overall scoring, consistency and drummer badges s/he earned as it can be seen in Figure 5.40.

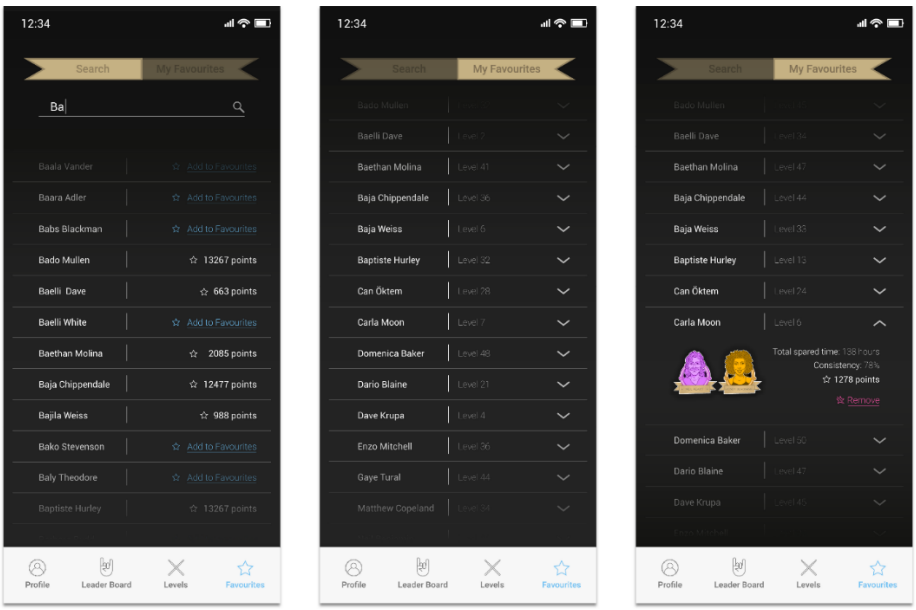


Figure 5.40 Favourites tab of Concept 2

5.4 Evaluation

Formation of focus group will be explained. The outcomes of the focus group including participants’ assessments and recommendations will be discussed.

5.4.1 Forming the Focus Group

Evaluation of both concepts is based on a focus group session conducted with four drumming instructors. Participants’ demographics, occupation and general information about their tuition experience are visualized in Table 5.1.

Table 5.1 Demographics and general information of focus group participants

Participants	Age	Gender	Years of experience in tuition (years)	Occupation	Musical Background
P1	43	f	14	Private music school	Conservatory (certificate program, drums) + Private lessons
P2	39	m	11	Private music school	Department of jazz (a year) + Private lessons
P3	33	f	13	Professional musician + Private lessons	Private lessons + Drum camps
P4	43	m	6	Professional musician + Private lessons	Private lessons

Focus group session is conducted on Zoom (an online meeting tool) and design concepts are shared by showing the user scenario (see Figures 5.41 and 5.42) of the concepts besides introducing the mobile application features, reward system elements and a motion graphic example of the rudiment screen. During the session, participants' assessments of the learning materials, possible design iterations and potential gamified solutions in relation to their point of view, based on their learning periods and observations on their students between the age of 15-19, were asked. Finally, the compatible medium for adapting gamification among the concepts were discussed.

Assessment of the learning content requires an expert knowledge. Therefore, sampling is limited by drumming instructors. Transcriptions consisting of remarkable statements can be seen in Appendix F.

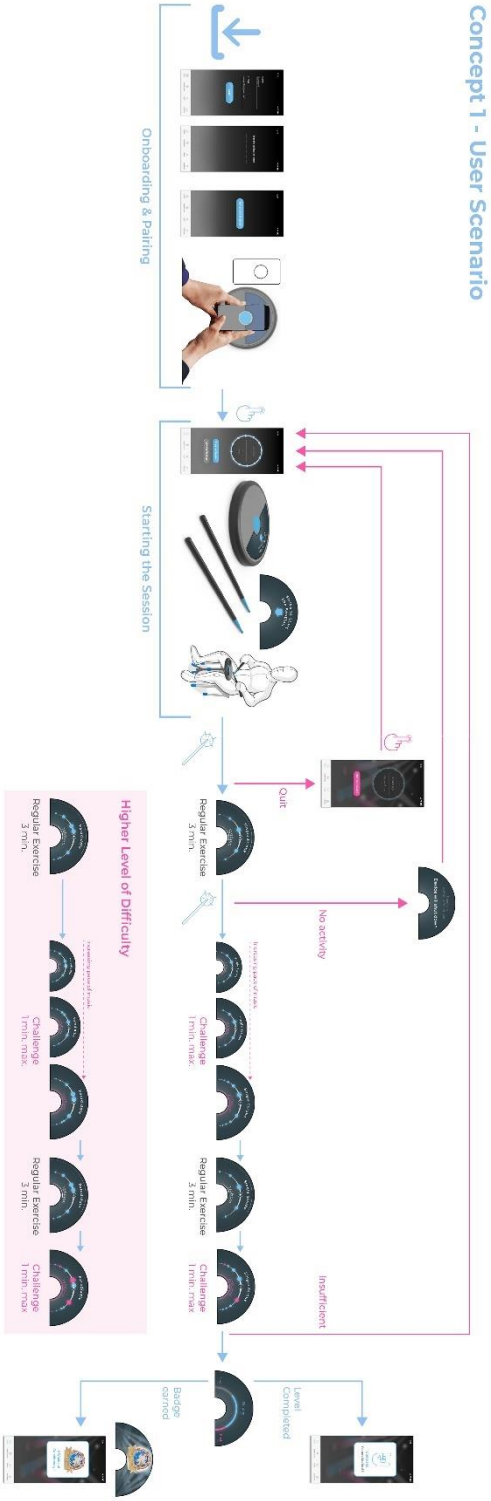


Figure 5.41 Concept 1 scenario presented in focus group session

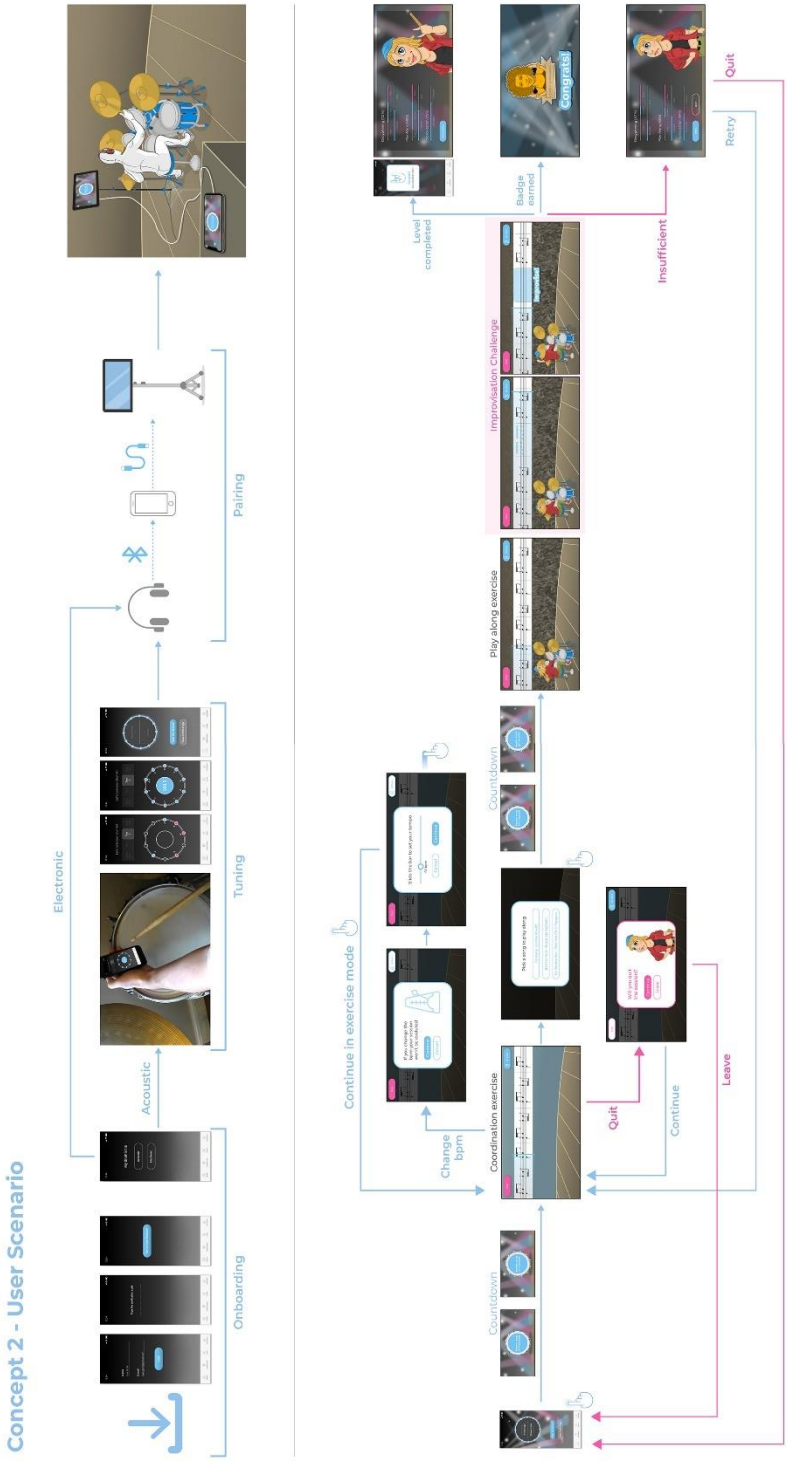


Figure 5.42 Concept 2 scenario presented in focus group session

5.4.2 Focus Group Outcomes

For the concept 1, major recommendations were based on the degree of autonomy, social interaction and element of 'fun'.

- Participant 1 suggested to include a chat widget for the 'Favourites' tab to enhance the social interaction. She highlighted her argument by claiming that users at younger ages would feel more comfortable while consulting each other about drumming rather than asking their instructors.
- Participant 3 and 4 also supported the chat widget by stating that the user group at that age range are used to communicate in that way thanks to online games.
- Participants 2 suggested to enable the user to set the tempo manually. Also, he stated that 3 minutes of practicing on steady tempi might lead to boredom. Thus, he recommended to set the durations with a minute exercised with 4 tempi values. For instance, paradiddle can be practiced in a minute with 60, 90, 110 and 120 bpm.
- Participant 2 elaborated his scenario by illustrating that there can be a badge for a successful performance in playing the paradiddle in 120 bpm. Thus, the user can earn the badge surprisingly as a result of manually determining the exercise settings. In other words, badge designs can be enriched with task contingent rewards besides consistency.
- All the participants mentioned that stick control practices are the most essential exercises for the drums practicing. On the other hand, they are the most boring tasks for the learners regardless of their age groups. For instance, participant 3 asserted that usage of Concept 1 won't be long-lasting for a learner, unless an enhanced 'fun' element is integrated.
- Enhancing the users' engagement with rudiment exercises is discussed. Participant 1 suggested to practice with a repertoire that students would like instead of the metronome's click.

- Also, participant 1 and 3 suggested to add a competition element between the users. This competition can be operated by enabling a challenge between the participants. They exemplified the scenario by saying that a student may show that s/he increased a rudiment's precision to 140 bpm to another student who couldn't exceed the related exercise above 120 bpm.
- Participant 3 also recommended that challenges can be based on elimination. She illustrated that challenges between two users can have an increasing difficulty. It can start by playing four bars of single stroke in 60 bpm up to 100 bpm. If one of the users make a mistake s/he gets eliminated. Participant 4 supported her argument by comparing it with a duello in online games.
- Hence, besides the conversations on chat, the users' interactions shall be reinforced with competition element.

For the concept 2, the most controversial topic was the improvisation challenge. Also, further implementations for the feedback mechanism were discussed.

- Participant 1 suggested that improvisation assessment shall solely be based on playing on time, since compatibility of an attack or ornamentation is a relative notion. She exemplified her argument by stating that a rapid attack consisting of triple croches in a slow musical piece cannot be considered as wrong.
- Participant 3 also agreed participant 1's ideas by stating that compatibility cannot be measured.
- Participant 4 argued the relativity by highlighting that improvisation shall be compatible with song's overall groove. He suggested that the song's groove can be defined to system for creating a base for the evaluation.
- Participant 3 also said that it can be implemented according to defining the overall notation values to the system. She illustrated that a triple croche cannot be expected in 'Nothing Else Matters'. Thus, her recommendation is an evaluation based on mathematical aspects in terms defining the overall notational values in the related song.

- However, she shared an insight with her students. She contributes her students to make attacks, regardless of sounding incompatible or 'ridiculous'. Her only concern is to make them to beat on and continue to main rhythm after the attack on time. Hence, she emphasized the having the taste of groove is based on exploring by themselves via making various trials even if they sound incompatible. Thus, such guidance in terms of compatibility shall be made carefully.
- Participant 1 and 4 suggested that feedback mechanism shall be more elaborated. Participant 3 asserted that excluding the real-time feedback is a right decision to prevent distraction. However, a transcript of exercises in a sheet music format shall also be available for the user. It's because they may want the points where they played wrong. Otherwise, they may continue to do the same mistakes.
- Participant 2 recommended to organize events, likewise in the online games. He exemplified his argument by stating that a 'Buddy Rich Tournament' can be organized and 'Buddy Rich badges' with different designs can be given for successful performances.

Participants' comparisons between two concepts and overall implementations that can be applied on both concepts were discussed.

- All the participants agreed that challenge can be implemented in both concepts. While the first one can be based on rudiments, the latter can be operated by play along exercises.
- All the participants suggested that reminders can be sent to users as notifications in cases of a long-time gap between the last usage to enhance the consistency.
- Participant 1, 2 and 3 recommended that badges shall be up to date. They shall continuously be revised with updates to keep the user engaged in the gamified system.

- In terms of the comparison between the two design concepts, all the participants agreed that concept 1 is more beneficial for a drumming student in terms of the learning context and more usable due to its portable structure. However, they also agreed that the second concept is more coherent for implementing gamified solutions. Also, participant 1 pointed out that reward system of concept 2 is more effective as extrinsic motivator. In other words, she claimed that badges based on user's autonomy would be more effective.
- Through finalizing the comparison, all the participants reached a consensus on integrating two products.
- Participant 3's major concern about concept 1 was that it won't be a long-lasting product. However, implementing the gamified system can be used at least for 5 years.
- Even though, all the participants recommended to combine both concepts as an accompanying product while performing with the drum kit, there were different approaches to integrate the stick control exercises to learning context.
- Participant 3 suggested to implement the stick control exercises as an obligatory task before starting the coordination and play along exercises. Thus, such mandatory tasks, lasting for 5 minutes, would make them to warm-up before starting session.
- However, participant 2 didn't agree with her statement by claiming that such obligations may alienate the user from the gamified system. Therefore, he proposed to limit the stick control exercises by competition between users.

5.4.3 Reforming the Design Proposal

As a result of the interim conclusions derived from the focus group session, the additions and iterations to be considered as ‘general factors’ to enhance the user experience and as ‘drums-specific factors’ to contribute the practice sessions.

5.4.3.1 General Factors

- Two design proposals shall be combined in the form of Concept 2 for long-lasting usage.
- Chat widget shall be integrated to mobile application’s ‘Favourites’ tab in order to enhance to social interactions and make the participants make conversations about their drumming journeys.
- Competition element is essential for building motivation. Therefore, a challenge widget shall be involved in ‘Favourites’ tab as well.
- Achievement badges shall be elaborated and revised with updates. Users shall be rewarded for the success shown in competitions, besides consistency and autonomy-based badges.
- As a holistic component of user experience, there shall be reminding notifications in case of long-time gaps between the last practice session.
- Also, there shall be event organizations for play along exercises thematized by famous drummer tournament. There shall be badges rewarded for successful performance in related events.

5.4.3.2 Drums-Specific Factors

- Stick control exercises are the most essential element of the learning context. On the other hand, they constitute the tasks that participants are most hesitant to. However, play along exercises doesn't require such motivational drivers, since users enjoy the activity itself regardless of an extrinsic driver. Therefore, points displayed on the leader board shall be based on technical exercises including rudiments and coordination studies. Play along exercises sole outcome shall be restricted with drummer badges.
- For the feedback mechanism, transcriptions of coordination and play along exercises, showing the correct strikes and faults, shall be involved in sheet music format. The transcriptions can be integrated to 'Levels' tab of the mobile application.
- Feedback for improvisation challenges is a delicate point, since developing the sense of musicality time and experience. Therefore, for the initial levels related challenge's feedback shall be constrained with playing on time. Assessment of compatibility shall be shared in further levels with the user.

CHAPTER 6

DISCUSSION & CONCLUSIONS

Motivation factor is crucial especially for the case of musical instrument learning. As a method, 'gamification' involves significant potentials to enhance the learners' motivation compared to conventional/didactic learning methods. On the other hand, combining gamification with recent technological artefacts defines enriched areas of interactions for designers to study. Despite the prejudices on gamification, there are considerable implementations of the method in various fields including musical instrument training. However, among the gamified musical practice instances, the drums, as an essential rhythm-based instrument, has not been considered.

Gamifying the drum kit learning enables potentials with respect to the instrument's enhanced interaction capabilities while playing it and its nature that directly influence humans' internalized sense of rhythm. During the study potentials of gamification on novice players' drum kit practices were analysed. Also, potential design solutions were investigated by considering current technological capabilities. Due to their close relationship with recent technological artefacts, the novice players' age group was limited by the learners aged between 15-19. For the scope of investigation, 'design' was used as an intermediary tool to explore these potentials.

During the study, data collection and analysis stages were operated for twice. For the initial data collection stage, a literature review was conducted (see Chapter 2). The literature review was based on two trivets listed as the drum kit and gamification. The concepts of 'rhythm' and 'groove'; the history, evolution, physical aspects and basic musical terms of the drums; assisting hardware and software solutions for drum kit practicing were analysed for the first section. The latter section mainly focused on gamification's principles, remarkable examples, outstanding fields of

implementations and its relationship between the significant learning and motivational theories. As an outcome of the literature review, design insights were organized by taking ‘4 elements of education polarizers’ into consideration. To clear the diverse design insights, in-depth interviews were conducted with 6 drum kit instructors who are experts of their areas (see Chapter 4). During the sessions, data about interviewees’ experiences in their learning periods, teaching and practicing were gathered. The responses were coded and analysed, then combined with the former design insights.

The first data analysis phase resulted in determination of design specifications with embodiment of concepts including hardware and software-based design solutions (see Chapter 5). Even though in-depth interviews clarified the design insights considerably, there were points including uncertainties. As a result of the partial ambiguity, two design solutions were generated that approaches the unclear parts from different perspectives.

After the completion of design concepts by taking its material aspects, user interactions and UI features into consideration, the study was followed by the second data collection stage. For the data collection phase, a focus group session was conducted with drum kit instructors (who didn’t take part in the previous in-depth interview sessions) as well. Since compared to a novice drummer, instructors are experienced in terms of both learning and teaching, the sessions were conducted with experts likewise the in-depth interviews. During the sessions, two design concepts were presented and their overall opinions on the concepts, possible revisions and potential game-based solutions were asked. The data collected from the focus group was analysed and resulted in finalized design specifications for a single concept.

6.1 Revisiting the Research Questions

The research questions listed below were aimed to be answered with the help of the findings from the literature review, in-depth interviews and assessment of design concepts by focus group participants.

In what ways might gamification positively affect the musical instrument learning experience?

Gamification can encourage the learners by means of extrinsic motivators. The extrinsic motivators can help the learner to build intrinsic motivation. Intrinsic motivation is an internalized notion that primarily depends on enjoying the activity itself regardless of an external driver. Even though there are opinions asserting that intrinsic motivation is an inherited notion embedded in the learners' DNAs, it's also possible to build intrinsic motivation for the cases of reluctant students to some extent. Since the fundamental aspect of musical instrument learning majorly depends on practicing it, the only way to make the learner enjoy the musical activity can be done by enhancing his/her engagement with the instrument. In other words, learners' time spent with the instrument shall be increased. In that scope extrinsic motivators have a crucial role to keep the learners' enthusiasm alive. As a method, gamification has significant potentials to generate such extrinsic motivators. Reward system is one of the fundamental instances. Learners can feel motivated with elements including points, trophies, achievement badges and so forth. As a result, they sense the feeling of improvement and success with the help of well-designed level structure and challenges. Thus, they become eager to keep practicing. On the other hand, gamification can keep an ideal balance between the sense of improvement and accomplishment. By means of efficient and well-designed feedback mechanisms, the learner can be notified about the long way that s/he shall proceed to keep learning without a demotivation. Another aspect that gamified learning solutions include is

the social interaction. Competition element, in a naive manner, is one of the essential components of social interaction. Leader boards displaying the rankings and challenges between the learners can contribute a lot to sense of improvement. Lastly, the element of 'fun' is a crucial aspect to maintain the user's enthusiasm and enhance the learner's interaction. For gamification, 'fun' element can be supported by avatars, animations or it can directly be integrated in gamified system, badge designs and so forth.

In more specific terms, a chat widget shall be involved in product's mobile application to enable an environment for learners to make conversations about their musical journeys. Also, the competition element, supported with challenge requests, shall be integrated to the app as well. To keep the learners' enthusiasm alive, achievement badge designs' visual characteristics and semantics shall be well defined. Furthermore, they shall be up to date with new designs to enhance the learners' engagement. Additionally, learners shall be reminded with notifications in case of time gaps between the product's last usage. Lastly, event organizations, apart from the individual levels or quests, can contribute to element of competition.

Which mediums are suitable for applying a gamification method during the drum kit learning stage? What design concepts may be appropriate?

Besides theoretical aspects including the notation and being knowledgeable about the rhythmic structure, coordination and stick control exercises are the most outstanding practical elements for drum kit practicing. Learners are hesitant to do stick control exercises and get bored rapidly regardless of their age group. On the other hand, stick control/rudiment practices are the most essential exercises that shall be done frequently and regularly by the drum kit learners, since they constitute the basics of the drums practicing. However, the tasks that users enable the coordination (independently using their four limbs) are more dynamic and learners are more enthusiastic to go through such exercises especially for the case of playing along songs. Thus, as a physical product, a design compatible with the acoustic or

electronic drum kit is suitable for applying a gamification method in drum kit learning. According to field study outcomes, a monitor integrated with a music stand is an adaptable option but the design can be improved in further iterations. However, in such integration stick control exercises also shall be integrated to level design and challenges, or it can be a part of the competition element. Besides the physical product, a mobile application shall also be involved to enable the learners to view their progression, track feedbacks and communicate with other learners of the community.

How can gamification motivate the user to commit to practicing and learning the drum kit?

In-depth interview outcomes provided significant insights about participants' drum kit and drummer imagery which motivated them to choose the instrument among the other alternatives. Participants' common tendency to rock'n'roll genre, willingness to be on the stage and musicians they admired were the mutual elements considering their early learning periods. Thus, these aspects enable crucial visual implementations in the styling of reward components, avatar designs, environment design in levels, feedback UI designs and so forth. In other words, integrating such elements to gamification components can enhance the early learning experience. Also, including events like tournaments, challenges between users, being able to communicate with other novice musicians are crucial to reinforce the social interaction. Moreover, it enables a platform to create a community for learners to ask questions to each other and share insights about their musical journey.

6.2 Limitations of the Study

The first limitation is the sampling criteria of the focus group. Focus group participants were constituted by drumming instructors due to being experts of their areas and having a prior experience of being a student. Participants' age range was 33-43. In other words, they were members of generation Y who are familiar with recent technological artefacts since they were young. However, they cannot be regarded as digital natives compared to potential user group of the design concepts. Furthermore, they are not experienced in games or gamified learning systems. In other words, a more holistic evaluation of the concepts, would involve target users, who would be more digital native and likely to offer complementary insights to drum instructors. Hence, the evaluation phase includes limitations in terms of lacking the potential user groups' feedbacks, insights and opinions.

Another limitation of the evaluation phase is the way of conducting the focus group. The session was held via an online meeting tool. So, there wasn't a physical model or a Wizard of Oz prototyping for the UIs to be presented. Hence, participants couldn't directly interact with the product models. Therefore, their assessments were primarily based on learning context, reward system, level structure, feedback criteria and so forth. The evaluation for the user interaction with the product was considered superficially due to online meeting conditions. In other words, a holistic data for user experience includes limitations as well.

6.3 Further Developments

The second design concept embodied with stick control exercises can be improved by several aspects. Firstly, the assessment criteria of the learner can be elaborated. The weight of competition success, challenge performance and consistency for the point score system can be studied in details. Also, the improvisation challenge, which

was a controversial topic in the focus group session, can be discussed and its implementation level can be rearranged. Another development can be made on user interactions with the product. Audio-based interactions can be taken into consideration. Also, the badge designs can be diversified and potential updates for the badges can be studied. In other words, design effort can be made to create a strong hybrid concept between concept 1 and 2, and to physically prototype aspects of its specification (either for real, or using Wizard of Oz approach) to gain real user feedback.

Besides the concept improvement, a ‘Research through Design’ study can be conducted as an alternative to ‘Research then Design’ study. Also, ‘Research through Design’ can be operated by participation of intended end-users, in other words the digital natives can directly be involved in the design process starting from the initial stages. Thus, it can enable a comparison between the outcomes of ‘Research then Design’ study as well.

Also, in addition to gamification, the urge to do playful activities and the interest in game-like experiences can be investigated. The study can be elaborated by literature review and in-depth interviews. As a result, the outcomes can be more holistic. In other words, the gamified musical learning implementations wouldn’t be limited by previously implemented gamification elements including badges, points, feedback UI and so forth.

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APPENDICES

A. Informed Consent Form (In-depth Interview)

This study is conducted by Middle East Technical University Industrial Design Department Graduate Studies student Arat Baran Keskin for MSc thesis. This form intends to inform you about this study and ask for your consent.

Aim of the Study

The aim of the study is to investigate the potentials of gamification as an intermediary tool for encouraging novice players to learn and practice drumming. Experiences of drum learning and teaching will be investigated with the help of data gathered from both novices and instructors, and potential design solutions will be formed.

Voluntary Participation

If you accept to participate the study, you will be expected to participate an in-depth interview. This session may take between 45-60 minutes. Your participation in this study is voluntary, as you can refuse to take part at any time without giving a reason. Please do not hesitate to ask any question at any time.

Information to be Collected

During the in-depth interview session, you will be expected to answer questions related to your drumming experiences including learning stage, teaching and practicing. The in-depth interview will be recorded in audio format. Before recording starts and after recording ends, you will be notified.

Your Consent

The researcher and the researcher's supervisor may listen the recordings of your interviews for the research aims. No-one else will hear the records. A thesis will be published containing your contributions. The data used in this thesis will remain

anonymous, meaning that you will not be identifiable, and your comments and actions will be confidential in this research.

We would like to thank you in advance for your participation in this study. For further information about the study, you can contact;

Arat Baran Keskin

Phone:

E-Mail:

I am participating in this study totally on my own will and am aware that I can quit participating at any time I want. I give my consent for the use of the information I provide for scientific purposes. (Please return this form to the data collector after you have filled it in and signed it).

Name Surname	Date	Signature
	...../...../.....	

B. In-depth Interview Questions

1. Professional Background

Interviewee's occupation will be asked in terms of the institution, school or organization where they are working as a tutor.

2. Enthusiasm on Drumming

• When did you start playing drums?

• What were the driving forces that motivated you to learn?

• Is there a specific reason that made drum more appealing than the other musical instruments?

3. Learning Experiences

• How did you start learning? (hiring a studio, studying with an instructor, at school etc.)

• Were you practicing with a drum setup all the time?

- If not, which methods did you use?
- What were the pros and cons of that method?

• What were the most challenging aspects for you while learning? (rhythm, tempo, stick control, muscle memory)

• Can you briefly summarize the periods of your learning progress? (e.g. How long did you consider your self novice? How long did it take for you to become competent?)

• How would you channelise your self supposing that you will start drumming today as a fresh learner?

• Did you use mechanical or electronic products in order to support your learning process? (e.g. metronome)

4. Teaching Experiences

• For how long have you been teaching drumming?

• Do you follow the same method with your students as the method you have followed when you were a drumming student?

- If the answer is “no”: What alterations did you apply on the previous method?

- Why did you follow a different method?

• Are all of your students’ learning progress are similar?

• What are the aspects that you consider crucial while teaching?

• What is the most challenging part for you as a teacher and for your student as a learner?

• How do you track your students’ performances? (Do you only meet them in the studio, class or do you get informed about their progress through other ways?)

5. Practicing habits

• How often do you practice?

• How many hours do you spare for drumming in a single session?

• If there is a time gap between the practice sessions, do you feel out of condition?

- If yes, in which aspects do you feel in that way?

• Where do you practice?

• Do you always practice with a drum setup?

• Did you use mechanical or electronic products in order to support your learning process? (e.g., metronome)

6. Advices for Novices

• What are the crucial points that a beginner should consider while practicing?

• How many hours should they spare time while practicing alone? Which methods can they use to improve their skills such as air drumming, practicing pad etc.?

• Do you recommend any assisting software that can guide them or enhance their practicing experience such as computer software, smartphone application, wearable devices and so forth?

C. Drum Instructor Experiences (Transcriptions)

Motivational Drivers

'Since I was a child and, of course, the drum and woman drummer seemed to be perfect things I was motivated to- well, I already decided on the drum'. (Participant 1)

'The drum has a visual aspect such as hands, feet, strokes etc. It may seem a bit aggressive. Thus, it's appealing for a kid at that age'. (Participant 2)

'After 13 years old, the puberty age begins and music is an attractive thing. You get applause from the audiences, attract attention, your feeling of being admired moves to forefront'. (Participant 2)

'I will always be on the stage; my dreams have always been like this'. (Participant 2)

'I have never felt as comfortable in any of them as I felt with drum kit'. (Participant 4)

'Due to a both interaction and conflict between my father, a shift has happened towards an instrument that he wasn't familiar with'. (Participant 5)

'The reason is that it's unexplored, my father doesn't understand or I listen to rock music and the drum is forefront in the rock music or Ian Paice of Deep Purple, or I don't know I got affected from Neil Peart or many other drummers'. (Participant 5)

Participants' responses are linked to their taste of music at the age they started to decide drumming which have been exemplified with the bands and musicians as follows. Nirvana, Manowar, Metallica, Megadeth, Asia, Oh Yes, Deep Purple, Iron Maiden, Rush, Ian Paice, Neil Peart, Lars Ulrich and Carter Beauford.

Practice Mediums

Initially, whether the participants were used to practice with the acoustic setup all the time during their learning process was asked as an ice-breaking question. None of the participants had the chance to own an acoustic drum kit in their living areas. Participant 1, participant 3, participant 4 and participant 6 mentioned that they were able to play acoustic drum only at school or studio. Secondly, assisting mediums, including mechanical and electronic products in order to support their learning process, was asked. All the participants used the metronome. Participant 4 and participant 6 additionally mentioned the software tools that they benefited from. Participant 4 used 'Guitar Pro 5' for writing drum partitions. He mentioned his purpose of using it by saying:

'you are not actively playing but you can try different things and listen. You get familiarized with how it sounds' and *'I benefitted a lot from it while learning the notation during transition to theoretical education. I learned the quarter beats, half beats and the notes of which we didn't the names, thanks to that computer. It was the basic'*.

Participant 6 mentioned a smartphone software, of which the name he couldn't remember during the interview session, for the similar purpose of participant 4's by saying:

'There was a thing. Ear improving exercises. I benefitted a lot from them while learning. In order to learn the periods - it was like 'Ear tools' or something else. There was a method for learning the times by means of frequencies.'

Also, he mentioned a software tool called 'Sibelius' in order to learn notation and solfege during his learning stage.

Proprioceptional Interactions

Participant 1 highlighted the significance of the rebound feature by saying:

'It's because the stick doesn't rebound. Hence the wrist improves incredibly. I strongly recommend to play on pillows.'

likewise participant 5's statement:

'I consciously practiced on the pillows to get the rebound on a platform which doesn't bounce'.

On the other hand, participant 3 highlighted the 'rebound' aspect speficially for the scope of the practice pads by stating:

'Well, you can practice on the pillow, on the table or anywhere else but the point of those pads is the rebound system'. Participant 5 directly referred to con of the 'rebound' by saying *'We couldn't get rebound'*, while Participant 1 mentions the con of the 'rebound' aspect by referring to articulation via saying:

'In the snare drum- I mean, the thing you do via the practice pad doesn't work that efficiently on the snare drum. You may not see a correlation between these two. (...) Articulation becomes quite clearer on the snare drum, but on the practice pad it drags.

Participant 3 elaborated the 'incompatibility' via comparing the material features by saying:

'The negative aspects are that whatever you do, you won't get the acoustic setup's rebound, the bouncing period will be different. (...) Well let's say, the bass sound increases with respect to toms which means it has a loose leather. However, there isn't such a loose leather on any pad, generally it bounces more and its rebound is quite higher. Thus, it compels' likewise participant 6's statement:

‘Well, I didn’t think that it had a significant contribution. I have always felt that I got more mileage out of the acoustic drum. Since, even if you don’t know enough at the beginning, you directly contact with the leather’.

Additionally, participant 1 referred to con of the ‘rebound’ aspect by saying:

‘However, practicing on the pillows is very demoralizing since it doesn't have a rebound as well’.

Participant 3 directly refers to practice pads’ sizes by saying:

‘Furthermore, you carry your practice pad nearby yourself and you practice by placing it on your knee while chatting with your friends. It was like that’ likewise participant 6:

‘I think the rubber pad is a good idea to generate motivation. You can practice on your knee outside or you can have small pad in a place where you feel happy and practice paradiddle, coordination. You can practice meanwhile sitting, at home’,

while participant 3 highlights its the ‘sound’ aspect, which relates to auditorial interaction, besides its size by saying:

‘While you are watching a TV, a movie, a series- since it doesn’t make any sound even at that time, you can practice for two hours consistently without getting tired and making it more fun’.

	Pros	Cons
Proprioceptional	**touche** P1 - *"For me it enabled my touche to get higher, since it doesn't make a sound, it made me to control my force less while practicing. So it made my touche higher."*	**rebound - incompatibility** P1 - *"In the snare drum - I mean, the thing you do via the practice pad doesn't work that efficiently on the snare drum. You may not see a correlation between these two. (...) Articulation becomes quite clearer on the snare drum, but on the practice pad it drags."*
	portability P1 - *"Furthermore, you carry your practice pad nearby yourself and you practice by placing it on your knee while chatting with your friends. It was like that."*	**rebound - incompatibility** P1 - *"However, practicing on the pillows is very demoralizing since it doesn't have a rebound as well."*
	tremolo P1 - *"Except that, practice pad is a tool that enables us to make tremolo easier and faster compared to snare drum."*	**rebound - incompatibility** P3 - *"The negative side is that whatever you do you won't get the rebound sufficiently as on the acoustic drum, the rebound periods will be different. (...) For instance, as toms (referring to numbers: tom1, tom2) proceed, increases the bass sound, which means it has a looser leather. However, there isn't such a loose leather on any practice pad, normally it bounces much more and its rebound is much higher. Thus, it compels."*
	rebound P1 - *"It's because the stick doesn't rebound. Hence the wrist improves incredibly. I strongly recommend to play on pillows, but you have to do it so correctly that you should place the pillow accurately, right aligned to the belly button. Practicing with the pillow is great."*	**rebound - incompatibility** P5 - *"We couldn't get enough rebound"*
	rebound P1 - *"Since it doesn't rebound, it incredibly improvees your wrist, it results in an enormous wrist fatige and improvement in the wrist. Since it doesn't provide the rebound, when you shift to snare drum, the drum, you start to fly. 'Flying' sounds a bit exaggerated, there isn't a huge difference, but normally, you can see that it's much more different than practicing on the pad."*	**rebound - incompatibility** P6 - *"Well, I don't think that it had a significant contribution. I have always felt that I had got the mileage of acoustic drum, because even though you don't know the job at that time, you directly contact with leather."*
	rebound P3 - *"Well you can practice on the pillow, table etc. but the point of those pads is actually the rebound system."*	
	portability P3 - *"What are the positive aspects- well, you watch a TV or a series. Since even at that time it doesn't make any noise, you can practice for two hours continuously and without getting tired. Also you can make your practice sessions fun."*	
	rebound P5 - *"Of course I practiced on pillow on purpose for getting the rebound, on a platform that doesn't bounce"*	
	portability P6 - *"I believe that rubber pad is a good idea to increase motivation. For instance, a rubber pad tied to good. You can practice on you knee outside or you can have a small pad and practice wherever you feel happy. You can study paradiddle, coordination or you may practice while seated, at home etc."*	

Practice pads

Pillows

Auditorial Interactions

Participant 1: *'It has sort of disadvantages but its advantages are more, because you play it everywhere without disturbing the others'*, while participant 3 focused the advantage of long-lasting practicing sessions by saying: *'The positive aspect is that it's quiet. It's less tiring'* Additionally, participant 2 links the 'quietness'

aspect to ‘imagination’, for the purpose of both practice pads and pillows, by saying

‘It’s a situation that encourages imagination. If you place a pad or pillow by saying that it’s his/her new snare drum, the kid may start to hear the sounds in his/her head’.

Auditory	**quietness** P1 - *"It has sort of disadvantages but its advantages are more, because you play it everywhere without disturbing the others."*	**sound - incompatibility** P5 - *"I could study coordination or swing but the sound makes you feel horrible. It sounds like* (imitating the sound) *tik tik tik"*
	imagination P2 - *"S/he can go through all exercises with the help of a practice pad or a chair, cushion or a pillow that can assist the pad. They will respond to every need of exercises and this will encourage the kid's imagination. When I tell the kid that from now on this will be his/her snare drum, then the kid will start hearing its sound inside his/her head. (...) S/he can imagine the drum and its sound in his/her head with closed eyes regardless of needing the acoustic setup."*	**sound - incompatibility** P6 - *"I have always felt that I benefitted more from the acoustic setup. (...) You directly contact with the drum itself, with its real sound."*
	quietness P3 - *"The positive aspect is that it's quiet, you can practice with long duration. It's less tiring. I mean, as I said- since it's merely a warm-up, it's like listening to music in the gym or watching something meanwhile running. Things do become a reflex while studying."*	

Practice pads

Pillows

Both

Challenges of Learning

At the beginning, participants were asked to mention the way they started learning including hiring a studio, studying with an instructor, at school and so forth. Participant 1, 2 and 6 had percussion instruments education before the drum, while participant 3 had percussion instruments education after he met the drum. The percussion instrument education background considered as a ‘similar discipline’ by the aforementioned participants due to instruments’ rhythm-oriented nature. Participants 1, 2, 5 and 6 took private lessons from drum instructors during their learning stages. Participant 3 also had expert guidance from his cousin for drumming before he started his education of percussion instruments at conservatory:

'Yes, my cousin was autodidact, he didn't get educated but he was self-taught. Well, actually he raised 15-20 drummers in the family. I am one of them. I am the only one who got educated at school. Thus, I started with him when I was 5, but at the age of 11 I directly started the conservatory.'

Participant 4 also stated that he was guided by an expert from time to time, which he didn't regard as a private lesson. He elaborated his statement by saying:

'Well, I took lessons, but I took in such a way that we used to go to a studio very often in high-school. (...) At the studio, there were private drumming lessons taking place at 2-3 different rooms, and there were instructors etc. He also was one of the remarkable drummers and music teachers of İskenderun'.

Apart from the instructor guidance, participant 1 and 6 also mentioned the constraints of practicing at their learning stages. The common constraint was linked to finding a location to practice. Participant 1 highlighted that she could be able to practice at the conservatory's studios by saying:

'Since there is a probability of students' handicap of not being able to own a timpani set, vibraphone, xylophone, the school was more flexible for the percussion instrument students. We could also go and study at the weekends.'

P6 mentioned a similar handicap by stating:

'I found a rubbish drum at school (meaning his high school). *It was a rubbish, trash. (...) Even though I could access the drums, I wasn't be able to play it at home. Thus, there were journeys that I used to practice with it before rehearsals.'*

All in all, every participant commonly received a guidance from an instructor or a family member during their learning stages.

Participant 1 stated the maintenance by stating:

'Maintaining the tempo on the metronome, these are compelling things', likewise participant 2: *'fitting it into metronome's click'*.

Participant 5 also approached the tempo with a similar approach by saying:

'You play on the stage without rushing or dragging you play along with the guitar, with the band. (...) However- let's play this, what's its tempo, what's the bpm, these are the fundamentals do you understand? I improved that side of mine and made up a shortage'.

Participant 3 emphasized being inclined to fast up while practicing with the metronome by saying:

'Accompanying the metronome was a headache. It's because you are unavoidably tended to rush, you are always inclined to speed up while playing'.

Participant 4 pointed out that he had difficulties while speeding up by saying:

'Well, I think speeding up, I can say speeding up instead of adapting a particular tempo. It's because you can't play a song of which you can't catch up with, then you give up on that'.

Participant 5 emphasized the importance of the 'stick control' by combining his arguments with 'unlearning previous faults':

'For instance, this happened while playing Jimi Hendrix, I didn't know double stroke or paradiddle. I used to make those attacks in accordance with myself, right? However, when I saw the original book, I realized that it's not the right way. Also, after I played these after I learned that alphabet, I said "what is this?" However, breaking this, took a lot of time'.

Also, he added:

'There was a song called "Spinning Wheel" of Blood, Sweat & Tears. In between "Spinning Wheel" there is an attack with drags and ruffs. I could never play it until I learned to make drags and ruffs. Then, I played'.

Like Participant 5, Participant 6 highlighted the implementation of stick control by saying:

'What am I supposed to do with these, am I going to read pages and pages of notes? That's a different kind of madness. Pages of snare drum note, he tells me paradiddle, everything passes through paradiddle etc.'

Participant 1 pointed this out by saying:

'If you are left-handed, the right hand and if you are right-handed, the left hand's weakness. These are compelling in terms of the drum, I think'

while participant 6 stated:

'All in all, I can play, but I have problems with the coordination. I have a mindset that throws everything to the right'.

Participant 6, likewise participant 2 and 3, also emphasized the body's overall balance for the coordination while implementing the technique on drum setup by saying:

'there's no problem with the snare drum method. The problem is in the internal dispersion. You have to practice it; I mean you have to study on the drum setup'.

Participant 3 pointed out a similar approach by saying:

'well, I can do it on 100 or on 200 bpm (referring to paradiddle) as fast as I want to but the thing that important is spreading it on the drum. (...) I can play like it like this but if I don't spread it to drum it doesn't make any sense. After all you become a sole machine. Therefore- the kids, all of my student, including me- what was the most compelling part, this. Spreading the technique on the drum, on the setup'.

Participant 2 also highlighted the importance of the body's overall balance in coordination by referring to key role of the feet:

'When you think of an attack, the balance there, the balance while returning to the main rhythm after the attack- well let's say our hands, I believe that the balance at our upper extremities has less effect. In my opinion, mostly the balance at feet, the feet strokes distract the body's overall balance'.

Starting as a Fresh Learner Today

Participants were asked to talk about their learning order when they were drumming student. Even though the order varies in each participant, all participants excluding participant 5, stated that they had a linear and structured learning order. Participant 1, 3 and 6 started with notation then shifted to stick control, while participant 2 and 4 started learning stick control before notation. Hence, the aforementioned participants moved on with basic rhythms and play along songs after meeting with technical and theoretical fundamentals. Participant 5 mentioned the case of difference by saying:

'Normally, it happens. The kid studies music. While studying music, s/he gets on the concerts gradually. Slowly, without becoming a professional. Then forms a group with his/her friends. Then tries other genres and then- the progress in music lasts for a whole life time, it's valid for every area. Do you understand, but mine is inverted. I dived in the pool, then learned to play. Then made up the shortages etc. (laughs). Thus, this is my struggle'

Then, exemplified his condition:

'It started with imitating. For instance, you play 'Perfect Strangers', right? There's a 5/4 rhythm in between that. It goes as 4/4, then a measure turns into 5/4. I didn't know that it was 5/4. I slurred it over with music and ear. Much later, I learned that the part is 5/4, do you understand? What is this 5?'

Then, participants were asked to mention the period that they considered themselves as 'novice'. Participant 1, 2, 4 and 6 responded the question concretely

by saying 3 years, 2 years, 2 years and 1 year respectively. Additionally, participant 2 made a sweeping statement:

'*We can say the first 2 years is the beginner's stage. Then, the progress stage follows. It's because at the proceeding stage playing along with songs and coordination begins, you have to increase your level to other drummers' level. We can consider the beginner stage as this; it exceeds at least 2 years*.'

Also, participant 6 approached in a similar manner by saying:

'One year. Everyone can learn this in a year. Well, I don't mean all of the coordination. I don't mean new sentences. You learn the logic, the basic as the spine, then it's yours, you play on the stage, make new sentences. It's totally different, because it's an endless journey'.

In addition to the period of novicehood, the duration of becoming a 'competent drummer' was asked. Since a solid response couldn't be received at the first-time question was pointed, it was elaborated as the 'period of becoming sufficient to raise students.' Participant 1, 2 and 3 responded as 6 years, 8 years and 5 years respectively, while the other participants mentioned their turning points rather than giving a numerical answer. For participant 4 the turning point was the accumulation of theoretical knowledge that he gained from the school, while for participant 5, likewise participant 2, it was playing with wide variety of bands playing diverse genres. Participant 6 stated that he became competent after he started teaching.

In terms of *'strengthening theoretical background', participant 4 referred to structured learning by saying:*

'at least my personal studies could be more efficient, if I have had learned the notation earlier. I wouldn't do things only by means of hearing or if I could have learned the techniques earlier, I wouldn't limit myself with rock grooves, rock songs, rock rhythms etc. I mean my improvement was delayed in such sorting. I

mean, I would like to have a more balanced learning process by proceeding a bit on this, a bit on that.'

Likewise participant 5. Participant 5 explained the curriculum at his music school in details by saying 'the question is related to what we do here'. Also, he highlighted the significance of structured learning by saying:

'This job starts rock-oriented and pop-oriented, I mean it begins pieces heavily with eighth notes. I mean, you cannot make a beginner kid to play a song of Miles Davis, or Commodores. You begin with simpler, songs with eighth notes, songs containing eighth hi-hat beats. After songs with eighth notes, sixteenth notes - I mean, when a beginner kid comes to the lesson you can't make him/her to play Shuffle or Swing'.

Participant 6 referred to importance of theoretical basis as well:

'if I had my current consciousness at that time, during the initial approximate one or one and a half year I would solve the logic and the mathematic of it, after that I would make my own sentences'.

Differences between Personal Learning Experiences and Teaching

Participant 1 mentioned the approach by stating:

'therefore s/he learns o note, a rhythm in accordance with the note, we study their accompaniment, then we move on with a second rhythm and note accompaniment. Actually, I realize that it's an important method for me, I use accompaniment.'

Similar to participant 2:

'by starting with the stick control, notation, adapting them to drum, directing to coordination exercises, then completing a full method. By the way- at that time of course, accompaniments to music is more beneficial during the transition period to drum by increasing students' motivation without discouraging them'.

Participant 3 mentioned that he applied the same method in order to overcome the boredom arising from metronome:

'there are also students coming here who really don't like the metronome and they quit drumming just because of it. It's because they get fed up with it, since there is a constant thing like this (clapping his hands with a particular rhythm) and you can not strike with respect to it. Then, it becomes really annoying. Either they overcome this or they literally quit drumming just because of it. Thus, instead of it, I made them to play on music for making it fun, since the tempo is constant is music'.

Participant 6 also approached in a similar way in order to avoid boredom, related to theoretical overload:

'I directly prepare a repertoire for the kid. What are the songs you like, can you bring them to me?'.

Differences between Personal Learning Experiences and Teaching

Initially, participants were asked to mention how they track their students' performances as an ice-breaker question. Apart from one-on-one studio lessons, participant 1, 3, 4 and 5 stated that some of their students send their recorded performances on Whatsapp to receive feedback. The scope of the question is to understand their familiarity with smartphones.

Criteria of Learning Performance

To illustrate, participant 6 exemplified by stating: *'for example, the learners at the age of their forties drew my attention. When I make them play something, they never forget.'*

Participant 2 also made a similar comparison between the two age groups by saying:

'Since they consider it as a hobby rather than profession, after a couple of lessons they feel completed and quit'.

Participant 6 also shared his observation*:*

'Especially, the kids progress faster without being aware of their improvement'.

Participant 5 said:

'if the kid is too little, for example a 6-year-old, comes for a year, then quits'

similar to participant 6:

'to illustrate, it took a month to spare his two hands, he was 7 years old (...) both hands were leaning to hi-hat, both hands were dropping to drum etc.'.

Cruces of Learning

To illustrate, participant 2 stated that the metronome should get involved in practices by saying:

'I make them to play the simplest stick control exercises with metronome'

while participant 1 approached more flexible:

'I don't start with metronome in the beginning, at a certain point it should definitely get involved in. Especially, I make the kids, who are in need, start in a short period of time. It depends on the student'.

Additionally, participant 4 also referred to 'groove/ostinato' by highlighting 'tempo accuracy':

'I expect them to generate something or after listening a song, repeating the song's rhythm. Even though it doesn't perfectly fit the original, I want them to repeat a

measure continuously or in a metronome study- when the tempo changes, I expect them to make paradiddle in a quarter or half note without my guidance.

Also, participant 5 pointed out a recommendation for pushing the limits:

'normally you should be able to play single, double stroke or paradiddle as sixteenth notes s in 200 bpm. However, in professional life that speed is not even sufficient'.

Participant 2 also highlighted that coordination should be adopted as a fundamental aspect:

'when I start to teach paradiddle, I don't only include the hands but also like right-left right kick- I mean the first two is right-left-right-right, but I did the last one with my foot (...) I believe that learning this in the beginning is useful'.

Additionally, participant 4 emphasized the muscle memory by referring to 'coordination':

'I believe that fundamentals should be embraced by the muscle memory in a really good level, since it will be effective in their future improvisation performance and the new rhythms they will learn.'

'while I am gripping sticks like this, my thumbs turn to me. This is called French Grip. If the palms are turned on the ground, it's called German Grip. I didn't used to know whether this was French or German grip until the teacher showed me. Normally you grip the sticks like this, right? However, it should be held like this. Actually, these two fingers don't have a contribution, they are just for the support. These three fingers (thumb, index finger, middle finger*) have the main function* (…) *Playing consciously, I mean, you must know what you are playing'.*
(Participant 5)

Challenges of Learning & Teaching

'Since I study with very young kids, I mean, the period I started and rigid education model in the conservatory – I don't teach notes to kids at the beginning. I teach them to play with numbers, then- after they derive pleasure for a while, I match them with notes.' (Participant 1)

Out of Condition

Participants' personal practice habits will be discussed in the category. As ice-breaking questions, practice frequencies and duration of each practice session, excluding the breaks, were asked. Participant 2 and 4 stated that they currently practice every day and participant 1 said that she practices once or twice a week, while other participants didn't mention a specific period since it depends on their availability in their schedule. However, they referred to their past practicing frequencies while responding. To illustrate, participant 3 didn't point out a well-defined practicing schedule by saying:

'there are periods which I concentrate for 3 months and practice 7-8 hours a day. Also, are there many periods that I practice only for once or twice a week. It depends, and also, once you become a professional, you achieve a certain level, you have less spare time.'

Similar to participant 5's statement: '*from 2000 to 2006 I practiced 3-4 hours a day. However, after 2006 the frequency of my solo practice sessions reduced* (by referring to professional life)'

Participant 6 also used to spare his 2-3 hours for practicing during the Covid-19 pandemic. Participant 1, 4 and 5 mentioned that they practice for an hour in a single session, while the other participants didn't mention a specific time period.

Cruces of Practicing

Initially, participants were asked to mention whether they always practice with the acoustic drum setup. Participant 1, 2 and 3 stated they don't practice with the acoustic setup. Participant 1 and 2 practices on practice pads, while participant 3 practices on electronic drum kit. Participant 4, 5 and 6's choice depends on the location and the task to be accomplished. Participant 4 expressed this binary condition by saying:

'Well, generally I play on the acoustic drum. I own an electronic drum, but generally I prefer the acoustic setup at the school'

Likewise participant 6's situation:

'currently, there's an electronic drum here (referring to his home studio). *Since it's connected to the system, I directly record and send it. However, if I want to practice continuously, I always practice on the acoustic drum'*.

Participant 6 highlighted that distinction by saying:

'Since the things you play include nuance and dynamic, you prefer to play on the acoustic drum. However, if you want to solve the structure, you can play on the digital'.

Secondly, their practicing location was asked. Participant 1, 2 and 3 mentioned that they are able to practice at home due to handicap of not being able to place an acoustic drum inside their living areas. Participant 6 also stated that he practices at home, but he practices at his home studio where an acoustic setup is located in. Participant 4 and 5 are tended to play at the school, where they coach their students, for playing on the acoustic setup.

Thirdly, the practicing tools that participants use were asked. All participants mentioned that they use digital metronome. Additionally, participant 1 and 2 said that they use tuner. Participant 3 and 6 record their practice sessions. Participant 2

and 5 mentioned that they use speed changer application for practicing. Participant 2 also emphasized that he uses the application for his students a well:

'with the help of that application you can adjust the song for the student rather than adjusting the kid for the song via slowing down the song's speed or reducing the tempo. (laughs) *Therefore, we're trying to fulfill the kids' expectations. At least, it enables a motivation to them.'*

Participant 5 highlighted that technology in a similar approach by saying

'to illustrate, there isn't a greater blessing than being able to slow down, and then listen to a section that you cannot play'.

Participant 2 also use a notation software to generate grooves and a stick control exercise application that includes rudiment tutorials.

Another ice-breaking question was about the ideal period of time that a beginner should spare for drum kit practices. All participants' responses range from 15 minutes to an hour, excluding participant 6. Participant 2 and 3 also pointed out the importance of practicing daily. Participant 3 expressed this condition by saying

'I prefer them to play around 15-20 minutes every day rather than practicing an hour every other day. It's because you progress faster if you practice daily'.

Apart from the other participants, participant 6 said *'I wish they could practice. They should practice minimum for 3-4 hours. I mean- it's like taking 10.000 steps a day. This doesn't work by practicing for an hour a day. Minimum 4 hours. Minimum. Actually 4 hours is nothing compared to a human's lifetime'*.

The last ice-breaking question of the category was related to physical or digital tool recommendations for assisting learners' practice sessions. Participant 1 and 2 emphasized the practice pads. While participant 1 recommended the wearable practice pads, due to its portability, by saying:

'Well that can be- we used to place the practice pad on our knees. To our front calf. Think of a little snare drum circle, think of wooden snare drum circle on it.

There's only a rubber where you will strike on. There's a connection that corresponds to belt and you fasten it to your calf with hook and loop. Then you make wrist practice on your leg'

Participant 2 mentioned the digital ones which embodied with metronome:

'There are pads for the beginners which includes a metronome on top. There are tools that embodies the metronome and practice pad as a whole. Actually, I believe that these digital tools are more successful in terms of being visually stronger and their ease of implementation.'

Participant 4 recommended simple drum pad applications for trying rhythm combinations. Participant mentioned websites where learners can access play along versions of songs and speed changing software. Participant 6 suggested notation programs for generating grooves.

Participant 1 illustrated her advice by saying:

'I don't give any homework to them. I don't have such kind of tracking. I just want them to, it can be counted as a homework, to sit in front of the TV with sticks. (…) *I want them to grab the sticks and strike directly. This is all I want'*.

He also supported stick control practices by saying: *'practicing with songs can't be counted as practicing'*.

Design Specifications

'It was even sufficient for me to say that I am on the right track. It would be good to overcome that obsession. I actually had hesitations such as whether am I holding the sticks correctly – oh, the teacher showed me how to grip right, so I am doing it the right way- at these issues. However, the issues occurred afterwards like am I playing on the right time period, are these values correct- the values I am playing. If someone

*would have said "yeah boy, you are playing correctly" I could overcome and it would pass' (*Participant 3)

'There's a game I play with my students. There are numbers from 1 to 10. 1, 4, 7, 9 and we clap at 10. 1 (clap), 2, 3, 4(clap), 5(clap), 6, 7 (clap), 8, 9 (clap), 10 (clap). Da (clap), ta, ta da (clap), ta, ta, da (clap), ta, ta (clap), ta. Actually, it constitutes a rhythm. I convert it to teach them counting and dividing the time. (...) I make them to play in an elimination-based way, so when they miss to clap it becomes more fun and enjoyable.' (Participant 2)

'We used to determine seven different tempi. *The kid says three of them, I say four and I expect them to play seven stroke precisely at these seven tempi. Our only precondition is playing the single stroke by the way. Precise performance sometimes takes 5 seconds, sometimes takes 10 seconds- depending on the kid's level. In case of performing the single stroke accurately- I have a candy case, I offer them waffle or sweet etc. It's an award-based game' (participant 4)*

Interactions

'Gerçek Dorman's method is like a book that explains a task to a very young child. D-52. A drum kit journey, lasts for 52 weeks, is written there. For example, I recommend it to all of my students. It's because it's a source that can explain everything from every perspective ranging from the posture to exercises you shall dive in. It guides you so good and it summarizes so nicely that it doesn't make you get bored. For instance, all the single strokes, double strokes that you do- you encounter with them every 5-10 pages. It says 'now play it in 85 bpm'. You always come across with paradiddle.' (Participant 6)

D. Curriculum Examples from 'D52' Drum Set Method of Gerçek Dorman

Week	Rhythm study	Stick control	Coordination	Repertoire (Artist, song)
1	quarter hi-hat/quarter bass drum-snare drum variations **(60 bpm)**	single + double stroke with eighth notes **(60 bpm, 3 min. each)**	basic hand-foot exercises with quarter notes **(60 bpm, 3 min. each)**	-
2	quarter hi-hat/eighth bass drum-snare drum variations **(60, 70 bpm)**	single + double stroke with eighth notes **(60 bpm, 2 min. each)**	basic hand-foot exercises with eighth notes **(60 bpm, 3 min. each)**	-
3	quarter hi-hat/eighth bass drum-snare drum variations **(60, 70 bpm)**	single + double stroke with eighth notes **(70, 80 bpm, 3 min. each)**	quarter beats with hands, eighth beats with feet **(70, 80 bpm, 3 min. each)**	**Neil Young:** 'Heart of Gold', 'Down by the River' **Tina Turner:** 'Private Dancer', 'We Don't Need Another Hero' **Rod Stewart:** 'Maggie May', 'Young Turks' **Huey Lewis and the News:** 'If This is It', 'Don't Make Me Do It'
4	Basic rock rhythms, eighth hi-hat/bass drum and snare drum variations **(70, 80 bpm)**	single + double stroke paradiddle, reverse paradiddle, inward paradiddle, outward paradiddle with eighth notes **(70, 80 bpm, 3 min. each)**	eighth beats with the snare, bass drum and hi-hat **(70, 80 bpm)**	**John Cougar Mellencamp:** 'Hurt So Good', 'Small Town' **King Crimson:** 'I Talk to the Wind', 'Epitaph' **Melissa Etheridge:** 'Ain't It Heavy', 'Message to Myself' **Roxette:** 'Crash! Boom! Bang!', 'How Do You Do!' **Tom Petty and the Heartbreakers:** 'American Girl', 'Learning to Fly' **Cher:** 'You Better Sit Down Kids', 'Believe'
5	Starting the rhythms with crash cymball **(80, 90 bpm)** Opened/closed hi-hat **(60, 70 bpm)** 3/4 rhythms **(70, 80 bpm)** Single backbeat **(80, 90 bpm)**	-	-	-
6	eighth hi-hat/sixteenth bass drum variations **(70, 80, 90 bpm)**	singe/double stroke & paradiddle combinations with eighth notes **(70, 80, 90 bpm, 3 min. each)**	double stroke snare, bass drum, hi-hat exercises with eighth beats **(70, 80 bpm)**	**The Police:** 'Every Breath You Take', 'Roxanne', 'Message in a Bottle' **Genesis:** 'Land of Confusion', 'I Can't Dance', 'That's All' **Phil Collins:** 'In the Air Tonight', 'Another Day in Paradise', 'Sussudio' **Bryan Adams:** 'Summer of 69', 'Everything I Do, I Do It For You'
7	eighth hi-hat, snare drum/sixteenth bass drum variations **(60, 90 bpm)**	exercises with the drum kit with eighth notes **(80, 90 bpm, 3 min. each)**	Paradiddle coordinations of snare, bass drum and hi-hat with eighth notes **(80, 90 bpm, 3 min. each)**	**Steely Dan:** 'Home at Last', 'Do it Again', 'Peg' **Steve Miller Band:** 'Swingtown', 'The Joker', 'Abracadabra', 'Fly Like en Eagle' **Journey:** 'Separate Ways', 'Don't Stop Believin', 'Any Way You Want It' **Bruce Springsteen:** 'Born to Run', 'Badlands', 'Dancing in the Dark'
8	eighth hi-hat/sixteenth bass drum variations **(60, 90 bpm)**	single stroke with fills (attack) with eighth notes **(80, 90 bpm)**	Reverse paradiddle coordinations with snare drum, bass drum and hi-hat with eighth notes **(80, 90 bpm, 3 min. each)**	**Toto:** 'Hold the Line', 'Rosanna', 'I'll Be Over You' **Jethro Tull:** 'Locomotive Breath', 'Fat Man' **Dire Straits:** 'Sultans of Swing', 'Money for Nothing', 'Calling Elvis' **Fleetwood Mac:** 'Go Your Own Way', 'Hellhound on My Trail' **Richard Marx:** 'Nothin' You Can Do About It', 'Hazard', 'Endless Summer Nights' **Yes:** 'Yours Is No Disgrace', 'Roudabout', 'Owner of a Lonely Heart'
9	eighth hi-hat/sixteenth bass drum variations **(70, 95 bpm)**	half beats with drops: single/double stroke, paradiddle, reverse paradiddle, inward paradidle, outward paradiddle with eighth notes **(60 bpm, 3 min. each)**	Inward paradiddle coordinations with snare drum, bass drum and hi-hat coordinations (with eighth notes) **(80, 90 bpm)**	**Beatles:** 'I Saw Her Standing There', 'Help', 'Sgt. Pepper's Lonely Hearts Club Band' **Queen:** 'Bohemian Rhapsody', 'Don't Stop Me Now', 'Made in Heaven' **Pink Floyd:** 'Let There Be More Light', 'Money', 'The Wall Part 1, 2 & 3', 'The Trail' **The Doors:** 'Break On Through (to the Other Side)', 'The WASP' **Heart:** 'Barracuda', 'Who Will You Run To?' **Mountain:** 'Mississipi Queen', 'Whole Lotta Shakin' Goin' On'
10	straight-four snare drum **(70, 80, 90 bpm)**	-	Triplets **(60, 70 bpm, 3 min. each)** Bass drum & hi-hat coordinations **(60-90 bpm, 3 min. each)**	-
26	sixteenth hi-hat, snare drum and bass drum variations **(60, 100 bpm)**	paradiddle/double paradiddle combinations with sixteenth notes **(60, 100 bpm, 3 min. each)**	reverse paradiddle linear coordinations with eighth notes **(60, 100 bpm, 3 min. each)**	-
27	sixteenth hi-hat, snare drum and bass drum variations **(60, 100 bpm)**	triplet combinations including changing dynamics with sixteenth notes **(60, 100 bpm, 3 min. each)**	reverse paradiddle linear coordinations with eighth notes **(90, 100, 110 bpm, 3 min. each)**	**Sam and Dave:** 'Hold on I'm Coming', 'Soul Man' **Wilson Pickett:** '634-5789', 'Everybody Needs Somebody To Love' **Aretha Franklin:** 'Respect', 'Think', 'Chain of Fools' **Otis Redding:** 'You Send Me', 'Ole Man Trouble' **James Brown:** 'Please, Please, Please', 'Think!', 'Cold Sweat', 'Funky Drummer'
28	sixteenth hi-hat, snare drum and bass drum variations **(60, 100 bpm)**	paradiddle/triple paradiddle including changing dynamics with sixteenth notes **(60, 100 bpm, 3 min. each)**	triple paradiddle coordinations with sixteenth notes **(90, 100, 110 bpm, 3 min. each)**	**Stevie Wonder:** 'Signed, Sealed, Delivered (I'm Yours)', 'Superstition', 'Sir Duke' **The Meters:** 'Cissy Strut', 'Look-Ka Py Py' **Average White Band:** 'Pick Up the Pieces', 'Cut the Cake' **Kool and the Gang:** 'Celebration', 'Get Down On It'
29	sixteenth hi-hat, snare drum and bass drum variatons **(80, 110 bpm)**	paradiddle/double paradiddle/triple paradiddle with sixteenth notes **(110, 120 bpm, 3 min. each)**	paradiddle/double paradiddle/triple paradiddle with sixteenth notes **(90, 110 bpm, 3 min. each)**	**Spin Doctors:** 'Two Princes', 'Little Miss Can't Be Wrong' **Commodores:** 'Easy', 'Machine Gun' **Parliament:** 'Give up the Funk', 'Flash Light' **Tower of Power:** 'What is Hip?', 'Soul Vaccination' **David Lee Roth:** 'Yankee Rose', 'Shyboy', 'Just Like Paradise' **Earth, Wind & Fire:** 'September', 'Boogie Wonderland' **Red Hot Chilli Peppers:** 'Get Up and Jump', 'Around the World', 'Can't Stop', 'Look Around'
30	**Introducing 'Groove', 'Hooking-Up', 'Form' and 'Musical Arrangement' concepts**			

Week	Rhythm study	Stick control	Coordination	Repertoire (Artist, song)
48	Cascara, Clave, 6/8 Afro-Cuba, Songo, Bolero, Bomba, Cha-cha **(80, 140 bpm)**	-	Cascara, Clave coordinations **(100, 110 bpm)**	**Machito & His Afro-Cubans:** 'Holiday Mambo', 'Carambola' **Tito Puente:** 'Oye Como Va', 'Mambo Gozon' **Arsenio Rodriguez:** 'Los Sitios Hacere', 'El Reloj De Pastora' **Los Van Van:** 'Esto te Pone la Cabeza Mala', 'Temba, Tumba y Timba' **Batacumbele:** 'Batacumbele Te Saluda', 'Cachita' **Irakere:** 'Bacalao con Pan' **Los Monequitos de Matanzas:** 'Oyelos de Nuevo', 'Congo Yambumba' **Gonzalo Rubalcaba:** 'Recordando a Tschaikowsky'
49	Rumba, Mozambique, Merengue, Mambo, Guagauanco **(80, 120 bpm)**	-	Singe/double stroke/paradiddle/ songo kick coordinations **(80-120 bpm, 3 min. each)**	-
50	Chicago Shuffle, Backdoor Shuffle, Bo Diddley, Bluegrass, Purdie Shuffle, Funk rhythms, James Brown rhythm, D&B rhythms, King Kong/Soul Vaccnation rhythm, March, Disco rhythms, Middle East rhythms **(80, 105, 140, 160, 165 bpm)**	-	-	-
51	Baio, Bossa Nova, Samba rhythms **(80, 160 bpm)**	-	Mixed rudiment exercises with Baio kick (with sixteenth notes) **(80, 110 bpm, 3 min. each)**	**Joao Gilberto:** 'Desafinado', 'Corcovado', 'Bim Bom' **Astrud Gilberto:** 'Agua De Beber', 'The Girl From Ipanema' **Sergio Mendes:** 'Mas Que Nada', 'Magalenha' **Dorival Caymmi:** 'Saudade Da Bahia' **Jair Rodriguez:** 'Deixa Isso Pra La', 'Disparada' **Antonio Carlos Jobim:** 'Wave', 'Aguas de Março' **Chico Buarque:** 'Cotidiano', 'Roda Viva' **Milton Nascimento:** 'Tudo o Que Voce Podia Ser', 'San Vicente'
52	Calypso, Reggae, Ska, Soca **(80, 260 bpm)**	-	Mixed rudiment exercises with Bossa Nova kick (with sixteenth notes) **(100, 110 bpm, 3 min. each)**	**Los Hermanos Rosarios:** 'Adolescente', 'Alo' **Mighty Sparrow:** 'May, May', 'Congo Man', 'Sparrow Dead' **Bob Marley:** 'One Love', 'Soul Rebel', 'Stir It Up' **Peter Trosh:** 'Legalize It', 'Get Up, Stand Up' **Black Uhuru:** 'Sinsemilla', 'What is Life' **Pablo Moses:** 'A Song' **Inner Circle:** 'Sweat (A La La La La Long)', 'Da Bomb'

E. Informed Consent Form (Focus Group)

This study is conducted by Middle East Technical University Industrial Design Department Graduate Studies student Arat Baran Keskin for MSc thesis. This form intends to inform you about this study and ask for your consent.

Aim of the Study

The aim of the study is to investigate the potentials of gamification as an intermediary tool for encouraging novice players to learn and practice drumming. Experiences of drum learning and teaching will be investigated with the help of data gathered from drum instructors/tutors, who will be involved in evaluating potential design solutions by means of a focus group to create a basis for design iteration.

Voluntary Participation

If you accept to participate the study, you will be expected to participate in a focus group conducted online. This session may take between 45-60 minutes. Your participation in this study is voluntary, as you can refuse to take part at any time without giving a reason. Please do not hesitate to ask any question at any time.

Information to be Collected

During the focus group session, you will be expected to share thoughts, opinions and insights regarding with the presented design concepts. The focus group will be recorded in audio format. Before recording starts and after recording ends, you will be notified.

Your Consent

The researcher and the researcher's supervisor will analyze the recordings of the focus group for the purposes of the research. No-one else will see or hear the records. A thesis will be published containing your contributions. The data used in this thesis will remain anonymous, meaning that you will not be identifiable, and your comments and actions will be confidential in this research.

We would like to thank you in advance for your participation in this study. For further information about the study, you can contact;

Arat Baran Keskin

Phone:

E-Mail:

I am participating in this study totally on my own will and am aware that I can quit participating at any time I want. I give my consent for the use of the information I provide for scientific purposes. (Please return this form to the data collector after you have filled it in and signed it).

Name Surname	Date	Signature
	...../...../.....	

F. Focus Group Transcriptions

Concept 1

P2 – *Can we arrange this bpm manually, or is there a timing? For instance, there can be exercises with four different tempi in a minute. It can move on to next in a minute I mean. Can it be arranged or is it pre-set?*

P1 – *Can they have a conversation? (...) I am thinking that in the online games- for example my son improved his English- I mean he can speak in English and he owes this solely to computer games. They talk so much that- I wanted to ask that whether is there a similar function in this example. (...) Even it's not a long conversation- well I don't know, maybe there can be a platform to let them talk about drumming or the application.*

P4 – *They are used to do it, thanks to games.*

P1 – *For example there will be 100 people who set their heart on drumming. Thus, there is situation where people have in common.*

P3 – *S/he can ask a point which wasn't understood or I don't know- it enables a situation that the student can freely consult a peer or a friend rather than an instructor.*

P1 – *All in all, it's necessary in a technical way, but as I said, it's because they chat on all the online games, both written and vocal.*

Concept 2

P3 – What does the compatibility depend on? What are the criteria that decide whether it's compatible and not?

P1 – *The most important thing is that the measure, timing shall be correct. You have to fill the measures with rests or with a 4/4 attack if the song's measure is 4/4- I mean you have to fill the measure correctly. Apart from this, no one can decide upon whether it sounds nice or not. It's a matter of taste. It's appropriate. However, the during the song's flow – I mean you cannot make an attack like 'drrrrr' in a slow piece, nobody prefers that but even this action cannot be regarded as wrong. The important thing is playing on time, filling compatible with the measure.*

P3 – *If your fills remain inside the empty measure-*

P1 – *It's nice to sound compatible but it's relative. I mean, you may strike for four times or you may leave a rest there or two rests. It's a relative thing. I believe that it's not possible to say right or wrong, as long as it's on the measure. (...) For instance, in 'Nothing Else Matters' the attacks or obvious and sounds compatible*

with the song. So, you cannot make those fills like you do in a metal song even if they are inside the measure.

P3 – *Yes, you cannot make pop song attack for a slow song.*

P4 – *It's about internalizing the soul of the song; it's also related to its grooves.*

P3 – *There's a logic for improvisation, that's true but it's concept for playing in the measure. It's okay and reasonable, because every beginner experiences such problems. They don't know where to and how to make those attacks. To illustrate, I tell my students to blather freely, but the only rule is that the attack, returning to main rhythm shall be on correct time. However, do any mistake you want to. You shall make that mistake to see how to proceed for the next time. That's why I asked the compatibility. (…) Actually, such evaluation can be possible; since we have just talked about the slow music example. You cannot expect triple crochets in 'Nothing Else Matters', just imagining. Everything is OK, you can enable this by the speed also. I mean, by thinking that a rapid attack sounds incompatible in a slow music. According to that, the programme will sense that whether your attack is overwhelmingly constituted by sixteenth, eighth notes or triple crochets. What's the value? Maybe it can be assessed in that way. Since it will operate via software, it can be possible. (…) However, this won't measure the accuracy of the attack but the compatibility. Hence, there will be two layers: accuracy and compatibility.*

P2 – *However, it cannot measure this, how can it be possible? It cannot measure its compatibility.*

P3 – *All in all, I agree that no one can say it's right or wrong. In the end, it starts and ends in the same measure, but there are musicians taking the stage. S/he starts a slow song in the stage, while people dance on the floor s/he rips through with triple crochets (laughs). When you listen to this live, it sounds irrelevant. OK. However, no one can say that it's wrong. So, it's contradictory.*

P2 – *Yes, it's open-ended.*

P3 – *Of course you would say what was that all about.*

P1 – *Thus, it shall only be related to accuracy, timing and measure. Is the measure right or wrong?*

P2 – *Yes, can be. It can only evaluate for the measure.*

P4 – *The song can be defined to the programme. The compatibility in the background can be defined.*

P3 – *OK, but we are talking about the beginner students-*

P4 – *But we are talking about the musicality. S/he can rip through with rapid attacks and rudiment wills and thinks that s/he rocks but s/he misses the soul of the music. Thus, that rule becomes no more applicable.*

P2 – *That's why I ask this. It shall be evaluated mathematically. Like P1 said, s/he shall start at the beginning of the measure and fill it on time. I don't think that it cannot measure the musicality.*

P3 – *There is a notation uploaded here. Is there an option whether the students can see their mistakes on a sheet music? I mean, is there an area where the student can look and say 'oh, I played that part wrong'? (...) That would be nice, if there's a full sheet music. All in all, s/he can comprehend his/her faults. It's similar to the drums partition in Guitar Hero. When s/he can not strike correctly, it's shown in the screen. However, it's better not to show it real-time in order to prevent the distraction; but in the end if there is an option that enable to see the points played wrong, that would be nice to correct their mistakes.*

P1 – *Exactly. For example, it can be shown like 'it's on 1 min. 10 sec.'. It can be highlighted in red.*

P3 – *Maybe, s/he missed striking the same kick for five times or an there can be sixteenth kicks in the song and the student stroke less than required. Thus, there shall be an area to show it, in order to let the student specifically practice that fault. S/he shall know where to fix and what to exercise.*

P1 – *Well, let's assume s/he made a mistake of X percent. However, when s/he doesn't know where the mistake is, s/he will keep on doing the same mistake again and again.*

(…)

P3 – *Students shall be courage but they cannot start to take action due to fear of making a mistake. I mean, you got stuck in the middle of the rhythm. I say to them you shall decide upon what sounds nice to you after a particular time'. (...) Thus, you act more like an advisor instead of being a demotivator. I mean, I never preferred to say 'it's wrong', but you have to make the guidance. In the end, you shall become experienced.*

P4 – *Is there something missing in the song?*

P3 – *Certainly. For instance, there's an attack you love to make, but it came in a such point that it lasted too long. So, you have to be faster. You cannot know without trying it. It's valid in the kids as well. Since they act intimidated, they are not willing to do. The case of 'what if I do wrong, what if I make a mistake?'. That's why I observed. By 'blathering', I mean to play and show what's hidden inside.*

Concept 1

P2 – *As a said previously, arrangement of the tempo manually can be an option. I mean, instead of playing 60 bpm steadily, it can be increased by adding 2, 4 or 5 bpm. It can be set manually. It's because, I observe it in my students a lot. They get bored quickly. If you increase the tempo in every 30 seconds two by two, three by three or four by four- it depends on the student, but they got more engaged with the exercise. If you make them to practice in steady tempi for one or two minutes, it's not sustainable. They are based on my observations. (…) Maybe the student can set the arrangements and shift to levels automatically. For instance, s/he improved the exercise from 60 to 80 bpm. Then, you gave a badge for accuracy on 80 bpm. After that the student moved on and won the badge for performing at 100 bpm. S/he earned it too. Then, as feedback, the app may tell that 'You won two badges' today. Something like that. However, then she started again, but this time with 100 bpm and failed. For that case, different scenarios can be considered.*

Comparison

P3 – *There can be challenges between the active users who currently use the product. For example, a single stroke challenge – let's assume that you and I are online. You don't need to chat, system allocated automatically. At 60 bpm s/he makes single stroke against you, then you do against him/her. Then, the difficulty increases. It may become more fun, a small and sweet competition. Also, it can be operated by a bot as well. It's not necessary to do with online players but the student can think in that way.*

P4 – *Like the duellos of online gamers.*

P3 – *Something like a duello. (…) I will challenge you, then the system will give us the tempi automatically and make us to play four bars at 60 bpm until one of us fails. Let's assume that I come until 100 bpm and failed. I eliminated. Simple.*

P1 – *It can become entertaining.*

P3 – *It has been thought as young beginners, but it's applicable to all age groups. Comfortably. It can be implemented on the other design. Similar.*

P1 – *It depends on their current activity on the app. (…) Actually, it's not even necessary. Challenge can be sent in a different time slot, then the other student can be notified about the challenge.*

P3 – *Likewise the 'Scrabble' game.*

(…)

P1 – *I think the first one is suitable for usability and portability. However, none of the students enjoy doing these stick control exercises in the first design. So, the second one is much entertaining and appealing, but the first one is much practical.*

You can take it anywhere, but the drummer badges, improvisation challenges in the second one is much attractive. (…) Both are nice, but nobody likes doing the rudiment exercises regardless of their age. 5-year-old doesn't like, similar to 50-year-old. You have to beg to make them practice.

P3 – *In our country, the rudiment is an unlovable notion. In the end, we all know that, in more didactic or disciplined systems, students' first years or the first two years depend on rudiment exercises. (…) Not only limited by single stroke or the other basics, but more complicated variations are considered important at many points. So, I am in a dilemma to choose one among them. It sounds logical to have an integrated thing. (…) Let's assume such scenario- every drummer has a warm-up process. They warm-up their hands, makes a few single/double stroke exercises. I make my students to do it before the lessons by making to them to exercise with the pad for ten minutes. S/he can not sit on drum kit before doing it. A similar case can be implemented. In the screen, there can be an obligatory 10 minute-warm-up session. Before the student completes the exercise, s/he cannot proceed to the kit. It can be mandatory. You shall do it, OK, then go ahead with playing on the setup, practice the songs.*

P1 – *These two are not different from each other.*

P2 – *But if you make it compulsory, they may become irritated. (…) An integration is OK, but it shouldn't be obligatory.*

P3 – *At least for 5 minutes, please. (laughs)*

P2 – *Firstly, do the rudiment exercises, then play the songs. OK, it might be perfect; but everyone may not prefer this. (…) Doesn't matter for 15- or 16-year-old. It's the same for the 50-year-old.*

P3 – *However, at least it will offer a challenge. (…) There should be a challenge to amuse. In that stage there shall be a challenge to maintain all the exercises. S/he will warm-up, practice and do technical exercises. Furthermore, these can be operated on the kit, pad is not so necessary. We all can make single stroke on the setup as well.*

P2 – *Yes, there should be something to attract people and make them eager to do it (rudiments) (…) It shall be appealing. We may turn that boring part to appealing to make everybody to do it. Enthusiastically. Otherwise, winning badges etc. won't make such sense.*

P3 – *But yes, there can be an integration.*

P2 – *I am thinking of integration as well. I would love to.*

P3 – *However, by considering motivation, fun and encouraging to exercise – if we have to choose a design among these two, of course, and unfortunately, the second model is more applicable. Rudiments out, the drums in.*

P1 – *The first concept is the grammar-oriented, the second is more fun-oriented and popular concept. (…) To illustrate, practicing with the metronome is too boring, but the metronome click can be replaced by a song with the same tempo. It's like exercising along a song. Let's assume, a song with 120 bpm and 3 minutes length can be used while doing the rudiment exercises. (…) I used to practice rudiment exercises on the pad with fast songs in the background. For instance, practicing with music instead of metronome was much fun to me. So that, the metronome click can be replaced by a song in the first version.*

P3 – *I don't think that the first one can be used for more than a year. I wouldn't use it for more than a year, if I were a student. I would like to proceed to the second one. Isn't it true?*

P2 – *We have to revive the first one. It's valid also for us. I tried to make it in the lessons. All in all, consider this (rudiments) as a language. You will try to tell something, but you are unaware of the words. First you shall teach the words, then proceed to next stage. However, nobody wants to learn the words, but tries to talk. Hence, there is a nonsense. Thus, there shall be motivating and enjoyable ways to teach these words, but I don't know how to do it as well.*

P1 – *The aim here is a challenge, a competition. It's also valid for the kids, being a part of that competition makes this study more attractive. 'Oh, I reached to 120', 'I exceeded 140'- that would make attractive.*

Reminders

P1 – *Yes, it can send messages, or notifications. 'We missed you', 'We missed your strikes' (laughs)*

P3 – *They work notification-based. In the beginning, you have to give permission. It notifies you. It can be applied. In case s/he doesn't use for a month, a motivation can be enabled via notifications.*

P2 – *Yes, it can be improved. It can be developed during the game also. It can be developed with updates. Like new badges, or the badge of X is now available etc. They can be done by means of updates. Anyway, keeping the badges updated can contribute to user's engagement as well. Users may like new achievement badges thanks to updates.*

P3 – *Sure, rather than a thought like 'what the hell, we always have the same badge', it would be better to make small changes. Even if you make significant progress, the case shouldn't be like 'why am I still on the rockstar level'. There can be something else.*

P2 – *Well, I don't know- for instance there can be a 'Special Collection of Buddy Rich Badges', if you manage to this, you can earn that – there can be tournaments.*

To illustrate, Buddy Rich tournament with different Buddy Rich badge designs. The ones who win that tournament can earn the badge or can upgrade his/her level.

P3 – *They will give up on using the first one for sure. That's how it happens. We have never seen a student practicing for 6 months in that proper way. However, we put them between the tasks, OK, but regularly we have never- there shall be something that – all in all, even if we make regular lessons once a week, we have to make it twice. Twice a week. One technical lesson, one practical lesson. (...) I used to do it for a while, I made it twice. I tried to gather all my students once a week. It lasted for three weeks. I made a group lesson; all my students brought their practice pads. Only for three times. Not more than that. (...) However, the kids were having fun.*

P1 – *Due to competition.*

P3 – *There is an interaction. Nobody wants to do to by their own. (...) Thus, it's important to avoid making them feel lonely, even in the applications. (...) Integration is the best, integration is perfect. Thus, the combined version will last for 3 or even for 5 years.*

P2 – *Hit two targets with one app.*

P3 – *In the future- updates etc. You may initialize with the second version and involve the rudiments with updates, based on 'Stick Control Method' by George Lawrence. Triplets and so forth.*

P1 – *If both can be integrated not only 2, it can be used even for 5 years.*

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G. Ethical Approval (In-depth Interview)

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14 NİSAN 2021

Konu : Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi : İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Owain PEDGLEY

Danışmanlığını Yürüttüğünüz Arat Baran KESKİN'in "Gamification as a method to Encourage Novice Players to Learn and Practice Drumming" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve **106-ODTU-2021** protokol numarası ile onaylanmıştır.

Saygılarımızla bilgilerinize sunarız.

Dr.Öğretim Üyesi Şerife SEVİNÇ
İAEK Başkan Vekili

H. Ethical Approval (Focus Group)

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28 ŞUBAT 2023

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İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Owain PEDGLEY

Danışmanlığını yürüttüğünüz Arat Baran KESKİN'in **"Yeni Başlayanları Davul Çalmayı Öğrenmeye ve Pratik Yapmaya Teşvik Etmek için bir Yöntem Olarak Oyunlaştırma"** başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek **0098-ODTUİAEK-2023** protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.

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