

**ENHANCING USER EXPERIENCE MODEL THROUGH
MOTIVATION AND USABILITY FACTORS IN SERIOUS
GAMES FOR REHABILITATION**

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UNIVERSITI SAINS ISLAM MALAYSIA

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GAMES FOR REHABILITATION**

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Thesis submitted in partial fulfilment for the degree of
MASTER OF SCIENCE

UNIVERSITI SAINS ISLAM MALAYSIA

August 2022

AUTHOR DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

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ACKNOWLEDGEMENTS

In the name of Allah, The Most Precious and The Most Merciful

First and foremost, praise be upon to Allah whom ultimately we are depending on for asking for His guidance, strength and good health to face all the challenges and difficulties in order to complete this research. My deepest gratitude goes to my two supervisors Assoc. Prof. Dr. Waidah Ismail and Assoc. Prof. Dr. Norasikin Fabil, who have guided me throughout the entirety journey and gave me countless supports and useful advices while completing the research. To my beloved parents, Mr. Safian Sidan and Mrs. Nor Fazilah Che Din, my sincerest appreciation for your loves and supports in any way that I may have asked, may Allah reward your loves with His mercy.

Next, I would like to convey my gratefulness towards my siblings, family and friends for all the moral supports and the amazing chances they have given for me over years. Thank you for your endless motivational speech and togetherness along this meaningful journey. May Allah rewards your kindness with His blessings throughout your life. To my supportive colleagues in Room 4, all patients in SOCSO Tun Abdul Razak Rehabilitation Centre and two Master's Degree students from Universiti Sains Malaysia (USM), thank you for helping me out and guided me all the way until I have gained the confidence to make this research a success.

Before I ended this writing, I would like to dedicate a special thanks to Shaklee Malaysia, my uplines, side-lines and downlines for their guidance and opportunities given until I managed to pay my tuition fees for every semester using my own money. Last but not least, a special dedication to myself, who have been facing the journey bravely and overcome the challenges courageously, thank you for surviving the hardships. Thank you for letting you grow, and congratulations on every achievement that you have gained throughout the journey!

ABSTRAK

Teknologi telah berkembang dengan sangat canggih pada masa kini yang memberikan manfaat kepada masyarakat terutamanya kepada golongan kelainan upaya. Teknologi bantuan seperti robotik, simulator dan realiti maya dibangunkan dan digunakan semasa melakukan aktiviti harian di dalam beberapa bidang di Malaysia seperti bidang pemulihan (rehabilitasi). Sesi terapi di pusat rehabilitasi telah melibatkan penggunaan teknologi bantuan di mana orang kelainan upaya mendapatkan rawatan mereka dengan menjalani terapi harian. Teknologi bantuan menggunakan permainan serius telah dimasukkan ke dalam sesi Latihan untuk menggalakkan pengguna merasai keseronokan dan pengalaman kehidupan yang sebenar. Penyelidikan ini diadakan di Pusat Rehabilitasi SOCSO Tun Abdul Razak yang memanfaatkan permainan serius dalam sesi terapi fizikal bagi orang kelainan upaya. Terdapat tiga (3) jenis teknologi bantuan yang menggunakan permainan serius di pusat rehabilitasi: (1) simulator, (2) robotik dan (3) realiti maya. Seramai empat puluh lima (45) orang responden yang dipilih untuk menyertai penyelidikan ini dan kajian rintis telah dijalankan lebih awal sebagai kaedah kebolehlaksanaan dengan mengambil Sembilan (9) responden yang berbeza. Kajian ini dijalankan melalui kaedah kuantitatif menggunakan persampelan bertujuan ke atas responden yang dipilih. Walaupun pusat rehabilitasi dilengkapi dengan teknologi bantuan yang canggih, terdapat limitasi dalam memulihkan motivasi dan membantu pengguna mengekalkannya sepanjang sesi terapi. Maka, di sinilah persoalan dan objektif kajian timbul. Adakah motivasi semasa bermain permainan serius menjejaskan prestasi orang kelainan upaya sebagai pengguna? Oleh itu, objektif utama kajian adalah mengenalpasti atribut pengalaman pengguna dalam faktor motivasi dan kebolehgunaan pada permainan serius dan menentukan hubungan antara faktor motivasi dan kebolehgunaan terhadap permainan serius. Justeru, atribut dalam faktor motivasi dan kebolehgunaan digariskan. Terdapat empat atribut dalam faktor motivasi dan kebolehgunaan yang dipilih daripada dua model berbeza: (1) Model Motivasi ARCS dan (2) Model Kebolehgunaan Nielsen. Hubungan atribut telah dikira menggunakan perisian SmartPLS. Kebolehpercayaan dan pengesahan setiap soalan dianalisis menggunakan pengiraan Cronbach's Alpha, Average Variance Extraction (AVE) dan

Kriteria Fornell-Larcker. Daripada tiga (3) hipotesis utama, setiap hipotesis memberikan pengalaman yang positif kepada pengguna namun terdapat dua (2) subhipotesis yang memberikan kesan negatif terhadap hubungan antara faktor motivasi dan kebolegunaan dengan pengguna. Akibatnya, hubungan negatif itu telah dihapuskan berdasarkan analisis daripada perisian dan pengesahan daripada pakar. Akhir sekali, penambahbaikan kepada model pengalaman pengguna dengan menggunakan faktor motivasi dan kebolegunaan telah dirumuskan.

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ABSTRACT

As technology has grown tremendously sophisticated nowadays, it benefits the society especially to the people with disabilities. The assistive technology like robotic, simulators, and virtual reality are developed and utilized in daily activities in various types of fields in Malaysia such as the rehabilitation field. The therapy sessions in rehabilitation centers involve the use of assistive technology where people with disabilities get their treatments by undergoing daily therapies. Assistive technology using serious games is embedded during the exercises to promote users the enjoyment and real-life experiences. This research was held in SOCSO Tun Abdul Razak Rehabilitation Centre which benefited serious games in physical therapy sessions for people with disabilities. There are three (3) types of assistive technology that use serious games for physical therapy in the rehabilitation centre: (1) simulator, (2) robotic, and (3) virtual reality. The total of forty-five (45) respondents who were selected to be in this research and the pilot study was conducted earlier using nine (9) different respondents. The research was conducted through quantitative method using purposive sampling on the chosen respondents. Though the rehabilitation centre is equipped with sophisticated assistive technologies, there are limitations in restoring motivation and helping users to sustain it throughout the therapy sessions. This is where the questions and objectives of the research arise. Does the motivation while playing serious games affect the performance on people with disabilities as users? Hence, the main objective is to identify the user experience attributes in motivation and usability factors on serious games and determine relationship between motivation and usability factors on user experience towards serious games. Thus, the attributes in motivation and usability factors are outlined. There are four attributes in motivation and usability factors which are selected from two different models: (1) ARCS Motivation Model and (2) Nielsen's Usability Model. The relationship of each attribute is calculated using SmartPLS software. The reliability and validity of each question are analysed using Cronbach's Alpha, Average Variance Extraction (AVE), and Fornell-Larcker Criterion. From three (3) main hypotheses, each hypothesis provided positive experience for users, however there are two (2) sub-hypotheses that negatively impact the relationship between

motivation and usability factors toward users. As a result, the negative relationships are eliminated based on the software analysis and suggestion from SmartPLS calculation and the experts' validation. Finally, the enhancement on user experience model using motivation and usability factors is formulated.



الملخص

نظرا لتطور التكنولوجيا بشكل كبير في الوقت الحاضر، فإنها تفيدها المجتمع بشكل خاص لأشخاص ذوي يتم تطوير التكنولوجيا المساعدة مثل الروبوتات والمحاكاة والواقع الافتراضي واستخدامها في الأنشطة. الإعاقة جلسات العلاج في مركز إعادة. اليومية في أنواع مختلفة من المجالات في ماليزيا مثل مجال إعادة التأهيل التأهيل التي تنطوي على استخدام التكنولوجيا المساعدة حيث يحصل الأشخاص ذوو الإعاقة على علاجهم يتم تضمين التكنولوجيا المساعدة التي تستخدم الألعاب الجادة. من خلال الخضوع للعلاجات اليومية تم إجراء هذا البحث في مركز. أثناء التدريبات لتشجيع المستخدمين على الاستمتاع وتجارب الحياة الواقعية تون عبدالرزاق لإعادة التأهيل والذي استفاد من الألعاب الجادة في جلسات العلاج الطبيعي SOCSO أنواع من التقنيات المساعدة التي تستخدم ألعابا جادة للعلاج (3) هناك ثلاثة. للأشخاص ذوي الإعاقة إجمالي خمسة وأربعين. واقع افتراضي (3) آلي، (2) جهاز هجاءه، (1): الطبيعي في مركز إعادة التأهيل مستجيبا تم اختيارهم ليكونوا في هذا البحث وأجريت الدراسة التجريبية في وقت سابق كدراسات 45 تم إجراء البحث بالطريقة الكمية باستخدام العينة الهادفة. مستجيبين مختلفين 9 جدوى باستخدام تسعة على الغم من أن مركز إعادة التأهيل مجهز بتقنيات مساعدة متطورة، إلا أن هناك. على الباحثين المختارين هذا هو المكان. قيودا في استعادة الحافز ومساعدة المستخدمين على الحفاظ عليه طوال جلسات العلاج هل الدافع أثناء ممارسة الألعاب الجادة يؤثر على أداء الأشخاص. الذي تنشأ فيه أسئلة وأهداف البحث ذوي الإعاقة كمستخدمين؟ ومن ثم، فإن الهدف الرئيسي هو تحديد سمات تجربة المستخدم في الألعاب الجادة وتحديد العلاقة بين عوامل التحفيز وقابلية الاستخدام في تجربة المستخدم تجاه الألعاب الجادة. هناك أربع سمات في عوامل التحفيز. وبالتالي، يتم تحديد السمات في عوامل التحفيز وقابلية الاستخدام

نموذج (2) و ARCS نموذج تحفيز (1): وقائية الاستخدام والتي يتم اختيارها من نموذجين مختلفين . SmartPLS يتم حساب العلاقة بين كل سمة باستخدام برنامج Nielsen. قابلية الاستخدام من و (AVE) يتم تحليل موثوقية وصحة كل سؤال باستخدام ألفا كرونباخ ، ومتوسط استخراج التناين فرضيات رئيسية ، قدمت كل فريضة تجربة إيجابية (3) من ثلاث Fornell-Larcker معيار تؤثران سلبا على العلاقة بين عوامل الحفيز وقابلية (2) للمستخدمين ولكن هناك فرضيتان فرعيتان نتيجة لذلك ، يتم التخلص من العلاقات السلبية بناء على تحليل البرنامج . الاستخرا تجاه المستخدمين اخيرا ، تمت صياغة تحسين نموذج تجربة . والتحقق من صحة الخبراء SmartPLS واقتراح من حساب المستخدم باستخدام عوامل التحفيز وقابلية الاستخدام .

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LIST OF ABBREVIATIONS*

SPSS	Statistical Package for Social Science
PLS-SEM	Partial Least Square Structural Equation Modelling
SEM	Structural Equation Modelling

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