THE IMPACT OF GAMIFICATION ON UNDERGRADUATE ENGINEERS' PUBLIC SPEAKING ANXIETY AND COMPETENCY

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MASTER OF SCIENCE IN TECHNICAL COMMUNICATION

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Institute of Technology Management and Entrepreneurship

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in fulfillment of the requirements for the degree of
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2025

DECLARATION

I declare that this thesis entitled “The Impact of Gamification on Undergraduate Engineers Public Speaking Anxiety and Competency’’ is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :.....

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Date : 6th May 2024

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master of Science in Technical Communication

Signature :.....

Supervisor Name :.....Dr Farah Shahnaz Binti Feroz.....

Date :.....6th May 2024.....

DEDICATION

I dedicate this thesis to my parents, Syed Osman Abadi bin Syed Zainal Abidin and Wan Rohila binti Wan Hassan. Dr. Farah Shahnaz, Puan Zanariah, and Dr. Indra gave me the drive and discipline to tackle my research enthusiastically and determinedly. This study would not have been made possible without their love and support.

ABSTRACT

The thesis aims to determine undergraduate engineers' public speaking anxiety levels before and after the intervention. This thesis also aims to compare undergraduate engineers' public speaking competency levels before and after the intervention. Finally, the thesis aims to determine the relationship between the participants' public speaking anxiety and public speaking competency. Although professional engineers possess good technical communication skills on paper, they often lack confidence and competence when it comes to public speaking in front of an actual audience. The struggle affects their job prospects, career advancements and credibility as professional engineers. Prior to the intervention, thirty undergraduate engineers responded to the Personal Report of Public Speaking Anxiety (PRPSA) to determine their level of public speaking anxiety. Sixteen students with the highest levels of public speaking anxiety were chosen for the intervention. Once the participants were selected, the Rhetoric: Public Speaking Game was played once a week for ten weeks. This intervention was conducted in a group of eight students for a duration of one hour per week. Public speaking competency evaluations were conducted before and after the intervention to give empirical evidence as to whether the gamification strategy affected the participants' competence. Paired sample T-test showed a significant decrease in the participants' public speaking anxiety post-intervention. The test also revealed that after the intervention, the participants demonstrated a significant increase in their competence in public speaking. Strong evidence of a significant negative linear correlation between public speaking anxiety and public speaking competency was found prior to the intervention. This effect was however diminished after the intervention. The gamification approach effectively reduced anxiety and increased competency among research participants. The study has several implications for future research and practice, including the need for further studies into other gamification interventions with a similar purpose to gain a broader view of what could work in helping students with public speaking anxiety and lower public speaking competency. For practitioners, the study supports gamification and the implementation of online games in public speaking learning and practices.

KEBERKASANAN GAMIFIKASI DALAM MENGURANGKAN KEBIMBANGAN

DAN MENINGKATKAN KOMPETENSI BERUCAP PELAJAR

KEJURUTERAAN: SATU KAJIAN KES

ABSTRAK

Tesis ini menyiasat di mana pelajar kejuruteraan tahun tiga menggunakan strategi permainan digital untuk meningkatkan kemahiran berucap di hadapan umum dan mengurangkan kebimbangan ketika berucap di hadapan umum. Tesis ini bertujuan untuk menentukan tahap ketakutan pelajar kejururteraan berucap di hadapan sebelum dan selepas bermain permainan digital. Tesis ini juga bertujuan untuk membandingkan tahap kecekapan pelajar kejuruteraan berucap di hadapan umum sebelum dan selepas bermain permainan digital Akhir sekali, tesis ini bertujuan untuk mencari hubungan antara kebimbangan untuk berucap dan juga kecekapan berucap di hadapan umum. Sebelum bermain permaianan digital , tiga puluh orang pelajar kejuruteraan prasiswazah menjawab Personal Report of Public Speaking Anxiety untuk menentukan tahap kebimbangan mereka berucap di hadapan umum. Dalam kajian ini , enam belas orang pelajar dengan tahap kebimbangan berucap di hadapan umum yang tertinggi dipilih untuk bermain permainan digital. Setelah peserta dipilih, permainan digital "Rhetoric: Public Speaking Game" dimainkan sekali seminggu selama sepuluh minggu. Permainan digital ini dijalankan dalam kumpulan seramai lapan orang pelajar selama satu jam setiap minggu. Penilaian kecekapan mereka berucap di hadapan umum dijalankan sebelum dan selepas bermain permainan digital untuk memberikan bukti empirikal tentang sama ada strategi permainan digital mempengaruhi kecekapan peserta berucap. Selepas pengumpulan data, analisis statistik dilakukan menggunakan ujian t-test untuk membandingkan ketakutan berucap di hadapan umum dan kecekapan pelajar kejuruteraan pra-siswazah sebelum dan selepas bermain permaina digital. Analisis korelasi juga dilakukan untuk mengkaji hubungan linear antara kebimbangan berucap di hadapan umum dan kecekapan pelajar kejuruteraan pra-siswazah berucap di hadapan umum. Ujian t-test menunjukkan penurunan yang signifikan dalam kebimbangan berucap di hadapan umum selepas bermain permainan digital. Ujian tersebut juga menunjukkan bahawa selepasbermain permainan digital, peserta menunjukkan peningkatan yang signifikan dalam kecekapan berucap di hadapan umum. Terdapat bukti kukuh tentang korelasi linear negatif yang signifikan antara kebimbangan berucap di hadapan umum dan kecekapan berucap di hadapan umum sebelum bermain permainan digital. Namun, kesan ini berkurangan selepas bermain permainan digital. Pendekatan permainan digital secara berkesan mengurangkan kebimbangan dan meningkatkan kecekapan berucap di kalangan peserta kajian. Kajian ini mempunyai beberapa implikasi untuk penyelidikan dan praktis pada masa akan datang, termasuk keperluan untuk kajian lanjut terhadap permainan digital lain dengan tujuan serupa untuk mendapatkan pandangan yang lebih luas tentang apa yang dapat membantu pelajar dengan masalah ketakutan berucap di hadapan umum dan kecekapan berucap yang rendah. Bagi praktis, kajian ini menyokong penggunaan permainan digital dan pelaksanaan permainan dalam pembelajaran dan praktis berucap di hadapan umum secara dalam talian.

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LIST OF ABBREVIATIONS

PRPSA	-	Personal Report of Public Speaking Anxiety
SDT	-	Self-Determination Theory

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LIST OF PUBLICATIONS

The followings are the list of publications related to the work on this thesis:

Abadi, S O S A H, Feroz, F. S, Zanariah, T. Devi, S I, Subramaniam, S. K,. 2022. The Effects of Gamification on Undergraduate Engineers' Public Speaking Anxiety and Competency. *Hong Kong Journal of Social Sciences*, 59, pp. 1 – 10.

CHAPTER 1

INTRODUCTION

1.1 Background

In the realm of engineering education, the importance of effective communication skills, particularly proficiency in the English language and public speaking, cannot be overstated. The ability to convey complex technical ideas with clarity and precision is fundamental for engineers in today's global landscape. Despite the recognition of this need, undergraduate engineering students often face challenges in developing adequate public speaking competency, leading to persisting anxieties and shortcomings in real-world communication scenarios.

English courses play a crucial role in the education of engineering students, fostering effective communication skills, critical thinking, and a broader understanding of the global landscape (Johnson, 2018; Lannon and Gurak, 2016). English courses tailored to the needs of engineering students, emphasizing the importance of a balanced curriculum that combines technical expertise with communication proficiency.

Effective communication is paramount for engineers who must convey complex technical ideas to diverse audiences (Johnson, 2018). English courses help students develop clarity, coherence, and precision in their written and oral communication, ensuring that their ideas are effectively communicated to colleagues, clients, and stakeholders. Engineers frequently produce reports, proposals, and documentation. English courses equip students with the skills to compose clear, concise, and technically accurate documents (Lannon and

Gurak, 2016). This is vital for creating project reports, design specifications, and other professional documents that adhere to industry standards.

In today's interconnected world, engineers often collaborate with professionals from diverse cultural backgrounds. English proficiency facilitates global communication, enabling engineers to work seamlessly with international teams, contribute to global projects, and understand and appreciate cultural nuances in a multicultural workplace (Baden-Fuller and Pitt, 2018). English courses encourage analytical thinking and argumentation, skills essential for engineers when tackling complex problems (Johnson, 2018). The ability to critically evaluate information and present well-reasoned arguments is invaluable in the engineering field, especially when designing solutions or troubleshooting issues. Engineering professionals are not only responsible for technical solutions but also for understanding the ethical and societal implications of their work. English courses often incorporate discussions on ethics, social responsibility, and the broader impact of technology, fostering a holistic perspective among engineering students (Baden-Fuller and Pitt, 2018).

Integrating English courses into the engineering curriculum especially involving public speaking practices is instrumental in producing well-rounded professionals. By emphasizing effective communication, critical thinking, and global awareness, these English and public speaking practices contribute to the overall success of engineering students in their academic pursuits and future careers. As engineering evolves to meet the challenges of the 21st century, a comprehensive education that includes English proficiency is essential for producing engineers who can thrive in a rapidly changing global landscape.

Being able to speak in front of an audience or perform public speaking is becoming increasingly crucial in the era of Industry 4.0, particularly in places like schools, universities, at the workplace, and even in our personal lives. Public speaking is not simply an act or a process of making a speech before an audience, it is also the process of imparting and delivering valuable knowledge and critical information to them (Lindner et al., 2020). In this thesis, public speaking competency is defined as the skill of the undergraduate engineers to effectively convey ideas to an audience with clarity, engagement, and persuasion, employing techniques like articulate speech, vocal modulation, body language, and audience connection in English speaking environment. For that reason, public speaking competency is essential for better communication throughout an individual's career development, for business growth, and even in relationships between family and friends (Lee et al., 2018). Wan Norhaidi et al. (2019) also agree that public speaking is an essential communication skill that needs to be mastered by English as Second Language (ESL) students.

People are not born to become public speakers, but can be trained to become good ones. The idea of standing in front of a particular group to deliver a speech will lead most of us to anxiety and fear, which will also contribute to reduced public speaking competency. Anxiety is a feeling of nervousness, uneasiness, and fear of an expected threat (Raja, 2017). According to Lindner et al. (2020), anxiety is the most common mental disorder among public speakers. In this thesis, public speaking anxiety is defined as the fear and nervousness experienced by undergraduate engineers when speaking or performing in front of an audience. This anxiety often manifests in physical and emotional symptoms that can hinder effective oral English communication. Individuals with public speaking anxiety usually try

to avoid talking in public, but when they do talk, their anxiety level increases, thus causing them distress and low confidence levels.

Public speaking anxiety and competency has become an increasingly important area of research in technical communication. Public speaking anxiety is a well-documented phenomenon that affects many people, particularly in the context of technical communication. Technical communication involves conveying complex information to audiences with varying levels of knowledge and expertise, often in professional or academic settings. The pressure to communicate effectively in such situations can contribute to public speaking anxiety, which in turn can hinder a speaker's ability to convey their message and engage their audience. Recent evidence suggests that using digital technology related to technical communication, such as learning management system (LMS), helps with public speaking anxiety and competency (Deouduglu, 2022).

Research in this area has focused on understanding the causes of public speaking anxiety, as well as developing interventions to help speakers manage their anxiety and improve their communication skills. Some key papers in this field include an overview of the communication apprehension (CA) perspective, which posits that public speaking anxiety is a form of communication apprehension that arises from a fear of negative evaluation by others. The paper discusses various theories of CA and their implications for understanding public speaking anxiety, as well as approaches to measuring and treating public speaking anxiety (McCroskey 1984). Another paper from Beadle, A. (2012) discusses the impact of public speaking anxiety on career success, particularly in the context of technical communication. The authors argue that public speaking anxiety can be a significant barrier to career advancement for individuals who must frequently give presentations or

communicate complex information to colleagues and clients. The paper also discusses strategies for managing public speaking anxiety and improving communication skills.

Besides that, another paper from Aragon and Johnson (2008) examines the factors that contribute to the development of public speaking anxiety among college students, particularly in the context of classroom presentations. The authors identify several factors, including prior negative experiences with public speaking, social anxiety, and lack of preparation, that can contribute to public speaking anxiety. The paper also discusses strategies for addressing these factors and reducing public speaking anxiety among students.

Lastly, Turner, J. E., and Priyadharshini, E. (2018) provide a comprehensive review of the literature on public speaking anxiety in technical communication courses and offers recommendations for teaching strategies that can help students manage their anxiety and improve their communication skills. The authors argue that technical communication instructors have an important role to play in helping students overcome public speaking anxiety and provide specific examples of teaching interventions that have been shown to be effective.

This study intends to investigate whether undergraduate engineers' public speaking anxiety could be reduced and whether their public speaking competency could be improved by gamification. In this thesis, gamification is defined as the strategic incorporation of game design elements into English language oral communication within an educational context. Gamification, once considered as interaction for entertainment and fun, is now taking the lead in teaching and learning. The gamification learning environment mainly uses digital devices that foster public speaking improvement at a tertiary level, traditionally performed with relatively high-quality standards (El-Yamri et al., 2019). In this era of digitalization,

tertiary students find pleasure in playing games as a means of learning. As such, gamification has become a perfect match for 21st-century education, which relies heavily on technology (Wardaszko et al., 2019). Consequently, students tend to prefer acquiring new skills and knowledge in virtual environments rather than in the physical world, using virtual tools and resources.

1.2 Problem Statement

For many years, a lack of public speaking competency has persisted among undergraduate engineers, with English language proficiency courses at the university level failing to address the challenge of overcoming public speaking anxiety among them. These courses primarily emphasize the mechanics of public speaking, consequently failing to enhance their competency levels, a problem that persists even after graduation. The issue of public speaking anxiety and inadequate public speaking skills among engineering students has been a subject of extensive discussion among researchers over time. Several studies have reported that although professional engineers possess good technical communication skills on paper, they often struggle with the practical application (or implementation) of these skills in real-life situations. (Kim and Park, 2016: Wang, J et al., 2020: Weik et al., 2017: Zhou et al., 2019). In addition, a number of researchers have consistently reported that these undergraduate engineers often lack confidence and competence when it comes to public speaking in front of an actual audience. According to a recent study by Ratnasari (2020), individuals with an engineering background tend to exhibit low proficiency in public speaking due to several factors, such as limited vocabulary, nervousness, inadequate environmental support systems, and lack of knowledge of grammar.

Although some engineering undergraduates excel academically in universities, they often face challenges securing jobs due to inadequate public speaking skills or unsatisfactory performance during job interviews (Kim and Park, 2016: Wang J et al., 2020: Weik et al., 2017: Zhou et al., 2019). The competency of engineering undergraduates has been brought into question as 21st-century engineers are expected to possess proficient public speaking abilities. As Wang, J et al. (2020) and Bonnet et al. (2018) have postulated, effective communication skills are critical to the professional development of future global engineers as it greatly impacts their ability to succeed in society.

Implementing gamification to alleviate public speaking anxiety and enhance public speaking skills in undergraduate engineers presents challenges including understanding students' anxieties, designing engaging and balanced games, integrating activities into the curriculum, ensuring technology accessibility, providing effective assessment and feedback, sustaining engagement, considering cultural sensitivities, addressing individual needs, and supporting faculty. Overcoming these hurdles requires careful planning, collaboration with faculty, attention to diversity, and a commitment to personalized learning, ultimately enabling the effective use of gamification to foster public speaking confidence and competence among engineering students.

Gamification, the integration of game elements into non-game contexts, has gained popularity as an educational strategy. However, applying gamification to English courses and public speaking practices for engineering students presents challenges that impact their effectiveness. Real-life evidence and research studies shed light on these issues.

Despite the potential of gamification to enhance engagement, evidence suggests that some engineering students may not find gamified English courses as motivating as

anticipated (Johnson and Smith, 2021). The novelty of game elements may wear off quickly, leading to reduced motivation and participation. Engineering students require English courses tailored to their technical context. Gamification platforms may lack the flexibility to incorporate industry-specific terminology and scenarios, diminishing their relevance (Miller et al., 2020). Customization challenges may hinder the alignment of gamified content with the technical vocabulary essential for engineering communication.

Research by Brown and Lee (2019) suggests that while gamified English courses may enhance language skills, the transferability of these skills to real-life public speaking situations is not guaranteed. The structured environment of games may not adequately prepare students for the spontaneity and unpredictability of authentic communication scenarios in professional settings. Gamification often relies on digital platforms, introducing potential technological barriers. Some students may lack access to the necessary technology, and disparities in digital literacy may lead to unequal participation (Garcia et al., 2018). The challenge of ensuring equitable access to gamified English courses and public speaking tools may hinder their effectiveness.

While competition can be a motivating factor, an overemphasis on competitive aspects in gamified courses may lead to a negative impact on collaboration and a focus on individual achievement (Smith and Williams, 2022). In public speaking practices, the fear of judgment and competition may hinder students' willingness to take risks and experiment with their communication skills. The challenges associated with gamification in English courses and public speaking practices may result in decreased language proficiency, limited transferability of communication skills, and unequal opportunities for students with varying

technological access. These factors collectively impact the holistic development of engineering students and their preparedness for real-world communication challenges.

Acknowledging the challenges of gamification in English courses and public speaking practices is essential for optimizing their effectiveness. Balancing engagement with customization, ensuring the transferability of skills, addressing technological disparities, and fostering collaboration are key considerations for educators seeking to integrate gamification into the language learning and public speaking experiences of engineering students.

The digital natives of today prefer learning using gadgets and technology. Unfortunately, a significant number of lecturers engaged in teaching at the university level tend to avoid incorporating technology in their teaching methods due to concerns related to time and cost implications El-Yamri et al. (2019) and Westwick et al. (2016) support this notion, suggesting that many academics tend to shy away from the use of technology and are more comfortable with traditional teaching methods. Along with this issue, the age gap between academicians and students has contributed to a technology-use gap, as noted by Lindner et al. (2020).

To this end, many academicians have not effectively embraced gamification, which would be instrumental in helping learners explore relevant gaming attributes in their education. Additionally, there is a limited collaboration between students and academicians toward adding perspective and depth to playing games, which exposes the learners to a risk/fearfree setting. By integrating gamification, learners are free to learn and practice critical skills, including public speaking, in a supportive environment that encourages exploration and growth.