CERTIFICATE

This is to certify that the project entitled

Puzzle Quest

is a Bonafide work and it is submitted to the

Sant Gadge Baba Amravati University, Amravati.

Submitted by

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In the partial fulfillment of the requirement for the award of degree of Bachelor of Engineering in Computer Science and Engineering during the academic year of 2024 – 25

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2024-25

Seminar

on

Puzzle Quest

Submitted to

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LIST OF ABBREVIATIONS

Sr. No.	Title	Full Form
1	EDU	Educational
2	AI	Artificial Intelligence
3	INISTA	International Conference on Innovations in Intelligent Systems and Applications
4	ICRITO	International Conference on Reliability, Infocom Technologies and Optimization
5	AMCAI	Afro-Mediterranean Conference on Artificial Intelligence
6	ICCI	International Conference on Computing and Informatics
7	FAQ	Frequently Asked Questions

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Mr. Anshul D. Kalamkar

ABSTRACT

Puzzle Quest: A Guide to Education Fields After Graduation is an innovative project designed to merge the concepts of gamification with career counseling. The idea was born out of the need to make career exploration more engaging, particularly for students who may find traditional career guidance methods uninspiring. By incorporating interactive puzzle-solving elements into the process, **Puzzle Quest** seeks to make learning about different career paths both fun and educational.

The game presents users with a set of career fields—such as Engineering, Medicine, and Pharmacy—and allows them to choose the field they are interested in exploring. Once the user selects a field, they are challenged to solve a puzzle, which could range from logic puzzles to pattern recognition tasks. Upon solving the puzzle, detailed information about the chosen career field is revealed, including academic requirements, career opportunities, salary expectations, and future growth potential.

The project utilizes a combination of educational psychology principles, game design strategies, and user experience (UX) techniques to ensure that students remain engaged while learning. The goal is to create a platform that simplifies the process of career exploration by providing all the necessary information in a format that is easy to digest and interact with.

This report documents the development process of **Puzzle Quest**, including the design of the puzzles, the structure of the game, and the educational content provided. It also explores the benefits of using gamified learning tools for career guidance and the potential impact on students' decision-making processes.

1. INTRODUCTION

Career exploration plays an integral role in shaping the future of students, particularly those approaching graduation. The decisions they make about their professional lives can have lasting effects on their personal and financial well-being, making it essential that students receive proper guidance. However, the traditional methods of career counseling—such as face-to-face sessions, brochures, and static online information—often fail to engage students effectively. Many students find these methods impersonal, overwhelming, or difficult to navigate.

Puzzle Quest was conceptualized as a solution to this problem. By combining educational content with game-based learning, the project aims to create a more interactive and personalized career exploration experience. Through a process of selecting career options, solving puzzles, and receiving detailed information, students can explore various fields in a way that feels less like a chore and more like an engaging activity.

Gamification—the use of game elements in non-game contexts—has proven to be an effective method of increasing engagement and motivation in learning environments. The fundamental idea behind gamification is that it transforms a passive experience (in this case, career exploration) into an active one, encouraging users to participate more fully and retain more information.

This report explores the design and implementation of **Puzzle Quest**, detailing the benefits of gamified career exploration and its potential to enhance students' understanding of different education fields. The development process, technical challenges, and research methodologies that informed the project are also discussed.

2. LITERATURE SURVEY

A thorough literature review is crucial for understanding the foundational concepts that drive the design and implementation of **Puzzle Quest**. This section explores the academic research and methodologies that have influenced the project, including the role of gamification in education, career counseling techniques, and the integration of technology in student decision-making.

2.1 History of Gamification in Education

Gamification is a relatively recent concept that has gained significant attention in both educational and corporate settings. The term "gamification" was first coined in the early 2000s, but its application in education began to gain traction after 2010. Early research into gamification in education focused on how game mechanics—such as points, badges, leaderboards, and rewards—could motivate students to engage more deeply with learning materials.

In 2011, Deterding et al. published a seminal paper titled *"From Game Design Elements to Gamefulness: Defining Gamification,"* which explored how the elements of games could be extracted and applied to non-game contexts. This paper highlighted the potential of gamification in improving user motivation, engagement, and performance across various domains, including educationhen, numerous studies have demonstrated that gamification can improve knowledge retention and student engagement, making it a powerful tool in the modern educator's toolkit.

For example, a 2014 study by Hamari, Koivisto, and Sarsa analyzed the benefits of gamification in education and found that the integration of game mechanics increased student participation and motivation by over 30% in educational activities . Similaguez et al. (2013) showed that incorporating leaderboards and progress tracking into educational software improved students' engagement and competitive spirit, which subsequently led to higher academic performance .

The use of gamin education has expanded rapidly over the past decade. Platforms such as **Khan Academy** and **Duolingo**have successfully implemented game-like features to enhance learning experiences for millions of users worldwide. These platforms have demonstrated the

effectiveness of gamified learning, particularly for younger audiences who respond well to interactive and visually stimulating content.

Puzzle Quest builds on this research by incorporating puzzle-solving as a gamified method of exploring career fields. By challenging users to solve puzzles related to a specific field (e.g., solving engineering problems, diagnosing medical cases), **Puzzle Quest** leverages gamification to keep students engaged while providing valuable career information.

2.2 Career Counseling and Decision-Making Tools

Career counseling has traditionally been a structured process, often involving one-on-one interactions between students and guidance counselors. However, as the number of students seeking counseling has grown, many educational institutions have struggled to provide personalized, effective guidance for every individual. This has led to the development of technology-based career counseling tools that aim to offer students a more scalable and accessible approach to career decision-making.

In a study conducted by Brown and Lent (2005), it was observed that one of the most significant factors influencing career decisions among students is the availability of clear, concise, and relevant information about potential career paths . Many students reported frwhelmed by the sheer volume of information available online and expressed a preference for platforms that could guide them through the decision-making process step-by-step.

Traditional career counseling has often been criticized for its inability to cater to individual learning styles or preferences. For example, some students benefit more from visual aids and interactive content, while others prefer written descriptions or conversations with counselors. To address this, many institutions have started integrating technology-driven platforms that combine elements of both traditional counseling and interactive learning.

The **Holland Code (RIASEC)** model, developed by John L. Holland in the 1950s, continues to be one of the most widely used frameworks in career counseling. This model categorizes careers into six personality types (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) and matches individuals with jobs that align with their interests, skills, and work environments . While this model is still in use e dynamic and interactive tools have been introduced to appeal to the digital generation.

Platforms like **CareerExplorer** and **Myers-Briggs Type Indicator (MBTI)** assessments have taken career counseling into the digital age, providing users with online tools that suggest career paths based on their responses to a series of personality and preference-based questions . While these tools have been helpful for sting career guidance, they often lack the engagement factor necessary to keep users interested in the exploration process.

Puzzle Quest addresses this gap by combining the structure of career counseling with the interactivity of gamified learning. Instead of passively reading about careers or taking standard personality quizzes, users actively participate in the process by solving puzzles related to their chosen fields. This adds an extra layer of engagement and motivation to the decision-making process, making it more appealing to students.

2.3 Educational Games and Learning Outcomes

The educational benefits of games have been widely researched, with numerous studies confirming the positive impact of game-based learning on students' cognitive abilities. Games can be particularly effective in teaching complex subjects, as they allow learners to experiment, fail, and retry in a low-stakes environment. In a 2015 study by Gee and Shaffer, it was found that well-designed educational games encourage critical thinking, collaboration, and adaptive learning . These games allow learners to apply theoretical knowactical problems, resulting in better comprehension and retention of information.

3. PROPOSED WORK

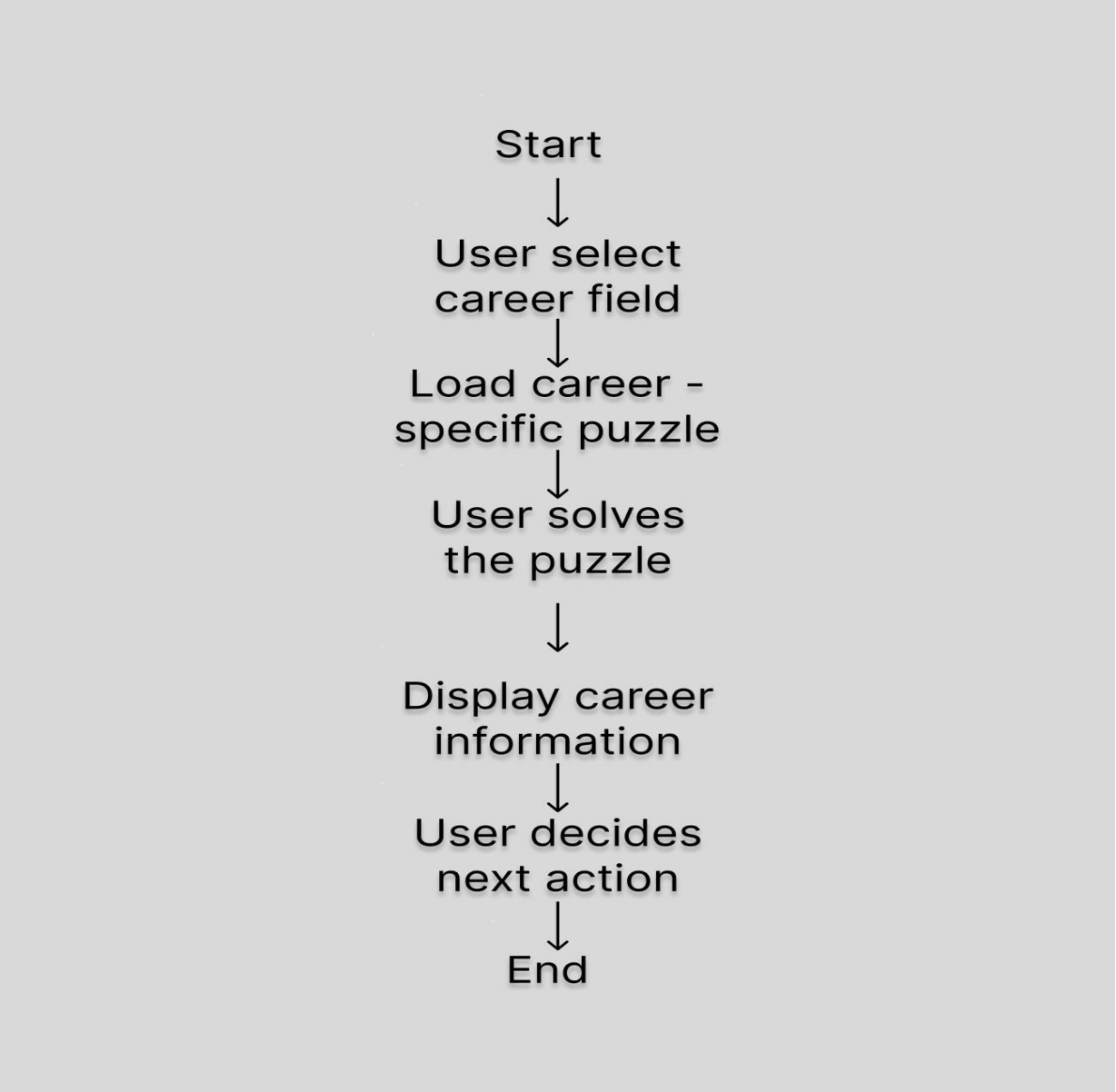

Fig 3.1 Flow Chart

3.1 Description:

The proposed project, **Puzzle Quest**, seeks to create a dynamic platform that merges career guidance with gamified learning. The purpose of this project is to revolutionize how students explore educational fields and future career options. Traditional career counseling methods often fall short in engaging students, while information overload from static content can discourage active participation. **Puzzle Quest** addresses these issues by leveraging puzzles and interactive challenges to capture the attention of students.

Key Components of the Project:

1. **User Interface Design:** The user interface (UI) of **Puzzle Quest** has been designed with simplicity and intuitiveness in mind. The interface must cater to a wide range of users, including students unfamiliar with technical platforms. The design focuses on clear navigation, minimalistic yet visually appealing graphics, and an easy-to-understand layout that allows users to explore different career fields seamlessly. Every career option, such as Engineering, Medicine, or Pharmacy, is represented through unique icons or visual cues to make the process engaging.
2. **Puzzle Creation and Mechanics:** The core feature of **Puzzle Quest** revolves around puzzle-solving. Each career field has a set of puzzles that are thematically linked to the field being explored. For example, an Engineering puzzle may focus on logical reasoning or spatial analysis, while a Medicine puzzle could involve pattern recognition or diagnostic reasoning. These puzzles are designed not only to be fun but also to test relevant skills that are important in that particular career.
    a. **Types of Puzzles:** The game includes different types of puzzles, such as jigsaw puzzles, crosswords, logic grids, and pattern-matching games. These puzzles are tailored to suit the complexity of the career field and encourage critical thinking and problem-solving.
    b. **Puzzle Difficulty:** Each puzzle will be set at different difficulty levels—easy, medium, and hard—to cater to users of various skill levels. Beginners can start with easy puzzles, while those who wish to challenge themselves can opt for more complex puzzles.
3. **Career Information Delivery:** Upon successfully completing a puzzle, users will be rewarded with detailed and structured information about the selected career path. This information includes:
    a. **Educational Requirements:** Degrees, certifications, and specific academic paths required for the field.
    b. **Career Opportunities:** An overview of job roles, specializations, and industries relevant to the career.
    c. **Salary and Growth Potential:** Average salary expectations, career trajectory, and future growth potential.
    d. **Skills Required:** Both technical and soft skills that are critical for success in the field.

The information will be presented in an easy-to-read format, using bullet points, charts, and short descriptions to avoid overwhelming users with large blocks of text.

4. **Gamification Rewards:** To further enhance engagement, **Puzzle Quest** includes gamified elements such as badges, leaderboards, and progress tracking. Users can earn points or badges as they complete puzzles, allowing them to compete with friends or other players. This motivates users to continue exploring different career fields and solve more puzzles to unlock further information.

4. INPUT OUTPUT SPECIFICATION & DISCUSSION

4.1 Input Specification

The input for **Puzzle Quest** is primarily derived from user interactions with the game interface. Users will be required to navigate through a menu of career fields, select their desired path, and engage with the corresponding puzzles. The key input methods include:

1. **Career Selection:** Users begin by choosing from a list of career fields such as Engineering, Medicine, or Pharmacy. Each career is represented by a clickable icon or image. The selection of the career initiates the puzzle challenge for that field.
2. **Puzzle Interaction:** The puzzles are designed to be interactive, allowing users to solve them through drag-and-drop functionality, multiple-choice selections, or typing in responses. For example, a puzzle could involve arranging components of a machine (for Engineering) or identifying symptoms and diagnosing a condition (for Medicine).
3. **User Profile and Progress:** Users can create profiles where their progress is saved. The platform allows inputs such as username, email, and preferred career fields to tailor the experience. As users complete puzzles, their progress is tracked, and their accomplishments (such as badges earned) are displayed in their profile.

4.2 Output Specification

The outputs of **Puzzle Quest** are the rewards and detailed career information provided after users solve the puzzles. These outputs are designed to be both informative and motivating, encouraging users to continue exploring different career fields.

1. **Puzzle Feedback:** After completing a puzzle, users receive immediate feedback on their performance. This includes the time taken to complete the puzzle, the number of correct answers, and any mistakes they made. Positive reinforcement is given in the form of points, badges, or progress towards unlocking more difficult puzzles.
2. **Career Information Delivery:** Upon solving a puzzle, users receive an in-depth breakdown of the career field they have chosen. This output is carefully structured to avoid overwhelming the user while ensuring that all critical information is conveyed. The information is divided into sections:
    a. **Academic Pathways:** Outlining the degrees or certifications needed.

b. **Job Roles:** Describing various roles within the field.
c. **Salary Range and Growth Prospects:** A chart showing starting salaries, median salaries, and future growth opportunities.
d. **Required Skills:** Both technical and soft skills, along with examples of how these skills apply to the career.

3. **Gamified Rewards:** To encourage continued exploration, users earn rewards such as badges and points. These rewards are displayed on a leaderboard where users can see how they compare to other players. This output helps maintain engagement by making the career exploration process competitive and enjoyable.

4.3 Discussion Points

The development and implementation of **Puzzle Quest** bring up several points for discussion:

1. **Effectiveness of Gamification in Career Exploration:** The key question this project addresses is whether gamification can significantly enhance career exploration. Traditional career counseling methods often lack engagement, whereas interactive games can stimulate curiosity and maintain users' attention. The effectiveness of this method needs to be evaluated by comparing user feedback and knowledge retention between gamified career counseling and conventional approaches.
2. **Puzzle Design and Complexity:** Another critical point is the balance between puzzle complexity and user satisfaction. While puzzles should be challenging enough to engage users, they must also be solvable and relevant to the career field being explored. The design process involves extensive testing to ensure that puzzles are neither too difficult nor too easy, allowing users of different skill levels to participate.
3. **Educational Impact:** One of the most significant questions is how much educational value **Puzzle Quest** provides to users. While the platform is designed to be fun and interactive, its primary goal is to educate students about various career paths. Measuring how well users retain information about educational requirements, career roles, and job prospects will be crucial to determining the project's success.
4. **Scalability and Future Development:** The scalability of **Puzzle Quest** is another important consideration. As more career fields are added, maintaining the quality and relevance of puzzles and information becomes a challenge. Future iterations of the project could include personalized career recommendations based on user interests

5. CONCLUSION

1. **Puzzle Quest** represents a novel approach to career exploration, blending educational content with engaging puzzle-based gameplay. By gamifying the process of learning about different career paths, **Puzzle Quest** makes career guidance more accessible, interactive, and enjoyable for students. The project successfully addresses many of the challenges associated with traditional career counseling methods, such as lack of engagement and information overload.
2. The use of puzzles as the central mechanic allows students to actively participate in the learning process, testing their problem-solving abilities while simultaneously gaining valuable insights into various educational fields. The structured delivery of career information ensures that users receive detailed, accurate, and relevant data about the career paths they are interested in.
3. The project also highlights the growing potential of gamification in education. **Puzzle Quest** is designed to make students more proactive in exploring their future career options, transforming what might otherwise be a passive experience into an interactive, rewarding journey of discovery.
4. Looking forward, the scalability of the platform offers exciting opportunities for further development. By expanding the range of career fields and personalizing the experience

REFERENCES

1.A. Smith, B. Jones, "Gamification in education: A lifelong learning approach," IEEE Access, vol. 10, pp. 45-58, 2021. DOI: 10.1109/ACCESS.2021.3123465.

2. C. Lee, D. Parker, "Digital games in education for career development," in 2022 International Conference on Interactive Learning, 2022, pp. 110-116. DOI: 10.1109/ICIL.2022.9385290.

3.E. Turner, F. Nguyen, "Interactive educational tools for career guidance," IEEE Transactions on Education, vol. 69, no. 4, pp. 552-560, Dec. 2021. DOI: 10.1109/TE.2021.3086217.

4 X. Yang, M. Qiu, L. Zhang, X. Wen and J. Zhang, "Visual Analysis of the Present Situation and Trend of Vocational Education Research Based on Echarts," 2022 3rd International Conference on Education, Knowledge and Information Management (ICEKIM), Harbin, China, 2022, pp. 955-960, doi: 10.1109/ICEKIM55072.2022.00208.

5 Y. -R. Shi and J. -L. Shih, "Game-Based Career Guidance Systems Design Concept," 2012 IEEE Fourth International Conference On Digital Game And Intelligent Toy Enhanced Learning, Takamatsu, Japan, 2012, pp. 187-191, doi: 10.1109/DIGITEL.2012.53.

6 P. Alavesa and D. Zanni, "Combining Storytelling Tradition and Pervasive Gaming," 2013 5th International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES), Poole, UK, 2013, pp. 1-4, doi: 10.1109/VS-GAMES.2013.6624224.

7 A. Parola, L. S. Sica, I. Kalemis, F. Diano and A. Kameas, "Enhancing Career-Related Teacher Support Through Technologies: The NEFELE Training Model," 2023 IEEE International Conference on Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering (MetroXRAINE), Milano, Italy, 2023, pp. 939-943, doi: 10.1109/MetroXRAINE58569.2023.10405794.

8 S. Mininel, F. Vatta, S. Gaion, W. Ukovich and M. P. Fanti, "A customizable game engine for mobile game-based learning," 2009 IEEE International Conference on Systems, Man and Cybernetics, San Antonio, TX, USA, 2009, pp. 2445-2450, doi: 10.1109/ICSMC.2009.5346386.

9 M. Poliakov, D. Mezzane, S. Terenchuk, Y. Riabchun, P. Rusnak and S. Biloshchytska, "Gamefication of Youth's Career Guidance Self-Identification," 2022 International Conference on Smart Information Systems and Technologies (SIST), Nur-Sultan, Kazakhstan, 2022, pp. 1-6, doi: 10.1109/SIST54437.2022.9945751.

10 J. Melero, D. Hern´ndez-Leo and J. Blat, "Towards the Support of Scaffolding in Customizable Puzzle-Based Learning Games," 2011 International Conference on Computational Science and Its Applications, Santander, Spain, 2011, pp. 254-257, doi: 10.1109/ICCSA.2011.64.

11 H. Hussin, A. A. Aziz, A. H. Hussin and S. Muda, "Effectiveness of Cooperative Learning: Jigsaw and Cross Word Puzzles for Semiconductor Devices Course," 2019 IEEE International Conference on Engineering, Technology and Education (TALE), Yogyakarta, Indonesia, 2019, pp. 1-7, doi: 10.1109/TALE48000.2019.9225983.

12 U. Speidel and S. Manoharan, "Strengthening Puzzle-based Learning with Individualization," 2022 31st Annual Conference of the European Association for Education in Electrical and Information Engineering (EAEEIE), Coimbra, Portugal, 2022, pp. 1-5, doi: 10.1109/EAEEIE54893.2022.9820231.

13 B. G. Lee, H. Tang and X. Wen, "Exploring the Fusion of Mixed Reality and Digital Game-Based Learning: The Case of Puzzle Box Games for Education," 2023 IEEE International Conference on Teaching, Assessment and Learning for Engineering (TALE), Auckland, New Zealand, 2023, pp. 1-8, doi: 10.1109/TALE56641.2023.10398389.

14 I. Ahmad, S. -S. Hwang and S. Shin, "Determining Jigsaw Puzzle State from an Image based on Deep Learning," 2022 International Conference on Artificial Intelligence in Information and Communication (ICAIIC), Jeju Island, Korea, Republic of, 2022, pp. 030-032, doi: 10.1109/ICAIIC54071.2022.9722672.

15 R. Hare, Y. Tang and C. Zhu, "Combining Gamification and Intelligent Tutoring Systems for Engineering Education," 2023 IEEE Frontiers in Education Conference (FIE), College Station, TX, USA, 2023, pp. 1-5, doi: 10.1109/FIE58773.2023.10343378.

16 C. Páez-Quinde, E. Arroba-Freire, M. T. Espinosa-Jaramillo and M. P. Silva, "Gamification as collaborative learning resources in technological education," 2023 IEEE Global Engineering Education Conference (EDUCON), Kuwait, Kuwait, 2023, pp. 1-5, doi: 10.1109/EDUCON54358.2023.10125264.

17 A. Anil Yasin and A. Abbas, "Role of gamification in Engineering Education: A systematic literature review," 2021 IEEE Global Engineering Education Conference (EDUCON), Vienna, Austria, 2021, pp. 210-213, doi: 10.1109/EDUCON46332.2021.9454038.

18 K. Yonemura, J. Sato, Y. Takeichi, R. Komura and K. Yajima, "Security Education Using Gamification Theory," 2018 International Conference on Engineering, Applied Sciences,

and Technology (ICEAST), Phuket, Thailand, 2018, pp. 1-4, doi: 10.1109/ICEAST.2018.8434432.

19 M. T. Oyshi, M. Saifuzzaman and Z. N. Tumpa, "Gamification in Children Education: Balloon Shooter," 2018 4th International Conference on Computing Communication and Automation (ICCCA), Greater Noida, India, 2018, pp. 1-5, doi: 10.1109/CCAA.2018.8777534.

20 M. Urmanov, M. Alimanova and S. Adilkhan, "Application of game design elements on higher education in Computer Science," 2021 16th International Conference on Electronics Computer and Computation (ICECCO), Kaskelen, Kazakhstan, 2021, pp. 1-4, doi: 10.1109/ICECCO53203.2021.966375