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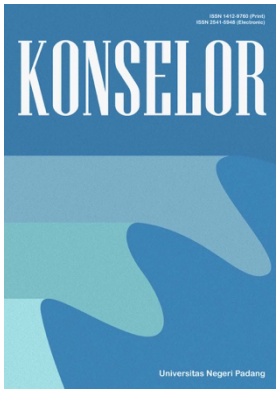

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Development of Self and Career-Understanding Gamification-Assisted Media for Students with Disabilities

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Development of Self and Career-Understanding Gamification-Assisted Media for Students with Disabilities

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Abstract: The objective of this study is to develop a career advice platform for Children with Special Needs (CSN) through the use of gamification-assisted education. The study suggests that inclusive vocational schools in Surabaya and Sidoarjo, East Java, should create an Android application called GOPEKA in response to the dearth of structured employment services and specialized resources for CSN. For CSN, who have a predisposition for studying via Android applications, the program is both user-friendly and captivating. The ADDIE paradigm, which comprises Analysis, Design, Development, Implementation, and Evaluation, was specifically applied in our Research and Development (R&D) endeavors. An essential component of career coaching for CSN, gamification-assisted media emerged from an initial investigation that included a literature review and conversations with school counsellors. Utilizing the Career Information Processing and Career Diamond theories as core concepts and incorporating gamification features (components, mechanics, dynamics) were also highlighted in the literature review. A GOPEKA application prototype was developed during the design and development process. Its interface design and button performance were enhanced as a result of a validation procedure conducted by professionals and experts. Seven secondary schools, including a special needs high school in Surabaya and Sidoarjo, participated in an evaluation of the app's efficacy with 82 disabled students from vocational high schools. The average total career planning scores improved significantly from the pre-test to the post-test subsequent to utilizing the GOPEKA application, as determined by the Wilcoxon test on non-normal data distribution. The study's findings indicate that the GOPEKA application's second iteration is efficacious and appropriate for implementation with CSN, subsequent to its validation and feasibility assessments. In addition, the article proposes avenues for further research and addresses the constraints associated with the implementation of gamification in product development.

Key Words: Special needs children; Career guidance services; Gamification; Android system and application; Self-understanding; Career media development

INTRODUCTION

Career development represents a fundamental human developmental task, spanning the entire life course, encompassing various roles and settings, and influenced by many factors. This developmental process aligns with educational phases, from primary through tertiary education (Kohler & Field, 2003; Weidenthal & Kochhar-Bryant, 2007). Despite this continuum, theorists and practitioners often

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emphasize the career development processes during adolescence and early adulthood (Hirschi et al., 2011). Career development for adolescents includes tasks like establishing stable career preferences, solidifying career choices, and engaging in career planning (Skorikov, 2007). The study of career planning and exploration during adolescence is deemed significant (Super, 1990).

Career planning is a critical developmental task for adolescents (McDaniels & Gysbers, 1992; Novakovic & Fouad, 2013; Rogers & Creed, 2011). The importance of career planning during this stage is twofold. Firstly, numerous developmental changes occur in this period; adolescents mature in their cognitive capacities and engage in identity formation, allowing them to contemplate their future and actively pursue their goals (Andre et al., 2019). Secondly, adolescence marks a transition from school to college and employment, necessitating adolescents to make significant decisions concerning their educational and career futures for success (Andre et al., 2019).

The necessity of career planning requires adolescents to prepare and develop foundational attitudes, competencies, and resources useful for career planning (Hartung et al., 2005; Savickas et al., 2018; C. M. Super, 1996). Adolescents must understand their strengths and weaknesses, encompassing abilities, talents, interests in specific fields, and personality traits. They must explore themselves and ascertain activities post-secondary school, whether to pursue employment or further education. While final decisions may not be made in adolescence, such planning has significant implications for their development. Adolescents also begin evaluating their strengths, skills, and abilities for life.

Career theorist Donald Super characterizes the adolescent phase (secondary school) as a period of multidimensional self-concept. Adolescents aged 15-24 are described as being in the "exploration stage" (D. E. Super, 1990), where they must specify and crystallize their previous learning experiences to determine the right path for career preparation. Adolescents are in a state where they must integrate what they like and dislike and what they are capable of and then compare these variables with personal and societal values. For typically developing students, opportunities to choose and determine a career path appear more open. In contrast, students with special needs are often considered to have limited opportunities in career development. It is a common perception that individuals with disabilities have fewer employment opportunities due to their limitations. This statement is supported by data from the International Labour Organization (ILO, 2017), which indicates that approximately 65-75% of individuals with disabilities work in the informal sector despite a high population of about 22.8 million people living with disabilities in Indonesia (ILO, 2017). The ILO reports that individuals with disabilities continue to face significant attitudinal, physical, and informational barriers in the workplace. Of the 22 million individuals with disabilities in Indonesia, about 13 million still struggle to find suitable employment compared to non-disabled workers (ILO, 2019).

Various factors hinder the entry of individuals with disabilities into formal employment, such as limited access to education for people with disabilities or a lack of willingness among company owners to deal with individuals with disabilities (ILO, 2017). Employers often have a pessimistic view of the work capabilities of individuals with disabilities, which contributes to their reluctance to recruit them (Bonaccio et al., 2020). Although Children with Special Needs (CSN) may have limitations in physical, mental, visual, auditory, and speech or language abilities, as well as other challenges, they also possess potential that can be optimized. Therefore, it is crucial to equip them to lead lives comparable to the general population upon graduation, armed with the knowledge and skills they have acquired.

Education represents the best approach to overcoming the limitations faced by individuals with disabilities in pursuing careers. In education, numerous efforts are made to enhance the knowledge and skills of children with special needs. These include special education and inclusive schools, considering the growing population of CSN year by year. Career guidance for students with special needs can help overcome psychological barriers, including immature self-concept and low self-esteem, enhance self-understanding, self-motivation, and self-confidence, and introduce them to work and business (Nota et al.). School-based career guidance services are pivotal for students as a venue for developing career awareness, formulating career plans, and beginning to address career-related issues (Lau et al., 2019). Career guidance prepares students to recognize their self-identity, talents, interests, and personalities. They also learn about further education opportunities and job prospects for students with special needs. Students are guided to tackle career development tasks and transition from high school to further education or the challenges of employment in a world marked by change, complexity, and ambiguity.

Career services, such as career guidance, are essential strategies for enhancing individual career planning (Trusty et al., 2005). With career services, students are facilitated to complete career development tasks. Completing career planning increases the likelihood of future career success. Based on a meta-analysis of studies involving career intervention modalities like individual counselling, group counselling, group test interpretation, training, classroom interventions, computer-based interventions, and counsellor-free interventions, individual career counselling has been identified as the most effective but least efficient service, while computer-based interventions are the most efficient (Whiston et al., 1998)). However, a hybrid approach combining both modalities offers the best of both worlds (Cerrito et al., 2018; Whiston et al., 1998)

Findings suggest that computer-based interventions are efficient as they are more easily accessible to a broader population, particularly those with limited financial resources (McLaren, 2014), and can be more effective with counselling sessions. Computer-Assisted Career Guidance Systems (CACGS) and Career Information Delivery Systems (CIDS) are among the most efficient approaches for providing information and career development (McLaren, 2014; Whiston et al., 1998). Delivering career development interventions over the Internet in the school context can circumvent geographical, psychological, physical, and financial barriers to accessing services and counselling interventions (Mallen et al., 2005). Therefore, building empirical evidence for effective and accessible Internet-based career development interventions is a prominent goal (Gioia & Herman, 2005). Initially, only a few technology-assisted career interventions, such as Onet, DISCOVER, and SIGI, were available, but now the use of technology in career interventions has expanded significantly (L. W. Morgan et al., 2014; R. L. Morgan et al., 2017).

Gamification is the application of game elements in non-game contexts (Deterding, 2012). Implementing missions, reward systems, pins, and scoreboards as forms of gamification can motivate students to complete technology-assisted programs (Wangi et al., 2018). In education, the use of gamification is increasing due to its numerous advantages, such as enhancing student motivation and learning achievement, providing enjoyment and entertainment, and increasing engagement in learning sessions (Khaddage et al., 2014; Lopes et al., 2019; Su & Cheng, 2015). A study exploring the intrinsic and extrinsic motivation of 100 participants in a gamified learning intervention found a positive relationship between the application of gamification and student learning motivation (Buckley & Doyle, 2016). Using applications with a reward system scenario in gamification showed higher student motivation than non-gamified approaches (Vranešić et al., 2019).

Gamification is also increasingly used in psychology, mental health, and counselling. A systematic review by Brown et al. (2016)(Brown et al., 2016) of 61 studies, most designed to manage depression using cognitive behavioural therapy, found that most studies used only one gamification feature (n = 58), with a maximum of three features. The most frequently used feature was story/theme, integrating gamification features into intervention designs to address depression and well-being. Additionally, Pamela et al. (2020) researched the effects of gamification on children's empathetic behaviour, showing an increase in affective empathy and empathetic behaviours in children.

Several media and gamification platforms have been developed as interventions and career needs assessments in the context of career interventions. Examples of gamified career planning intervention programs include GoldStar (Ansted, 2016) and Hard Struggle, which are gamification-based programs for self-exploration and career decision-making, and the game Youth@work for developing students' career awareness and adaptability (Hummel et al., 2018). Lastly, (Bhalerao et al., 2021) developed a gamification-assisted career guidance application for college major selection counselling.

Although gamification applications exist as part of career guidance programs, they still need to fully address the needs of individuals with special needs and encompass only some elements of career guidance programs. It is particularly evident in Indonesia, where career guidance media remain conventional, failing to meet contemporary challenges. They are often impractical, less motivating, and need to be systematically digitized (Gunawan, 2011; Luft, 2014; Syarqawi, 2018). Consequently, further research is required to develop comprehensive gamification career guidance applications that cater to individuals with special needs.

This research aims to produce gamification-assisted self-understanding and career media for students with special needs. The combination of internet-based mobile application devices, specific pedagogical approaches for individuals with hearing impairments (Tosho et al., 2016), and specific

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requirements for developing mobile applications for hearing disorders (Nathan et al., 2016a, 2016b) make this application development necessary. Approximately 96% of individuals with hearing impairments use smartphones daily for text-based communication (Power & Power, 2004). For adolescents with hearing impairments and students with special needs in general, the Internet facilitates communication and information access through text and visual imagery, allowing them to actualize themselves more freely by concealing their limitations (Barak & Sadovsky, 2008; Blom et al., 2014)

A meta-analysis found that interventions with games resulted in a 28% improvement compared to traditional methods (Marcelino & Sousa, 2019). Although gamification differs from serious games (Seaborn & Fels, 2015)(this finding underlines the necessity of enhancing motivation and engagement through gamification in career guidance services for students with special needs. The lack of innovative services integrating mobile gamification in career guidance for students with special needs is a significant issue. Specifically, the problem addressed in this research is the need for more innovative services that integrate mobile gamification into valid and effective career guidance for students with special needs. The general research question is: "How can gamification-assisted media for self-understanding and career understanding be valid, feasible, and effective for students with special needs?" More specifically, the research focuses on the feasibility and validity of self-understanding and career media for students with special needs.

METHOD

This study aims to develop a gamification-assisted career guidance model suitable for children with special needs. To achieve this objective, a research and development design was chosen. The development model employed in this study is the design research approach with the ADDIE model, which stands for Analysis, Design, Development, Implementation, and Evaluation (Aldoobie, 2015; D'Angelo et al., 2018; Susantini et al., 2021).

Participants

The analysis and effectiveness test stage was conducted in 7 secondary schools with 82 participants with disabilities. The tests were located in State 1 Sidoarjo Vocational High School, State 2 Vocational High School Buduran Sidoarjo, State 3 Vocational High School Buduran Sidoarjo, state 2 Vocational High School Surabaya, State 10 Vocational High School Surabaya, State 12 Vocational High School Surabaya, and High School for Special Needs Karya Mulia Surabaya.

Sampling & Procedures

The sampling procedure was implemented purposively, focusing on collecting data from students with disabilities in special secondary schools and vocational schools in Sidoarjo and Surabaya District. The development procedure for the gamification-assisted career guidance media, aligned with the ADDIE model.

Analysis

Literature reviews and needs/site visits are conducted in this initial phase. The focus is observing the current career guidance implemented for students with special needs in vocational high schools in Surabaya, Malang, and Sidoarjo. The steps of preliminary studies are: (1) Investigation of Gamification-Assisted Self-Understanding and Career Media: Information regarding the media is obtained through teacher interviews. These unstructured interviews are aimed at gathering information about the steps in career guidance, modes and media of guidance, and challenges faced by guidance counsellors or special education teachers (2) Literature Review on the Development of Gamification-Assisted Self-Understanding and Career Media for Students with Special Needs: Activities include reviewing theories of career and gamification, which serve as the foundational framework for the development of gamification-assisted self-understanding and career media for students with special needs in vocational and special education high schools. The literature review also covers theories of adolescent and special

needs career development, career guidance theory, and theory of self-understanding and career media development. (3) Preliminary Investigation of Mobile Gamification: This stage involves an initial review of aspects related to technology, media, and the application product to be developed in this study, Gopeka (online career planning gamification). The media investigation aims to select the appropriate media for application development that meets the criteria of children with special needs. The technology analysis is intended to understand how children with special needs interact with Android applications and the technology used in the study, including software specifications and more.Initial Investigation of Research Instruments: This activity is undertaken to identify various instruments needed in the research and development process of gamification-assisted career guidance for students with special needs.

Design

Procedures: Following a literature review and needs analysis through a preliminary study, this stage involves designing the GOPEKA gamification-assisted self-understanding, career media, and validation testing. The prototype design encompasses content, format, philosophy, and media acceptability among the target audience. The researchers have drafted an initial design, including a preliminary sketch/storyboard of the GOPEKA gamification-assisted self-understanding and career media for students with special needs.

Development

During the development phase, researchers created the product prototype of the GOPEKA application, research instruments, and instruments to assess accessibility for children with special needs towards the GOPEKA application. To ensure acceptability, exchanges of opinions and discussions about the suitability of the media were held with experts, including counselling lecturers and practising school counsellors or special education teachers. Media/gamification, guidance, and counselling experts validated the developed media and application. Feedback was also sought from practitioner teachers, both counsellors and special education teachers. The details of this design stage are as follows: (1) Development of the GOPEKA Self-Understanding and Career Application Prototype: The design of this mobile gamification application product involved various activities, including designing career guidance materials and stages, designing the application storyboard, designing gamification techniques, and designing the application database. The career guidance material includes topics on self-understanding, understanding of jobs, and action plans. (2) Designing Research Instruments: This stage involves creating several instruments. The draft instruments included a) a media validation sheet intended to measure the validity level of the GOPEKA self-understanding and career application. The validation sheet's structure had objectives, instructions for completion, assessment, and targets/validators. b) student responses to the GOPEKA application; c) Product Effectiveness Instrument.

Implementation

At this stage, product validation is implemented**.** The qualifications for expert validators include 1) holding a doctoral degree (PhD), 2) having expertise in guidance and counselling, gamification, and a willingness to assess the developed product. Practitioners who will use the product, such as teachers, whether guidance counsellors or special education teachers, also contribute. Practitioner validators' qualifications include: 1) Profession as a guidance counsellor or special education teacher at the vocational high school level, 2) Minimum education of a bachelor's degree in a relevant field, 3) At least five years of teaching experience, and 4) Willingness to provide input and suggestions on the developed product. Four experts carried out expert validation, while 11 practitioners carried out practitioner validation.

The aspects of the GOPEKA self-understanding and career application validity test include clarity, usefulness, feasibility, and appropriateness. Experts rate the product on a scale of 1-5, where one indicates that the item does not meet the product acceptability specifications, and five indicates that the item is fully consistent with product acceptability. The reliability coefficient is calculated using the

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formula proposed by Arikunto (2002), stating that a reliability coefficient for group achievement is considered adequate if the Alpha coefficient is between 0.60-0.70 for the reliability index coefficient.

In this stage, activities include validating the GOPEKA Self-Understanding and Career Application product and its implementation with students. During the validation phase, activities are conducted to measure the validity level of the GOPEKA self-understanding and career application by requesting product assessments from validators. The validation process involves synthesizing results based on the consensus of experts.

The product effectiveness test was implemented through experiments using a pretest-posttest group design using the career understanding instrument developed by (Gould, 1986). Procedures: From the valid media operations that have been compiled, field tests/product effectiveness tests and output from using the GOPEKA application on students' career self-understanding. The product's effectiveness in increasing students' career self-understanding was measured at this stage.

RESULTS

The Analysis of Gamification Theory

In a preliminary analysis of the application of gamification, referring to Werbach and Hunter (2015), three elements of gamification are crucial for creating commitment and motivation. Below is an explanation of each gamification element needed in the application: (1) Gamification Components. These are the objects used in the GOPEKA application. The gamification components implemented include levels, progress (scores), leaderboards, badges (awards), and avatars. (2) Gamification Mechanics. Gamification Mechanics are the fundamental processes that engage users in the program.

The following are the gamification mechanics developed in the GOPEKA application components: (1) Levels. The career guidance in this application comprises three levels: Level 1 (self-understanding), Level 2 (career environment understanding), and Level 3 (formulation of choices and work preparation). Using levels facilitates the development of gamification patterns and motivates students to complete all stages of career guidance. The pace of completion depends on each student's accuracy in finishing the provided levels. (2) Missions and Challenges. Presented within the application, these depict the completion of quizzes at each level. Participants can progress to the next mission if a mission is completed and the requisite number of coins from the previous level is attained. (3) Scores. Points in the gamification-assisted career guidance application are rewards for players who complete a mission or challenge. Scores relate to leaderboards, and the users need to unlock quizzes at subsequent levels. The next level opens when users accumulate a certain score from playing the previous level, daily check-ins, and daily quiz participation. (4) Leaderboards. These boards display comparative scores achieved by players during the gamification-assisted guidance. (5) Progress Bar. This indicates how far players have completed gamification-assisted career guidance activities. The progress bar is in the history of games played by the player to generate scores. (6) Badges. These indicate players' progress in achievement and learning. In this gamification-assisted career guidance application, 19 types of badges are acquired according to participant progress. Generally, badges include (1) a Newbie for players just starting guidance activities. (2) Adventurer, awarded to players who reach Level 1. (3) Explorer, given when students achieve Level 2. (4) Superstar, awarded to participants who reach Level 3 and win the quiz.

Gamification Dynamics

Gamification dynamics are overarching scenarios designed to maintain user engagement and motivation in the game. The dynamics in this context revolve around how the game imposes resource limitations, challenging players to overcome obstacles. The resources in play in this game are time and scores required to progress to the next quiz level. Additionally, gamification includes games that support job-related insights accessed through a games menu, thus integrating elements of game-based learning into the application. Game-based learning, distinct from gamification, involves processes and learning

through games, whereas gamification employs game components in non-game settings (Krath et al., 2021; León et al., 2022). In the games menu, several challenges are designed using a quiz designer application, Wordwall, to engage users in exploring jobs and work environments. On Wordwall, job-related questions are created within a gaming setting or as multiple-choice questions but with time limits, additional points, and badges for correct answers. It has been observed that using Wordwall as a game-based learning tool can enhance motivation(Safitri et al., 2022).

The gamification dynamics in this application manifest in the quizzes that lead to decision-making simulations after accessing information through game-based learning and materials in the articles menu. The application imposes a score threshold for students to progress to the next level. Users can advance to the next level if they correctly answer 80% of the questions from the previous level's quiz. Successful completion of challenges at one level awards the user a badge, indicating readiness for the next level. This feature aims to evoke emotions in users to overcome obstacles and complete the game. Here, badges and total coins inform users of their progress in mission completion. The application fosters competition, which is evident from the leaderboard, and is expected to continually motivate users to accumulate scores and complete the GOPEKA program. A limitation of this application is the need for a narrative element or quest. Developers have yet to incorporate a quest feature, such as a roadmap, into the GOPEKA application. Mamekova et al. (2021) suggest that gamification applications lacking positive motivational outcomes should implement quests.

The Analysis of Career Theory

Career Diamond theory and Career Information Theory (CIP) are the career theories that build this product. Donald E. Super (Suherman, 2013) emphasizes that career development focuses on the growth and direction of several individual career issues throughout a fairly long period. Super believes that development for career decision-making begins in childhood. During this period, someone gets knowledge and information from models. In adolescence, a person determines interests and develops skills, resilience, and values. The journey to a career decision is long, so Andersen and Vandehey (2011) argue that the career journey process cannot be decided in a short time and requires knowledge and experience. He believes that the awareness stage of career decision-making cannot be determined directly and cannot change. According to him, the relationship between exploring self-concept and exploring awareness about the environment needs to be done to narrow down choices on one type of career. Furthermore, the career that has been determined can become capital for changing the next career

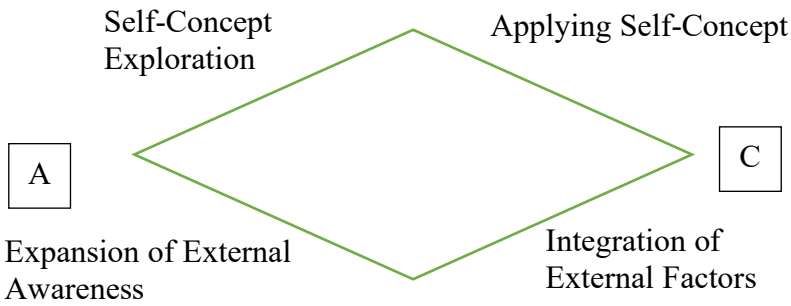

Figure 1 The Career Diamond (Andersen & Vandehey, 2011)

In achieving the vision to determine career direction, researchers depart from the theoretical basis of Career Information Processing (CIP) as a career guidance model (Peterson et al., 1991). According to Gati et al. (2019), Career decision-making is important for identity formation and has long-term impacts in several life domains. Therefore, decision-making theory can only apply if: (1) Individuals have taken several preparatory steps; (2) Individuals have a series of goals to achieve; (3) Have choices; (4) Several considerations used by someone to compare and evaluate alternatives.

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In order to reach the decision-making stage, a person must gather information about themselves and their work, as well as other alternatives to support satisfactory decision-making. Thus, in PIC, the most basic domain is the knowledge domain, namely that, individuals need to know themselves and the world of work and work environment. From this foothold, individuals enter the decision-making stage and, finally, the executive processing domain (Brown & Lent, 2004).

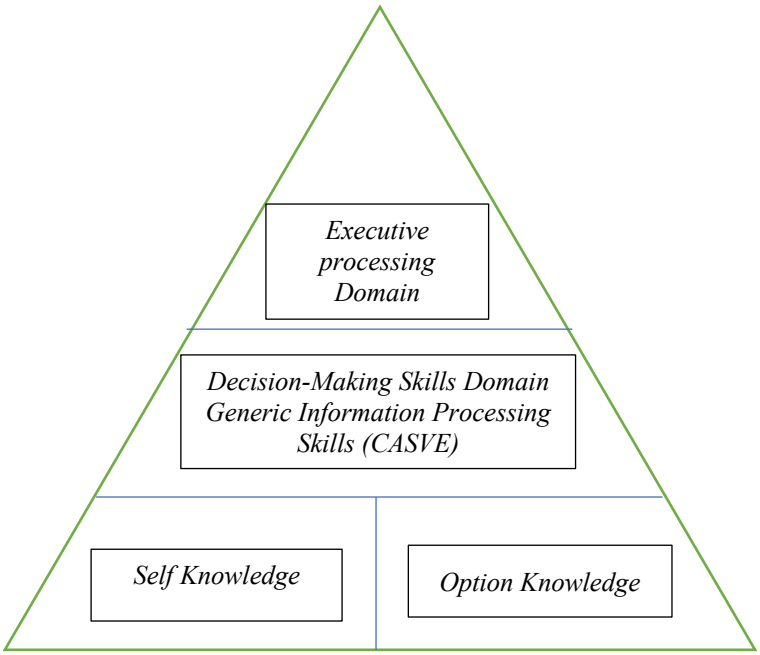

Figure 2 Information Process Domain Pyramid (Peterson et al., 1991).

In determining a career, the information a person must have regarding career choices includes information about career alternatives. Individuals should access as much information as possible regarding various career options. Accessibility to various career alternatives allows someone to adapt to a post-modern career, which provides several career alternatives. Gati et al. (2019) also provide various variables that individuals need to know before deciding on a career direction, such as job details in one type of occupation, organizational culture in various occupational fields, as well as the depth of advantages and disadvantages from the results of in-depth analysis of multiple types of professions.

Design and Development Stage

The product of this research is the GOPEKA Self-Understanding and Career Application, a mobile application developed in the Android.apk format that is installable on Android devices. This mobile application is hosted on Google Play Store, where users can download it for free. The application's content specifications include career planning materials and the application's interface. The content, developed by the researchers in line with career planning theories, is presented as concise materials, quizzes, and assessments covering self-understanding, understanding of the work environment, and formulating career choices and preparations. The layout and interface of the application are designed with minimalist colours, catering to the specifications required by students with disabilities. The design flow chart of the GOPEKA application is included in Appendix 5.The structure of the gamification-assisted career guidance service is flexible and implemented through an online application. Students can freely open and complete the application stages anytime and anywhere, provided an internet connection. The online application, named GOPEKA (Online et al.), is an Android .apk application requiring an Android smartphone for installation, downloadable from the Google Play Store. GOPEKA includes a usage guide within the application.

GOPEKA is an application containing career guidance materials packaged with gamification and comprises three levels. Each level has its mission, and to progress, users must complete the mission by achieving a certain score on the quiz of the previous level. The levels represent the stages and topics of career guidance to be mastered, while missions in the form of quizzes are activities or challenges to be completed by students. Students can only advance to the next level if they have completed the missions and challenges of the current level. The gamification-assisted career guidance using the GOPEKA application also includes a scoring system for students who complete missions or challenges and a progress bar to track the student's progression through the missions and levels of career guidance.

Figure 3 Prototype 1 Interface of the GOPEKA Application

Expert and Practitioner Validation

The trial implementation of the gamification-assisted self-understanding and career media for students with disabilities yielded results including (1) evaluations by guidance and counselling experts, (2) evaluations by educational technology experts, (3) assessments by practitioners consisting of school counsellors and special education teachers, and (4) effectiveness testing of the gamification-assisted self-understanding and career media for students with disabilities. The following table summarizes the validity scores from experts and practitioners:

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Table 1. Assessment Results by Expert Validators and Practitioner Validators

Aspect	Expert Validators	Practitioner Validators
Clarity	0.9212	0.8010
Usefulness	0.9250	0.8545
Feasibility	0.9690	0.7777
Appropriateness	*0.8625*	*0.8041*

Based on the Table 1, it is evident that the expert validators rated all criteria highly, while the scores from practitioner validators were high in clarity, usefulness, and appropriateness, with feasibility scoring in the medium category. Some notes from validators during the evaluation of this product are: (1) Scores should be immediately displayed in the application after completing assessments. (2) A back button is necessary to maintain the functionality of the application. (3) The inclusion of engaging games is necessary to maintain motivation to complete missions. (4) Certain text sections need to be enlarged with simplified language tailored to the abilities of children with special needs. (5) Some tests completed need to display results. (6) There are no accessible criteria for users in quiz results. Based on assessments from expert and practitioner validators, usability is the most critical aspect needing improvement. Usability is crucial as it determines whether users will continue using the application (Rahadi, 2014). Nayebi et al. (2012) argue that there are three important factors in Android application development: 1) the less time users need to complete the app's content, the easier the app is to use, 2) the system can be learned by observing objects, making the app easier to learn, and 3) meeting user expectations. The validation results reveal many confusing and difficult-to-learn features, necessitating user feedback to determine whether the GOPEKA application is ready for implementation.

Product Improvement

Based on the feedback from the validators, improvements were made to the GOPEKA application, specifically to its user interface, as shown in Figure 3-6.

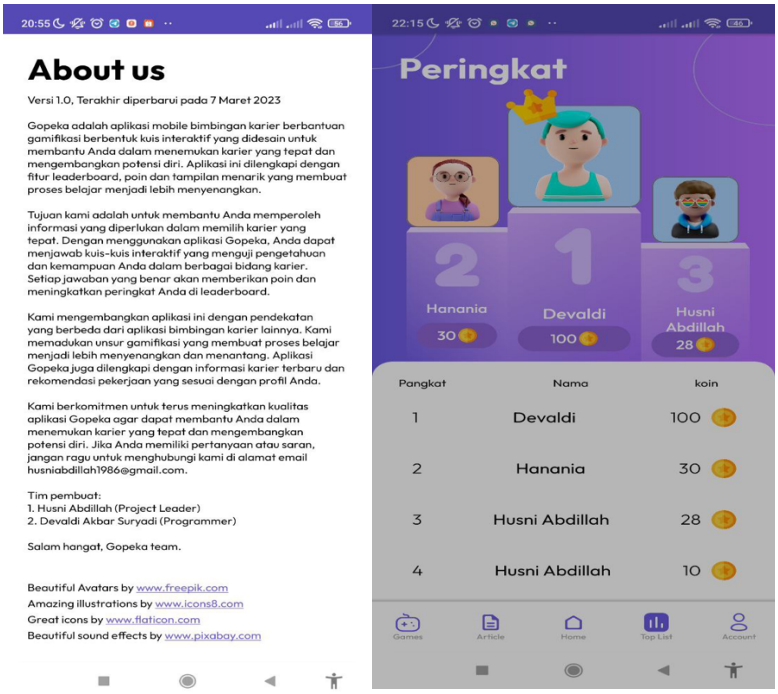

Figure 4 Enhancement of the Ranking Feature to Make it More Appealing, Along with a Description of the Developer's Identity

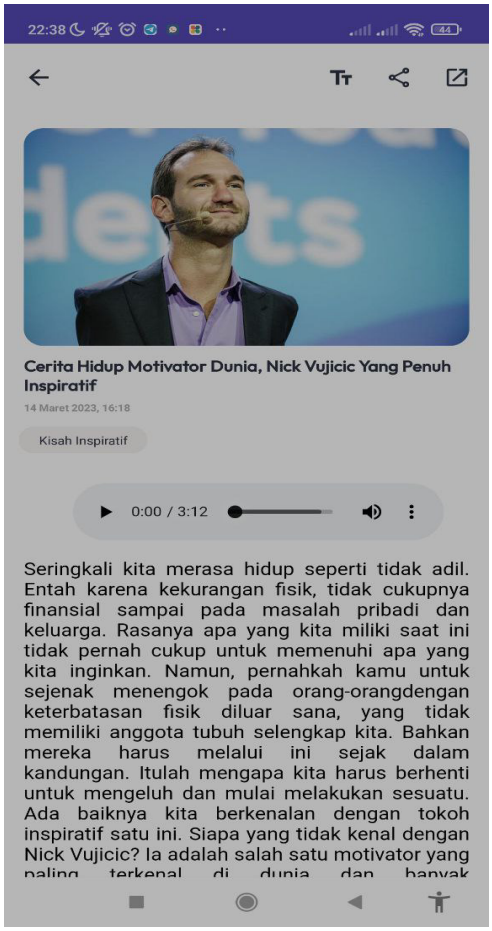

Figure 5 Display of Material with Adjustable Font Size and an Audio Feature to Read Aloud Text

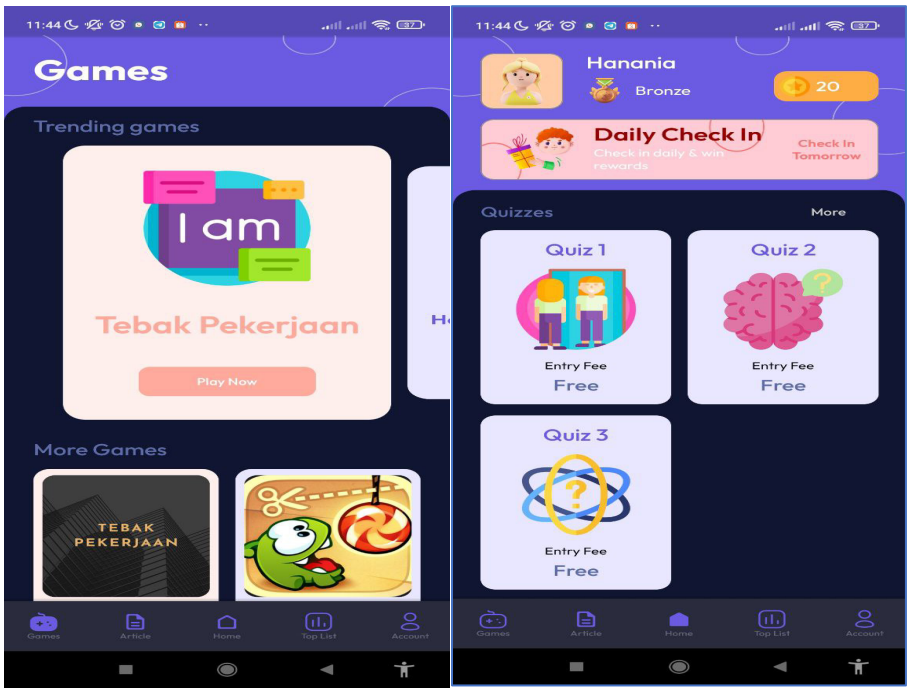

Figure 6 Display of Quizzes and Games Focused on Career Self-Development

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Evaluation Stage

The effectiveness test was implemented by comparing the pre-test and post-test scores on career planning of 82 students with disabilities from SMK N 1 Sidoarjo, SMKN 2 Buduran Sidoarjo, SMKN 3 Buduran Sidoarjo, SMKN 2 Surabaya, SMKN 10 Surabaya, SMKN 12 Surabaya, and SMALB Karya Mulia Surabaya. The normality test results showed that the pre-test and post-test data had a Sig value <0.05, not normally distributed, so a Wilcoxon pairwise test was needed to determine whether there was a difference in the pre-test and post-test results. Based on the Wilcoxon results, the average total career planning score on the pre-test was 18.77, while on the post-test, it was 24.17. Then, from the Wilcoxon test results, a significance value of 0.000 ($p<0.05$) was obtained, so it can be concluded that there is a significant difference between the average total career planning score during the pre-test compared to the post-test, where the average total career planning score during the post-test was higher than the average total career planning score during the pre-test.

DISCUSSION

Field analysis and theoretical foundations influenced the development of the GOPEKA application's design. A survey of 91 vocational high school students with disabilities revealed that most owned Android smartphones. It is anticipated that with easy accessibility to Android smartphones, they can independently access the gamification-based career guidance media application. Dharmarathne et al. (2022) have noted that mobile applications aided by gamification effectively motivate individuals with cognitive disabilities to determine their career paths.

A key advantage of this application is its focus on motivating individuals with disabilities to determine their careers beyond the conventional career guidance material. Previous research explained that students with a disability are more likely to struggle with career decision-making due to a lack of motivation (Spencer et al., 2021). Additionally, features are designed to be accessible for individuals across various disability spectra. However, a limitation of this application is the developer's inability to incorporate vibration and sound features, making it less accessible for individuals with severe visual impairments.

Across the various stages of the Cognitive Information Processing (CIP) theory (Folsom et al., 2005; Reardon, 2017), the GOPEKA application provides services to users in self-understanding and understanding job choices. Self-understanding and Job Understanding are presented in freely accessible articles and games, similar to information on a website. The articles provide insights about numerous individuals with disabilities who have successfully pursued careers, inspiring others. They also include narratives on career guidance, such as understanding interests and talents, the environment, and how to understand the work environment. Students can also analyze their abilities to understand various jobs and careers, recognize work environments, and comprehend job application processes.

In the game format, users can independently explore their knowledge about various jobs and occupations, discover their interests and talents using John Holland's RIASEC theory, and assess their ability to create a curriculum vitae and job application letters. RIASEC interest and talent assessments have been developed in web-based and gamified app formats. For instance, (Budiyono, 2020) developed a web-based instrument, while (Hamid and Senan, 2021) developed a gamification app for the RIASEC test. However, quiz creation applications like Kahoot! and Quizizz have yet to be adapted to incorporate a specific algorithm for final decision-making in their assessments. The most effective approach in this application is to link instruments provided on other websites to the GOPEKA application. Based on the results of self and job exploration, users can evaluate their exploration outcomes through quizzes that provide feedback in scores, badges, and a leaderboard to gauge their learning progress relative to other users. The incorporation of gamification elements has been recognized for its ability to motivate and maintain user engagement in accessing information on mobile applications. The quizzes are designed to resemble the interfaces of Kahoot and Quizizz, quiz-making applications that integrate gamification elements such as scores, badges, leaderboards, and limited resource challenges. Including gamification elements has increased interest, driven achievement ambition, and created a competitive environment with badges. Designing quizzes with limited time resources (Göksün & Gürsoy, 2019) can also enhance

motivation and engagement among individuals with disabilities (Ghasemi Arganeh et al., 2021; Mahoney & Hall, 2017).

An alternative perspective from a meta-analysis by Mamekova et al. (2021) indicates that not all gamification necessarily enhances student motivation. Of the seven articles analyzed, which needed to demonstrate adequate homogeneity, it was found that only about a third of the users were motivated through gamification. They argue that external motivation induced by gamification elements may reduce intrinsic motivation (Elshiekh & Butgerit, 2017; Hanus & Fox, 2015; Saleem et al., 2022).

Gilyazova and Zamoshchanskii (2020) opine that the key to enhancing intrinsic motivation lies in carefully arranging gamification elements with game thinking rather than making gamification the sole method for achieving career guidance objectives. Game Thinking, contributing to the formation of intrinsic motivation, contrasts with game mechanisms (such as 'points, badges, and leaderboards'), which focus on extrinsic motivation. It indicates that gamification is a challenging technology; primary attention should be given to maintaining a balance between utilitarian (educational) and hedonic (recreational) functions. It aligns with Deterding's (2012) theory that game experiences or gamefulness with game elements play a crucial role in enhancing user motivation. In the prototype that was developed, the developers did not provide the freedom to adjust the game. In contrast, in the second prototype, researchers recommended that the developers allow admin control over gamification elements to create gamefulness/game thinking.

However, Gilyazova and Zamoshchanskii (2020) emphasize that intrinsic motivation in gamification is part of the method, not the goal, suggesting negative consequences if this fact is overlooked. Based on the limitations of gamification in career guidance and Super's Career Theory, supported by the Diamond career model, which advocates extensive self and environment exploration before career decision-making (Andersen & Vandehey, 2011, p. 55), the researchers designed the product considering the limitations of gamification-based services at the level of self-understanding and job field exploration. Higher stages, like decision-making and metacognition, become part of the student's career journey and interaction with parents and mentors.

CONCLUSION

The research on the GOPEKA Self-Understanding and Career Application for Students with Disabilities, conducted in SMKN 1 Sidoarjo, SMKN 2 Buduran Sidoarjo, SMKN 3 Buduran Sidoarjo, SMKN 2 Surabaya, SMKN 10 Surabaya, SMKN 12 Surabaya, and SMALB Karya Mulia Surabaya, concludes that: In the analysis stage, it was found that preliminary analysis revealed the need for a structured career guidance service, the absence of media, and the absence of specific guide materials in the implementation of career guidance for Children with Special Needs (CSN). Consequently, the design and development of an Android-based gamification-assisted self-understanding and career application were undertaken. The GOPEKA gamification-assisted self-understanding and career application for CSNCSN students has been improved following validations by experts in guidance and counselling, educational technology experts, and practitioners, including school counsellors and special education teachers.

GOPEKA gamification-assisted self-understanding and career media for CSN students based on the results of field effectiveness tests on 82 students. It was seen that there was a difference between the pre-test and post-test results using the Wilcoxon test. In the pursuit of enriching the educational experience for students with disabilities through gamification-assisted media, future researchers are encouraged to explore various avenues for further investigation. The study's data collection tools, primarily questionnaires and interview guides, provided a superficial understanding of career planning profiles. To attain a more profound insight, upcoming researchers should consider supplementing these methods with additional observational approaches. It will ensure a comprehensive analysis, yielding accurate results and fostering insightful discussions.

Future researchers are advised to explore alternative research designs acknowledging the limitations associated with the one-group pre-test post-test design, particularly its potential interference with internal and external validity. Opting for designs that offer greater resilience against such

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disturbances will contribute to the robustness and reliability of the research findings. Embracing diversity in approaches and media, future researchers can experiment with different methods to empirically discern variations in the effectiveness of implementing career guidance services for students with disabilities. This exploration allows for a broader understanding of the nuanced impact of various strategies on the target audience.

To propel the development of gamification applications, allocating more resources and carefully selecting skilled developers with expertise in utilizing technology at an advanced level is recommended. Expanding the scope of implementation, integrating game-like quizzes, and employing sophisticated algorithms, such as those rooted in gamification-based storytelling or plot-didactic games derived from the latest research findings, can elevate the implementation of talent interest tests to new heights. This proactive approach ensures a dynamic and effective use of technology in catering to the unique needs of students with disabilities.

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