

## Children's Basic Etiquette Learning in Mobile Application



Erika Atmaja<sup>1</sup>, Wirawan Istiono<sup>2</sup>

<sup>1,2</sup> Universitas Multimedia Nusantara & Jl. Scientia Boulevard, Curug Sangereng Kelapa dua, Tangerang, Indonesia

**ABSTRACT:** The level of value and ethical crisis that occurs in children still tend to be found in society. It could be influenced by parenting patterns and observed based on daily interactions (talk and behave). Improving children's understanding can be done through a game because it is considered to be an effective way and able to provide entertainment for children. This research uses the modern method from the Fisher-Yates Shuffle algorithm for randomizing quiz questions because it has linear time complexity and constant space complexity. Based on the results of testing using a questionnaire to 38 respondents, the score of player satisfaction using the GUESS-18 calculation method is 82.08% which is a value with the predicate 'Good'. For the comparison of quiz scores on the pretest and post-test questions given, there were 86.84% of players managed to experience an increase in ethical development after completing learning through the game My Little Adventurer.

**KEYWORDS:** Children Etiquette Learning; Educational Application; Fisher-Yates Algorithm; Mobile Application

### I. INTRODUCTION

Childhood is the first learning tool in a child's formation and personal development that does not escape the attention of parents. Every parent has a role in accompanying the growth of the child's character through daily examples. The first learning for each child is obtained through action and guidance on ethical values given by parents so that it becomes the basis for someone to socialize in the community [1], [2]. The study explained that character education still has many shortcomings. Besides, the strengthening character education program is implemented in schools that have not yet achieved its goals [3]. Factors that can cause an ethical crisis are often found in the case of broken-home families, where no parental example can be shown [4]. On the other hand, children will record attitudes and behaviors that tend to be rude. This is because children can accept the values that parents apply through the way parents talk, behave in daily life, and interact with others or family, as well as living conditions and the surrounding environment [5], [6]. Based on the results of interviews with resource persons who are clinical psychologists for children and adolescents, it is stated that currently, there are still many children who do not understand ethics. The factors that influence this can come from parenting patterns that tend to give everything the child wants or wants. Lack of interaction with children, besides technological developments, is also one of the influences because a lot of information is received. Still, only a little can be filtered to allow children to accept bad things.

This study focuses on children's cognitive development in the concrete operational stage, which can be observed between seven and eleven years old [7]. The choice of research at the concrete operational stage is because the child already has logical thinking, and they can understand real or concrete problems that are displayed through real events that can be experienced in everyday life [8], [9]. At this stage, the child can think systematically so that able to determine the next step to complete the game. Playing is one of the activities that are important for children because they can encourage children to express what they feel and make a child able to get fun and joy as well as learn both in their physical, intellectual, social, moral, and emotional development that can be obtained through a series of activities carried out [10], [11]. Therefore, games are considered to be an effective way of learning to provide information on an aspect so that children will learn more by doing it as a form of entertainment [12]. Through the game, players' feelings can be influenced through interesting displays, animations, and stories [13], [14].

The implementation used in-game uses the Fisher-Yates Shuffle Algorithm which is used to generate random permutations from a finite set [15]. The set is a collection of quiz questions related to the learning material delivered through the given game scenario. This algorithm was chosen because it is suitable for use in randomized numbers. The Fisher-Yates Shuffle version of the modern method algorithm is considered the most optimal algorithm [16]. This can be noticed through its space and time complexity, where all executions for generating, swap, and decrement are performed in the same or constant space and are repeated n times, resulting in the same time complexity as  $O(n)$  and the same space complexity as  $O(1)$  [17]. To identify the child's understanding in

## Children's Basic Etiquette Learning in Mobile Application

capturing the learning delivered, parents can observe it through every quiz answer that the child has done. The design of the game that was built and the types of quiz questions given have been adjusted according to the results of personal interviews with clinical psychologists for children and adolescents so that the game that was built has been adapted and is suitable to be played for children aged seven to eleven years. The results of player or child satisfaction will be measured using GUESS-18 which consists of 18 questions and nine constructs [18]. The game development was carried out to achieve the development of children's ethics using the Fisher-Yates Shuffle algorithm. Furthermore, an evaluation was carried out to determine the level of child satisfaction after playing the game using the Game User Satisfaction Scales (GUESS) method. In addition, it aims to increase children's understanding of ethics through educational games

### II. LITERATURE STUDY

#### A. Ethics and Cognitive Development

According to the Big Indonesian Dictionary, ethics is a system of values or moral norms that serve as guidelines for a person or group to behave and act so that it can be interpreted as the science of good and bad that is accepted in society. In Greek, ethics comes from the word *ethos*, which means custom [19]. There are two ethics divisions, descriptive and normative ethics [20]. Cognitive can be interpreted as "cognition," which means a process of understanding everything that is obtained from the environment [7], [21]. In its development, the term cognitive became part of human psychology related to the level of understanding, consideration, and execution of information and problems centered on conation (will) and affection (feeling) [8], [10]. Cognitive development has a high relationship with intellectual development or brain function by being a determinant in improving the ability to think [9]. Without the cognitive aspect, a child will have difficulty understanding and carrying out the proper execution of information obtained through learning provided by the family and community environment [4], [10]. One of the figures who formulated the theory of cognitive development is Jean Piaget. Piaget conducted research on the stages of change in age from infancy, childhood, to adulthood which makes differences in the ability of individuals to learn through their mindset and reasoning. In addition, cognitive development can be formed because of the interaction between the individual and the environment so that it will indirectly shape the child's personality from attitudes and behavior through the thinking process that occurs [22], [23]. There are stages of cognitive development which are divided into four stages, namely the sensorimotor stage (0-2 years), the preoperational stage (2-7 years), the concrete operational stage (7-11 years), and the formal operational stage (12 years and over) [24].

#### B. Fisher yates shuffle algorithm

The Fisher-Yates Shuffle algorithm is named after Ronald Fisher and Frank Yates. In addition, this algorithm is known as Knuth Shuffle, which comes from the name of Donald Knuth, an algorithm to obtain random new sequence results from a finite set. Fisher-Yates is considered the most optimal and widely used among other randomization algorithms [15]. The Fisher-Yates algorithm consists of two methods, original methods and modern methods. This study used the modern method, which is an appropriate method for use on a computerized system because it has good results more optimal. It can be noted that the execution used to generate random numbers, exchange, and subtraction entirely runs on space or the same place, and then do a loop or repeated  $n$  times. Therefore, it can be concluded that the Fisher-Yates Shuffle algorithm has complexity linear time or time complexity  $O(n)$  and space complexity which is more efficient because it does not require extra space and all steps are performed in the same place or array so that obtaining space complexity is constant  $O(1)$  [17]. The following step is a randomization step performed on the Fisher-Yates Shuffle algorithm with the modern method.

1. Prepares a array containing the numbers 1 through  $N$ .
2. Choose a random number  $K$  between one and the number that has not been selected.
3. Starting from the bottom to swap between the selected number and the last number in the array, and the selected number is inserted into a temp array to be stored.
4. Repeat the second and third steps until all numbers have been eliminated.
5. The order of the randomization results is in array temp.

### III. METHODOLOGY

The research methodology for "Design and Development of Game for Children's Ethical Development using the Fisher-Yates Shuffle Algorithm" use the Waterfall research method with the following steps. The first step is requirement gathering and analysis. In this step, the literature studied included understanding the theory of cognitive development, the Fisher-Yates shuffle algorithm, Likert scale calculations, and the GUESS method, a discussion of the elements contained in game, and others. Furthermore, collecting information related to research topics regarding the role of the game for children as the basis for the

## Children's Basic Etiquette Learning in Mobile Application

development of the game My Little Adventurer through a personal interview process conducted with a clinical psychologist of children and adolescents named Mrs. Natalia M.Psi through the application Halodoc, she stated that ethical problems in children are currently being taken seriously. The lack of children recognizing ethics can be caused by several things, such as parents' busyness with their work and inappropriate parenting patterns that can be noticed through parents' tendency to always obey their children's wishes. In addition, technological advances also impact because large amounts of information can enter freely and are not thoroughly filtered for children. The second step is design, where at this stage, an analysis is carried out regarding the required information, such as game elements consisting of formal and dramatic elements. Next, the creation of a flowchart, and interface design, to the creation of each asset used in-game.

The third step is implementation, where after designing the game, the game is made using Unity Game Engine 2D and C# language on the platform Android. At this stage, the Fisher-Yates Shuffle algorithm will be implemented in part of the game. The fourth step is integration and testing, where at this stage, testing is carried out on every function contained in the game that has been made to find out if the overall design is appropriate and running well. The fifth step is verification, where in the verification stage is divided into two measures. Firstly, evaluating using the GUESS-18 method. Secondly, the pretest and post-test stages. Evaluation using the GUESS-18 method is a calculation based on the results of the questionnaire that has been obtained and then conclusions are drawn to determine the level of player satisfaction, while in the evaluation stages pretest and post-test are used to compare against the results of quizzes conducted on players before and after players complete the given learning topics. This is used to see players' level of understanding and development toward ethical learning. The last step is operation and maintenance, where at this stage, the game has been completed and maintenance is carried out to provide fixes for errors that were not found before.

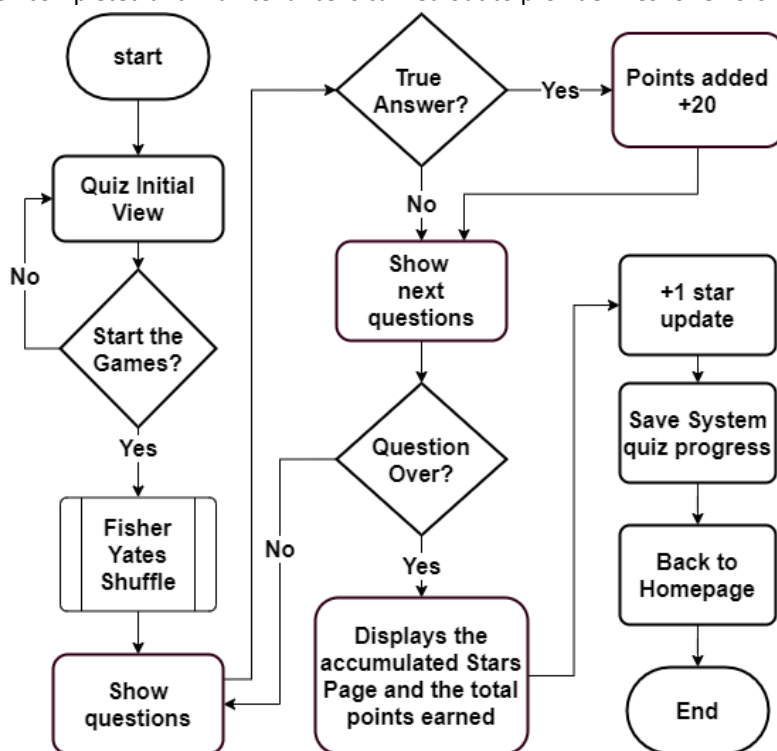


Fig 1. Flowchart Quiz

Figure 1 shows a quiz module for pretest and post-test quiz workflows. First, the quiz start page will be displayed. When the player does not select the start option, then nothing happens. Otherwise, the Fisher-Yates Shuffle module will be executed if the player selects the start option. Next, the questions will be displayed and a check is made on the answers chosen by the players. Then, it will continue to display the next question and check the number of questions, if the number of questions has not been exhausted, then the questions will continue to be displayed. However, if the question is finished, it will show that the stars have been collected and update the number of stars added by one.

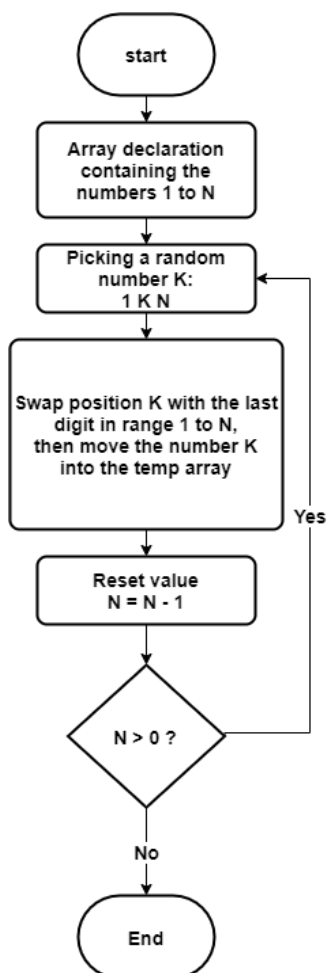


Fig 2. Flowchart Fisher-Yates Shuffle Algorithm

The Fisher-Yates Shuffle algorithm can be seen in Figure 2, where in this algorithm will implement in quiz questions to obtain random array results. First, there will be an array declaration containing the number of questions from 1 to N. Then, a random number K is selected from a range from 1 to N and an exchange is made between position K and the last number in the range 1 to N to be placed in the temp array. After that, the value of N is subtracted. If the value of N is greater than zero, it will be repeated starting from determining the random number K. On the other hand, if the value of N is not greater than zero, then the loop is stopped, and the workflow starts from zero. Fisher-Yates Shuffle algorithm has been completed.

**IV. RESULT**

The game is designed and developed using the Unity Game Engine on the Android platform. 2D assets are prepared using Clip Studio Paint. The algorithm used Fisher-Yates Shuffle as a random permutation generator to display the quiz questions in the game. Figure 3 is the interface of the Main Menu. In this section, players can choose several options the game provides, including starting the game through New Game or Load Game, Credit, How to play, and Quit Game options.



Fig 3. Result of the Implementation of the Main Menu Interface

## Children’s Basic Etiquette Learning in Mobile Application

Figure 4 is the interface where players can start the game by selecting the story option or seeing items that can be exchanged through the shop option. In addition, there is a quiz (post-test) option for players to start answering the quiz questions provided.



Fig 4. Result of the Implementation of Homepage Interface

Figure 5 is the interface when the player presses the quiz button on the homepage or when the player does the pretest question given at the beginning of the game. In this section, each question has four multiple-choice answers from A to D. Each time the player chooses an answer, and the next question will continue to be displayed until the question runs out.

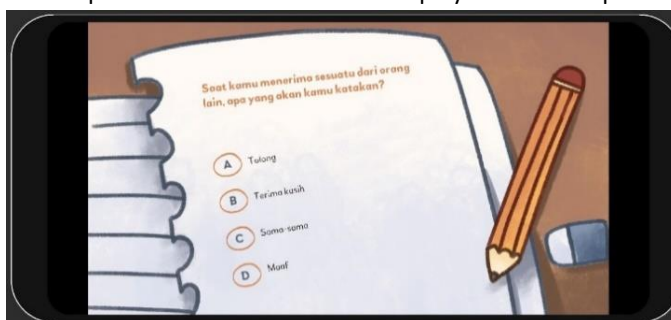


Fig 5. Result of the Implementation for Quiz Interface

The entire game process is carried out by the players, while parents or guardians carry out the evaluation process for filling out the questionnaire to represent the players (children) in providing a benchmark for player satisfaction during playing through the Google Form that has been provided. This is done to avoid the difficulty of players in understanding the questions given. Table 1 is the evaluation result using the GUESS-18 method, which can be seen in the average calculation result of each construct.

Table 1. Average Calculation Result of Each construct

Construct	Score (%)	Conclusion
Usability or Playability	83.6	Good
Narratives	81.9	Good
Play Engrossment	75.7	Good
Enjoyment	83.75	Good
Creative Freedom	81.3	Good
Audio Aesthetics	82.1	Good
Personal Gratification	80.95	Good
Visual Aesthetics	87.35	Very Good
<b>Overall Score</b>	<b>82.08</b>	<b>Good</b>

Based on the conclusion of the presentations, the average calculation obtained is based on each construct as an assessment of player satisfaction. In the overall results obtained, the percentage value of 82.08 is the conclusion of obtaining player satisfaction which can be defined as having a good predicate. For the results of the pretest post-test was used to measure the development of knowledge player behavior, where the intended behavior is politeness to others in terms of words, such as saying "thank you", saying "please", and saying "sorry" as well as through helping or ask permission from others. From the results of the pretest and post-test, it was found that there were 33 children out of 38 children that have increase result in ethical development after completing the ethical learning game My Little Adventure. From the result, that can be concluded, there were 86.84% of players who has increase result in ethical development.

## Children's Basic Etiquette Learning in Mobile Application

### V. CONCLUSIONS

The educational game My Little Adventurer has been successfully designed and built using the Fisher-Yates Shuffle algorithm to randomize the questions in the quiz section. Based on the results of testing using a questionnaire to 38 respondents, the player's satisfaction with the game My Little Adventurer is 82.08% which is a value with the predicate 'Good' where the Visual Aesthetics aspect gets the highest score of 87.35% with 'Very Good' predicate, while the Play Engrossment aspect received the lowest score of 75.7% with 'Good' predicate. Additionally, based on the results of the evaluation of the comparison between the quiz scores on the pretest and post-test questions given, there were 86.84% of players, or equivalent to 33 players out of a total of 38 players, managed to experience an increase in ethical development after completing learning through the game My Little Adventurer

### ACKNOWLEDGMENT

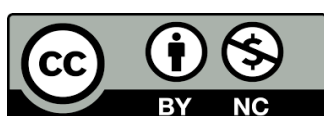
Thank you to the Universitas Multimedia Nusantara, Indonesia which has become a place for researchers to develop this journal research. Hopefully, this research can make a major contribution to the advancement of technology in Indonesia.

### REFERENCES

- 1) M. Rizaq, "FAMILY AS CHILDREN ' S FIRST EDUCATION ; THE ROLE OF PARENTS IN THE DEVELOPMENT OF ISLAMIC RELIGIOUS EDUCATION FOR ELEMENTARY SCHOOL AGE CHILDREN KELUARGA SEBAGAI PENDIDIKAN PERTAMA ANAK ; PERANAN ORANG TUA DALAM PERKEMBANGAN PENDIDIKAN AGAMA ISLAM," VOL. 13, NO. 1, PP. 184–208, 2022, DOI: 10.34005/ALRISALAH.V13I1.1785.
- 2) S. O'Shea, "Kids from here don't go to uni': Considering first in family students' belonging and entitlement within the field of higher education in Australia," *European Journal of Education*, vol. 56, no. 1, pp. 65–77, 2021, doi: 10.1111/ejed.12434.
- 3) A. Susandi, I. Ibnu, A. Salam, and M. Arifin, "THE ROLE OF FOSTER PARENTS IN IMPLEMENTING CHARACTER EDUCATION : Case Study of Children of Indonesian Workers in Puspan Village Maron District Probolinggo Regency," *Journal of Islamic Education*, vol. 21, no. 1, pp. 15–22, 2021, doi: <https://doi.org/10.19109/conciencia.v21i1.8452>.
- 4) W. Birhan, G. Shiferaw, A. Amsalu, M. Tamiru, and H. Tiruye, "Exploring the context of teaching character education to children in preprimary and primary schools," *Social Sciences & Humanities Open*, vol. 4, no. 1, p. 100171, 2021, doi: 10.1016/j.ssaho.2021.100171.
- 5) R. H. Weaver, "Predictors of quality and commitment in family child care: Provider education, personal resources, and support," *Early Education and Development*, vol. 13, no. 3, pp. 265–282, 2002, doi: 10.1207/s15566935eed1303\_2.
- 6) M. R. DAMIROVICH, T. I. IBRAGIMJANOVICH, and K. N. K. UGLI, "The role of family, community and education in the development of patriotic spirit in youth," *JournalINX*, vol. 7, no. 1, pp. 311–314, 2021, [Online]. Available: <https://www.neliti.com/publications/336405/the-role-of-family-community-and-education-in-the-development-of-patriotic-spiri>
- 7) B. D. (2021). Wiryananta, K., Safitri, R., & Prasetyo, "ToM & ASD: The interconnection of Theory of Mind with the social-emotional, cognitive development of children with Autism Spectrum Disorder. The use of ICTs as an alternative form of intervention in ASD," *Technium Social Sciences Journal*, vol. 7, pp. 312–320, 2020, doi: <https://doi.org/10.47577/tssj.v33i1.6845>.
- 8) W. Masitah and I. D. Pasaribu, "The influence of parenting style of early childhood cognitive development in Tanjung Medan Utara Village," *Proceeding International Seminar on Islamic Studies*, vol. 3, pp. 1223–1229, 2022, [Online]. Available: [http://jurnal.umsu.ac.id/index.php/insis/article/view/9783/pdf\\_393](http://jurnal.umsu.ac.id/index.php/insis/article/view/9783/pdf_393)
- 9) M. Roberts, T. Tolar-Peterson, A. Reynolds, C. Wall, N. Reeder, and G. Rico Mendez, "The Effects of Nutritional Interventions on the Cognitive Development of Preschool-Age Children: A Systematic Review," *Nutrients*, vol. 14, no. 3, pp. 1–15, 2022, doi: 10.3390/nu14030532.
- 10) Q. Yang, J. Yang, L. Zheng, W. Song, and L. Yi, "Impact of Home Parenting Environment on Cognitive and Psychomotor Development in Children Under 5 Years Old: A Meta-Analysis," *Frontiers in Pediatrics*, vol. 9, no. September, pp. 1–9, 2021, doi: 10.3389/fped.2021.658094.
- 11) K. N. Paulich, J. M. Ross, J. M. Lessem, and J. K. Hewitt, "Screen time and early adolescent mental health, academic, and social outcomes in 9- And 10-year old children: Utilizing the Adolescent Brain Cognitive DevelopmentSM (ABCD) Study," *PLoS ONE*, vol. 16, no. 9 September, pp. 1–23, 2021, doi: 10.1371/journal.pone.0256591.
- 12) W. Istiono, "Effectiveness of Mobile Game-based Education on Algorithm Thinking: Informatic Engineering Case," *International Journal of Emerging Trends in Engineering Research*, vol. 9, no. 3, pp. 163–168, 2021, doi: 10.30534/ijeter/2021/02932021.

## Children's Basic Etiquette Learning in Mobile Application

- 13) V. Georgiev and A. Nikolova, "Virtual reality simulations for presenting cultural-historic content in e-learning for kids," *Digital Presentation and Preservation of Cultural and Scientific Heritage*, vol. 11, pp. 267–272, 2021, doi: 10.55630/dipp.2021.11.24.
- 14) M. Hasbi, A. Munawir, G. Ahmad, Satriani, and U. Khair, "Teaching Vocabulary Using Games : Empowering Students ' Interest in Elt Classrooms," *Journal Abdimas Patikala*, vol. 1, no. 3, pp. 2014–2019, 2022, doi: <https://doi.org/10.51574/patikala.v1i3.290>.
- 15) I. Febriani, R. Ekawati, U. Supriadi, and M. I. Abdullah, "Fisher-Yates shuffle algorithm for randomization math exam on computer based-test," *AIP Conference Proceedings*, vol. 2331, no. April, 2021, doi: 10.1063/5.0042534.
- 16) J. Sampurna and W. Istiono, "Virtual Reality Game for Introducing Pencak Silat," *International Journal of Interactive Mobile Technologies*, vol. 15, no. 1, pp. 199–207, 2021, doi: 10.3991/IJIM.V15I01.17679.
- 17) M. Risnasari, M. A. Effindi, P. Dellia, L. Cahyani, N. Aini, and N. Aini, "Computer Based Test Using the Fisher-Yates Shuffle and Smith Waterman Algorithm," *KnE Social Sciences*, vol. 2021, pp. 353–360, 2021, doi: 10.18502/kss.v5i6.9224.
- 18) L. Laskey, "Space games: evaluating game-based virtual reality in higher education," *4th Symposium on Space Educational Activities*, no. April, pp. 1–6, 2022, doi: 10.5821/conference-9788419184405.057.
- 19) H. Litaly, S., & Serpara, "COMPARATIVE LITERARY WORKS, LANGUAGE LEARNING AND CHARACTER BUILDING OF LEARNERS," *Jurnal Tahuri*, vol. 18, no. 2, pp. 14–23, 2021, doi: <https://doi.org/10.30598/tahurivol18issue2page14-23>.
- 20) M. Hadi, "ETHICS AND LOGIC ANALYSIS IN THE DEVELOPMENT OF SCIENCE, TECHNOLOGY, AND ARTS," *SOSFILKOM : Jurnal Sosial, Filsafat Dan Komunikasi*, vol. 16, no. 1, pp. 87–102, 2021, doi: 10.4324/9780203011355-14.
- 21) S. J. Oppenheimer, "Iron-deficiency anemia: reexamining the nature and magnitude of the public health problem," *The Journal of nutrition*, vol. 131, pp. 616–635, 2001.
- 22) S. Grueso and R. Viejo-Sobera, "Machine learning methods for predicting progression from mild cognitive impairment to Alzheimer's disease dementia: a systematic review," *Alzheimer's Research and Therapy*, vol. 13, no. 1, 2021, doi: 10.1186/s13195-021-00900-w.
- 23) M. A. Saleem Khasawneh, "Cognitive Flexibility of Students with Learning Disabilities in English Language and its Relationship to some Variables," *Shanlax International Journal of Education*, vol. 9, no. 3, pp. 49–56, 2021, doi: 10.34293/education.v9i3.4003.
- 24) Ibrahimov F; Abdurahmanova G; Garayeva G, "COGNITIVE ACTIVITY MODEL OF THE LEARNING STATUS COMPONENT IN THE LEARNING PROCESS," *The scientific heritage*, vol. 88, no. 8.5.2017, pp. 2003–2005, 2022, doi: 10.5281/zenodo.6575808.



There is an Open Access article, distributed under the term of the Creative Commons Attribution–Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.