Improving Motivation and Learning Achievement of Social Sciences Through Combined Jigsaw Method With Silent Reading Technique At Secondary School

Mejorando el logro de la motivación y el aprendizaje de las ciencias sociales a través del método combinado de rompecabezas con la técnica de lectura silenciosa en la escuela secundaria

**Salamah[1],
Tri Purnomo[1],
Joko Sutopo[2]**

[1]Faculty of Education Universitas PGRI Yogyakarta, Indonesia
[2] Faculty of Information Technology and Electrical Universitas Teknologi Yogyakarta, Indonesia
Correspondence address; E-mail: salamah@upy.ac.id

ABSTRACT/ In the learning process in secondary schools, especially in science subjects requires unique skills and presentation methods so that students can receive the material well. Natural science subjects become subjects that are considered severe, so it requires a method that can improve learning motivation and student achievement in learning. This study aims to determine the increase in motivation and learning achievement of Social Sciences through a combination of Jigsaw techniques with silent reading in class Secondary School. Classroom action research is a way to collect data by conducting observations, tests, questionnaires, and documentation by involving two observers, valid quantitative data obtained by validating items on the test every day. There was an increase in students' social science motivation from pre-cycle observations from 32 students with high learning motivation and very high 10%. After class action, motivation is high and very high in cycle I is 69%, cycle II is 78% and cycle III is 81%. The results of the questionnaire data show that student motivation also increased from 66% in cycle I to 78% in cycle II and 91% in cycle III. The results showed that the learning process using a combination of Jigsaw methods and silent reading techniques was conducive and attractive to students. Keywords: Learning, Motivation, Jigsaw, School

RESUMEN / En el proceso de aprendizaje en las escuelas secundarias, especialmente en las asignaturas de ciencias, se requieren habilidades y métodos de presentación únicos para que los estudiantes puedan recibir bien el material. Las asignaturas de ciencias naturales se convierten en asignaturas que se consideran severas, por lo que requiere un método que pueda mejorar la motivación del aprendizaje y el rendimiento de los alumnos en el aprendizaje. Este estudio tiene como objetivo determinar el aumento en la motivación y el logro del aprendizaje de las ciencias sociales a través de una combinación de técnicas de rompecabezas con lectura silenciosa en la escuela secundaria de clase. La investigación de acción en el aula es una forma de recopilar datos mediante la realización de observaciones, pruebas, cuestionarios y documentación mediante la participación de dos observadores, datos cuantitativos válidos obtenidos al validar los elementos de la prueba todos los días. Hubo un aumento en la motivación de las ciencias sociales de los estudiantes por las observaciones previas al ciclo de 32 estudiantes con una alta motivación de aprendizaje y un 10% muy alto. Después de la acción de clase, la motivación es alta y muy alta en el ciclo I es del 69%, el ciclo II es del 78% y el ciclo III es del 81%. Los resultados de los datos del cuestionario muestran que la motivación de los estudiantes también aumentó del 66% en el ciclo I al 78% en el ciclo II y al 91% en el ciclo III. Los resultados mostraron que el proceso de aprendizaje usando una combinación de métodos Jigsaw y técnicas de lectura silenciosa fue propicio y atractivo para los estudiantes.
Palabras clave: aprendizaje, motivación, rompecabezas, escuela.

INTRODUCTION

The learning process is a process that contains a series of actions of teachers and students on the reciprocal relationships that occur in educational situations to achieve certain goals (Nurbianta & Dahlia, 2018). The teacher has a very important role in managing classroom situations and conditions so that students can learn comfortably (Fisher, 2019). Based on the development of more advanced eras, the teacher acts as a motivator and facilitator in teaching and learning activities (Munir & Rahmat, 2017). Someone is said to experience learning events if he experiences a change from not knowing to knowing, the success of the learning process is not only influenced by

students and teachers but is influenced by the environment (Nevo & Vaknin-nusbaum, 2019).

Education is a conscious and well-planned effort to realize the learning atmosphere and the learning process so that learners actively develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character and skills needed by them, society, nation, and country (Fryman, Fei, Mehta, & Ahmad, 2018). Education serves to improve the intelligence, dignity of the nation and the potential that exist in the students themselves (Ghasemzadeh & Arjmandi, 2017). Students viewed from the cognitive aspect. Cognitive, effective, and psychomotor aspects must go hand in hand so that education can be achieved well (Baihaqi & Wilian, 2019). Important components that can improve the quality of education in Indonesia (Anisah, Fitriati, & Rukmini, 2019): (1) school management that is expected to be open, accountable, and participatory: (2) the role of the community: (3) participatory, active, creative, effective, and enjoyable learning. Modern learning systems will provide flexibility for students to respond to and develop the knowledge learned (Azmin, 2016). In the modern education system the teacher's role is more dominant as a motivator and guide for students in exploring the knowledge being learned (Perwitasari & Eka, 2018). The teacher provides assistance to students in honing their creativity and potential so that students are able to know their interests and talents that can be developed by themselves (Zhou et al., 2019). These conditions provide opportunities for students to access the knowledge learned by not only based on the knowledge provided by the teacher, but from other sources (Ageasta & Oktavia, 2018). Learning strategy factors play a big role in achieving learning objectives (Winarti, Yuanita, & Nur, 2019). There is no doubt that student learning outcomes can be influenced by teaching strategies or methods applied by teachers in learning activities (Nugraha, 2019). Often use the Jigsaw method and silent reading techniques for action learning classes (Nevo & Vaknin-nusbaum, 2019). Causes of low student participation in the learning process: (1) Students lack the ability to formulate their own ideas and (2) Students do not have the courage to express opinions. Such incidents are the responsibility of the teacher as a motivator, to generate interest. The jigsaw method is a cooperative learning technique in which students, not teachers, have greater responsibility for carrying out learning. Each student in the "initial group" specializes in one part of a learning unit (Leary & Barber, 2018). silent reading is a reading activity that is done without voicing the contents of the reading it reads (Perwitasari & Eka, 2018). The application of the Jigsaw model and the silent reading technique as one of the cooperative learning medals is expected to increase student motivation and learning achievement, while it is expected to increase students' understanding of learning material (Rahmi, 2018).

METHOD

This research was conducted at SMP Negeri 21 Purworejo, Indonesia with the object of research in the science learning class in 2018. This school is a pioneering school with national school standards with the support of educators, service personnel and school committees.

The research subjects conducted by direct observation in the field began with action studies conducted in the teaching and learning process with the type of collaboration between observers and researchers as actions. The research object was 32 seventh grade students with 18 boys and 14 girls who took science subjects.

Procedure Research is carried out using classroom action research that reflects an action in the classroom together between the teacher, teacher instructor and supported by students. The field of education is one part of the scope of this action research. Classroom action research is a practical research to improve the quality of learning and improvement efforts by implementing actions to find answers to problems raised from everyday tasks in the classroom. This research is used to improve the ability of the subject by applying new methods that seem to have advantages to solve problems in learning. In the preliminary study, research found low motivation problems and achievement of learning outcomes in natural science subjects..

Research time

This research is a "study of action" conducted in teaching and learning process, therefore the research method which is a classroom action research with a kind of collaboration between observer and researcher as action.

ARTÍCULO

Subject research

The students of class VII-E SMP Negeri 21 Purworejo which amounted to 32 children consisted of 18 boys and 14 girls. The study took the subject of the class because based on the data, the social science subjects first-semester score showed optimum learning achievement social science class VII-E students.

Research procedures

This research is a classroom action research. Classroom action research is a reflection of the genius of learning in the form of actions, which are deliberately raised and occur in a joint class. The action is confirmed by the teacher or at the direction of the teacher who supports students. Action research is a form of reflective research conducted by actors in social societies and aims to improve their work, to understand this work and to the extent that this work is carried out by students. Action research is a form of reflective action carried out by actors in a social society and aims to improve its work, understand this work and the situation in which it is carried out. The field of education is one part of the scope of this action research. Classroom action research is practical research intended to improve or improve the quality of learning and improvement efforts are carried out by applying measures to find answers to problems raised from daily tasks in class. This research is used to improve the subject's ability by applying new methods that are considered to have advantages to solve problems in learning. In his research found the problem of low motivation and learning achievement of social science subjects. This study aims to solve the problem by conducting classroom action research through the use of jigsaw methods and silent reading techniques in class VII-E students of SMP Negeri 21 Purworejo Indonesia.

Data collection technique

Data collection techniques are ways that The researcher uses the data collected to answer the research problem formulation. Data collection techniques used in this action research consisted of test and non-test techniques. Test techniques in the form of written tests, oral tests and performance, are used to obtain learning achievement scores as indicators of learning achievement. While the non-test technique is used to collect qualitative data in the form of discussions with social science teachers. In this study, researchers also involved two fellow social science teachers as observers Pawit and Lasmina (people's names) to obtain research data compiled by research instruments based on literature review and discussion. Data collection techniques there are;

Observation

Researchers do the learning of teaching and learning to learn students and also cooperative learning with jigsaw models and calm reading. Observation results are invasive spaces, actors, activities, objects, actions, events or events, time and nuance. The instrument used during observation is an observation sheet containing an observation grille for more systematic observations. Observations were made in learning and student participation in learning.

Test

The test is used to assess the absorption of the material during the learning by the student. The test material refers to the material being studied by the student. Individual student work tests are given at the end of the cycle. The result of the research is an indicator of achievement improvement of student learning outcomes.

Questionnaire

The questionnaire is a research instrument that contains a series of questions or statements to capture data or information about the person, or things in the know or feel the students. In this study used a closed questionnaire is a questionnaire that every question has been available in various alternative answers so that respondents can provide the field in accordance with the will and the circumstances by simply giving a check on the column or place appropriate with revenue In this study used a closed questionnaire, with a 4-point like a scale that is: 1. = Strongly Agree (SS), 2. = Agree (S), 3 = Disagree (TS), 4 = Strongly disagree (STS)

Documentation

Most of what is available in the documentation is in the form of letters, diaries, camera data, reports, artifacts, photographs, and so on. Documentation is used to find out the student's written data that will be examined as evidence of research, including a list of repetitive grades for social science subjects, a list of learning outcomes per cycle, and photographs during learning. The documentation used in this study is the

ARTÍCULO

638

students' scores before the study and the grades during the study namely quizzes, student work and documents increasing student motivation.

Design research

Classroom action research is action research in educational offerings carried out in the classroom to improve and / or improve the quality of learning. Characteristics of PTK are internal investigations; collaborative efforts between school teachers and teacher educators (Liao, Griswold, & Porter, 2018). This research is a series of steps. Each step consists of four stages: planning, action, observation, and reflection (Zhou et al., 2019). The six provinces used in this class action study are used in reference to Hopkins as quoted by Basrowi as follows (Liao et al., 2018): 1) Primary school teachers and teachers in schools are teaching, so that whatever method applied by CAR must not interfere with commitment. as a teacher; 2) The data collection method used does not require excessive time from the teacher so that it is likely to disrupt the learning process; 3) the methodology used must be sufficiently reliable so that the application of basic principles has been obeyed by the rules to be maintained; 4) research problems are problems that are quite worrying and deviate from the professionalism responsibilities of teachers; 5) always be consistent and care about ethical procedures related to their work; 6) classrooms that exceed perspective in terms of problems are not seen as limited in the context of the classroom but in the perspective of the mission school as a whole. The design of this study uses the Kemmis and Mc Taggart models with the stages of planning, action, observation, and reflexes as well as re-planning for each cycle (Nevo & Vaknin-nusbaum, 2019). Examine this class action. The following are the main actions for each cycle to be performed. Each cycle of action includes planning, action, observation, and reflection (Zhou et al., 2019).

Planning

Planning is the first step of every cycle. In detail, the steps are as follows:

1). Seeking research problems that exist in the field, conducted through discussions between teacher researchers, homeroom, and students, through interviews, observation, and reflection. The source of the problem comes from the unrest of research in teaching and learning activities in the classroom.

2). Choose research problem

The problem obtained is discussed, then selected based on the weight of the problem and the breakdown of the cracker; a) Sharpen the research problem, The issues that are elaborated are detailed, then sharpened into issues to be studied. 3) Designing problem solvers, The design of the solution is done by considering the supporting factors, and the inhibiting factors and the maximization of support. At the planning stage, an action plan is also formulated in the implementation of the lesson plan, the implementation plan of this lesson will always be seen, analyzed corrected and updated according to circumstances and findings during the action in each cycle in face-to-face meetings in the classroom. Revision of lesson plan is done to complete the activity in action so as to achieve optimal result according to which is applied.

Action

Problem-solving such as the designed plan is using jigsaw method and silent reading technique in social science learning.

Observation

Observation is carried out in conjunction with the implementation of the action of action, the effect of the action and on the both of the action of action and the stage of the results of actions taken. Observations are also made on how far-reaching objectives that help the achievement of the planned objectives. The result of observation will be tabulated, analyzed as the compiler of the research report.

Reflection

Reflection is done to do research on the process, the problems that arise, and everything related to the actions taken. Implementation of reflection by the researcher to evaluate the outcome of the action and formulate the next action plan. In each stage of the study, colleagues gathered as collaborators to obtain research data, as well as to contribute to the discussion of emerging problems.

Data Validation

To obtain valid quantitative data, validation of the items on the written test sheet, oral and performance. For that prepared a grid or format to do validation on the item. While to obtain valid qualitative data, then done through triangulation data source. Triangulation of data sources is done by conducting in-depth interviews of several

people to restock to the truth of the data provided by the interviewee beforehand. To validate data collection method then done by applying more than one method.

Data Analysis Technique

The technique used is descriptive qualitative analysis, to analyze data result of student achievement value used comparative descriptive analysis. Used by comparing the value of learning achievement at the initial condition that is before students are given action. With the value of learning achievement after the students are given a break in each cycle. The data collected were analyzed descriptively by using percentage analysis. Through this percentage analysis technique, expected results and planned actions can be revealed. The average student learning outcomes at each end of the cycle are cultivated if it increases then it is assumed that the combination of the jigsaw method with silent reading technique can improve the learning achievement. Data of learning achievement is calculated by the formula:

Final Score=(total score answered by students)/(maximum number of scores)×100 0.00% -39.0% = not good, 40.0% -59,0% = good enough, 60.0% -79.0% = good, 80.0% -100% = very good. The highest number of scores for item strongly agree is 4 × 36 points statement = 144, while the item strongly disagree is 1 × 36 item statement = 36. Research interpretation of respondents to learning actions obtained from the results obtained values using the formula index%; index formula %=(Total Score Obtained)/(Score Obtained)×100

Grid questionnaire of student motivation is described in the q-uestionnaire as attached in this research report with the following provisions:

There are 36 statements, the student is expected to consider each statement well in relation to the learning material that has just been learned, and determine its truth with the member's answer that really matches the student's choice of students.

The answer option of each statement consists of four options that are enclosed with a check mark member on the available column.

Question Tests

Problem test used by researchers to measure student achievement on cognitive aspects that are quantitative, ie in the form of numbers or grades obtained by students after completing the learning process. Filling in the observation sheet is done by an observer from teacher collaborator by giving a score with criteria as follows: 1 = never, 2 = sometimes, 3 = often, 4 = always. Interpretation research result observation motivates student during the action to learn obtained from result value obtained by using formula index %. To know the way of teaching and learning activities in the behavior observation of teachers in the implementation of learning. The results of observations of students and teachers during the learning process are recorded and tabulated more and more so that it can and easy to use as a research source and provide an overview of the reality in the field.

RESULT AND DISCUSSION

Result

The results obtained from the results of the action cycle I, cycle II and cycle III. Result this study consists of test results and notes;

Description Initial Conditions, In the early conditions of the early learning process, took place conventionally by way of lectures without any variation of learning and without applying innovative methods of learning. Overall learning takes place in an orderly and smooth manner. After the learning activity is completed, evaluation is held in the form of a daily test to learn the success of the learning process. To improve the motivation and achievement of the learning outcomes is done by using class action using a combination of jigsaw method and silent reading technique

Description Results Cycle Action II

Planning Cycle I

At this stage, it is accomplished by devising a lesson plan with basic competencies describing the symptoms occurring in the atmosphere and the hydrosphere and its impact on life.

Cycle Learning Process I

At the core activities begins with varied lectures about the earth's atmosphere and its relation to human life briefly, in the second meeting of the cycle I lasted in (2*40) minutes, the teacher delivered the introduction by giving motivation.

Result Observation And Questionnaire Cycle I; 1.Observation of the Teacher, 2.Observation Against Student's Motivation, 3. The result of Student Motivation Motivation Cycle I.

Results of Student Achievement Test Cycle I Hail test to measure student achievement cycle I am the initial data of the implementation of learning through cooperative learning model with jigsaw

method combined with silent reading technique.

Reflection

The result of observation on the learning process there are things that need to be improved for the action plan in the following cycle is the nature of the learning group, not all students are actively working on helping the group in preparing the report, especially at the first meeting.

Description of Results of Action Cycle II

Actions are carried out in two face-to-face meetings. In this cycle, the main subject of basic competence is presented. Describe the main economic activities that include consumption, production, and distribution of goods/services;

Planning II

The Learning Implementation Plan is structured by composing and accommodating reflection results from the implementation of class actions in the previous cycle.

Learning Process Cycle II

In the first meeting of this cycle II is about the kinds of economic activities, consumption activities, any sun scale priority needs, positive and negative aspects of one's consumptive behavior, and the factors that affect consumption. At the meeting second in the process of learning more smoothly because the group has been formed at the previous meeting.

The result of Observation and Questionnaire Cycle II;

1). Observation of the Teacher, 2). Observation Against Student Motivation, 3). Results Questionnaire Student Motivation Cycle II; a). The result of student achievement test Cycle II To measure the restoration of students is data of daily test., b). Reflection Observation results or observations and research on teachers conducted by observation by filling out the observation sheet of learning activities.

Description of the Action Results Cycle III The action in cycle III is carried out in two face-to-face meetings with the subject matter of the basic competencies. Describe the role of business entities including cooperation as a place for the production process to run in relation to economic actors; a). Planning learning cycle III, b). Chapter III learning process, c). Observation result and questionnaire cycle III.

Discussion

Learning process, Implementation of learning with jigsaw technique with silent reading technique is good, showing a significant increase. This is evidenced by observations that there is an increase in pre-cycle (initial condition) low motivation of 8% and moderate 81% or only 10% of students who have high motivation and very high. After the class action, high motivation and very high in cycle I was 69%, the second cycle was 78% and the third cycle was 81%. The result of questionnaires of student motivation also increased from 66% in cycle I to 78% in cycle II and 91% in cycle III.

Motivating student learning, Increased student motivation is obtained from observations and questionnaires that students must fill.

Achievement Student Learning, The combined use of jigsaw meth and silent reading techniques can be well collaborated by the teacher so that the students are well-behaved. The results of evaluating the implementation of teachers in each implementation cycle are better seen from the comparison of teacher actions in the first cycle 68.75% or an average of 2.75, the second cycle 72.92% or an average of 2.93 and a third cycle of 85.42 % or an average of 3.42.

This is evidenced by the percentage of students completeness level in the pre-classical cycle 47% or 15 students, the first cycle 72% or 23 students, and the second cycle 81% or 26 students and the third cycle 88% 28 students. The results showed that in cycle II and cycle III had exceeded the performance indicators set at 80%. The presentation of learning also increased indicated by the achievement of the average daily test scores in the first, second, third cycle, namely: 69.31 in the first cycle, 79.9 in the first cycle, 81.75 in the second cycle, and 82.03 in the third cycle .

CONCLUSION

Based on the result of class action research in social science learning through a combination of jigsaw method with silent reading technique on VII-E students of SMP Negeri 21 Purworejo can be drawn the following conclusion:

The learning process by combining the jigsaw method and silent reading can motivate students to express their opinions and make decisions during the learning process.

There is an increase in learning motivation Social Science students through learning by

using a combination of methods Jigsaw and silent reading techniques.

Lessons using Jigsaw methods and silent reading techniques can improve learning achievement of social science.

REFERENCES

[1] Ageasta, Y. M., & Oktavia, W. (2018). Journal of English Language Teaching. Journal of English Language Teaching, 7(3). Retrieved from http://ejournal.unp.ac.id/index.php/jelt%0AUSING

[2] Anisah, N., Fitriati, S. W., & Rukmini, D. (2019). Teachers ' questioning Strategies to Scaffold Students ' Learning in. English Education Journal, 9(69), 128–143. Retrieved from http://journal.unnes.ac.id/sju/index.php/eej

[3] Azmin, N. H. (2016). Effect of the Jigsaw-Based Cooperative Learning Method on Student Performance in the General Certificate of Education Advanced-Level Psychology : An Exploratory Brunei Case Study. International Education Studies, 9(1), 91–106. https://doi.org/10.5539/ies.v9n1p91

[4] Baihaqi, A., & Wilian, S. (2019). International Journal of Multicultural and Multireligious Understanding The Influenc e of Classroom Learning Environment toward Students ' Vocabulary Acquisition : A Study on Second Semester Junior High School Students. International Journal of Multicultural and Multireligious Understanding, 6(2), 710–719. https://doi.org/http://dx.doi.org/10.18415/ijmmu.v6i2.762

[5] Fisher, K. M. (2019). Making Reading Relevant : Critical Thinking as Contemplative Practice. Spotlight on Teaching, 3(June), 11–14. Retrieved from https://digitalcommons.assumption.edu

[6] Fryman, C., Fei, A., Mehta, R., & Ahmad, S. (2018). Jigsaw Method for Non-technical Skills in Cardiac Arrest : a Novel Application of This Active Learning Pedagogy. Medical Science Educator, 28(2), 401–405. https://doi.org/https://doi.org/10.1007/s40670-018-0566-x

[7] Ghasemzadeh, H., & Arjmandi, M. K. (2017). Optimum solution and evaluation of rectangular jigsaw puzzles based on branch and bound method and combinatorial accuracy. Multimedia Tools and Applications, 77(6), 6837–6861. https://doi.org/10.1007/s11042-017-4601-5

[8] Leary, N. O., & Barber, A. (2018). Physical education undergraduate students ' perceptions of their learning using the jigsaw learning method. SAGE, 25(3), 713–730. https://doi.org/10.1177/1356336X18767302

[9] Liao, S. N., Griswold, W. G., & Porter, L. (2018). Classroom Experience Report on Jigsaw Learning I-type Instruction. In ITiCSE 2018 Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education (pp. 302–307). https://doi.org/10.1145/3197091.3197118

[10] Munir, S., & Rahmat, A. (2017). The Effect of Teaching Methods and Learning Styles o n Students ' English Achievement (An Experimental Study at Junior High School 1 Pasangkayu). Journal of Education, Teaching and Learning, 2(2), 233–237. Retrieved from https://www.learntechlib.org/p/209075

[11] Nevo, E., & Vaknin-nusbaum, V. (2019). Enhancing motivation to read and reading abilities in first grade. Educational Psychology, 0(0), 1–20. https://doi.org/10.1080/01443410.2019.1635680

[12] Nugraha, A. F. (2019). Enhancing students ' reading comprehension. Academic Journal Perspective, 7(May), 46–50. https://doi.org/http://dx.doi.org/10.33603/perspective.v7i1.1909

[13] Nurbianta, N., & Dahlia, H. (2018). Nurbianta, Hana Dahlia The Effectiveness of Jigsaw Method in Improving Students Reading Comprehension Nurbianta, Hana Dahlia. Eternal Teaching Journal, 9(1), 70–86. https://doi.org/10.26877/eternal.v9i1.2416

[14] Perwitasari, C. A., & Eka, G. (2018). The Implementation of Jigsaw Technique and Student Team Achievement Division (STAD) in Teaching Reading. Aksara

Jurnal Bahasa Dan Sastra, 19(1), 28–36. Retrieved from http://jurnal.fkip.unila.ac.id/index.php/aksara%0AThe

[15] Rahmi, G. (2018). An Investigation of Approaches to Teaching Reading Used by a Teacher in a Junior High School in Bandung. In Eleventh Conference on Applied Linguistics (CONAPLIN 2018) (Vol. 254, pp. 534–541). Retrieved from http://creativecommons.org/licenses/by-nc/4.0/

[16] Winarti, A., Yuanita, L., & Nur, M. (2019). Journal of Technology and Science Education THE EFFECTIVENESS OF MULTIPLE INTELLIGENCES BASED INTELLIGENCES AND SCIENCE PROCESS SKILLS OF JUNIOR HIGH. Journal of Technology and Science Education, 9(2), 122–135. https://doi.org/https://doi.org/10.3926/jotse.404

[17] Zhou, Y., Hu, Y., Wang, S., Zhao, Y., Dong, L., & Song, Y. (2019). Let us complete the puzzle together : A Jigsaw Cooperative Learning Trial on Optical Graduate Course. In Fifteenth Conference on Education and Training in Optics and Photonics: ETOP 2019 (Vol. 11143, pp. 1–8). https://doi.org/10.1117/12.2523386.

[18] Ghani, M.K.A., Mohammed, M.A., Arunkumar, N., Mostafa, S.A., Ibrahim, D.A., Abdullah, M.K., Jaber, M.M., Abdulhay, E., Ramirez-Gonzalez, G. and Burhanuddin, M.A., 2018. Decision-level fusion scheme for nasopharyngeal carcinoma identification using machine learning techniques. Neural Computing and Applications, https://doi.org/10.1007/s00521-018-3882-6.

[19] Mohammed, M.A., Mostafa, S.A., Obaid, O.I., Zeebaree, S.R., Ghani, M.K.A., Mustapha, A., Fudzee, M.F.M., Jubair, M.A., Hassan, M.H., Ismail, A. and Ibrahim, D.A., 2019. An Anti-Spam Detection Model for Emails of Multi-Natural Language. Journal of Southwest Jiaotong University, 54(3).

[20] GHANI, M.K.A., MOHAMMED, M.A., IBRAHIM, M.S., MOSTAFA, S.A. and IBRAHIM, D.A., 2017. Implementing An Efficient Expert System For Services Center Management By Fuzzy Logic Controller. Journal of Theoretical & Applied Information Technology, 95(13).

[21] Mohammed, M.A., Gunasekaran, S.S., Mostafa, S.A., Mustafa, A. and Ghani, M.K.A., 2018, August. Implementing an Agent-based Multi-Natural Language Anti-Spam Model. In 2018 International Symposium on Agent, Multi-Agent Systems and Robotics (ISAMSR) (pp. 1-5). IEEE.

[22] Mostafa, S.A., Gunasekaran, S.S., Mustapha, A., Mohammed, M.A. and Abduallah, W.M., 2019, July. Modelling an Adjustable Autonomous Multi-agent Internet of Things System for Elderly Smart Home. In International Conference on Applied Human Factors and Ergonomics (pp. 301-311). Springer, Cham.

[23] Sutopo, J., Ghani, M. K. A., Burhanuddin, M. A., Ardiansyah, H., & Mohammed, M. A. (2019). The Synchronisation Of Motion Capture Results In The Animation Character Reinforcement Process. Journal of Southwest Jiaotong University, 54(3).