Learning Innovation in Malaysia with a System Thinking Approach

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Abstract

Learning process innovation with a system thinking approach can improve the quality of learning through analysis of the relationship between learning problem variables and problem-solving. The purpose of this study to implement a system thinking approach to improving creative thinking, and problem-solving skills by thinking in a systemic way that can be developed in the learning process. Community Service uses a descriptive method with a qualitative approach. Data collection techniques are carried out by observing and documenting students in the learning process. System thinking in the learning process provides an overview of the interrelationships of problems in learning so that it can be used as a basis for developing problem-solving strategies through learning innovation. Learning Innovation with a System Thinking approach through interactive and student-centered learning can improve creative thinking skills, and problem-solving abilities to identify and find solutions to problems in the learning process.

Keywords: learning innovation, systems thinking, problem-solving.

INTRODUCTION

Learning is a process of interaction between students and educators and learning resources in a learning environment. Learning is a learning process given by educators so that there is a process of transferring knowledge and knowledge, mastering skills and character, as well as forming attitudes and beliefs in students. In other words, learning is a process to help students learn well (Norhikmah et al., 2022; Purwadhi, 2019).

In the learning process, there are still many problems experienced by teachers and students. The very rapid development of technology affects teaching and learning activities. Technological developments such as computers are now designed to be more sophisticated and in a smaller form in the form of laptops or notebooks so that they are easy to carry anywhere. All the refinement changes made are intended to match the changes in human life in accordance with the demands of the times (Febyanti et al., 2022; Jayanti et al., 2021). However, with this convenience, today's children tend to be wrong in taking advantage of the convenience and sophistication of technology. Students lack motivation because, during the process of teaching and learning activities, students learn a lot theoretically (Sidik et al., 2021). The theory taught cannot adjust and help students think and find solutions to every problem they face. Not only that, problems like this are still often encountered by teachers who do not use models, strategies as well as learning media when conducting learning (Casnan, Purnawan, et al., 2022).

Problems in the learning process can be overcome if teaching and learning activities are actively involved between teachers, students, curriculum, facilities, and infrastructure. With this in mind, teachers must be able to sort and choose media, strategies, and learning models that can adapt to students' abilities (Komara, 2014). The paradigm of the concept of education as a process of linkage with a good learning environment has the following characteristics: (a) Student-centered education. (b) Students as subjects. (c) The learning process takes place everywhere. (d) Goal-oriented learning (Amri & Ahmadi, 2010).

Active learning through appropriate learning models is able to create and assist the teaching and learning process and design student learning activities for the subjects being taught. Because the state of the education and learning process that is carried out does not provide space and

freedom for students to explore and develop their potential, student learning outcomes cannot be achieved optimally and precisely. The presence of the teacher also influences learning problems, because there is no facilitator to develop each student's curiosity (Afandi et al., 2013).

In the 21st century, humans must have the ability, especially in critical thinking, the ability to think creatively, the ability to communicate and collaborate, and the ability to master information and communication technology (Redhana, 2019). With various challenges to face the upcoming global competition. a learning model is needed that can develop various aspects of knowledge, aspects of attitudes, and aspects of skills (Indarta et al., 2022). That way, it is necessary to update the learning process so that students are motivated to participate in the learning process (Suryani et al., 2023). This is in order to achieve learning objectives and dispel the paradigm that so far learning has been centered on the teacher (Octaviana et al., 2022).

Teachers must have qualified competence in supporting the learning process. One of the competencies that need to be improved is the ability of a teacher to overcome various problems that occur in the school environment. The results of observations at the Kuala Lumpur Indonesian School conducted in 4 Indonesian Learning Centers out of 23 Learning Studios under the coordination of the Kuala Lumpur Indonesian School in Kuala Lumpur Malaysia show that the teachers and/or instructors at the Indonesian Learning Studios under the coordination of the Kuala Lumpur Indonesian School still have low competence in the development of learning and the learning that is carried out is also less interesting and less innovative. The conditions of the students are very diverse because all classes, from grade 1 to grade 6, are made into 1 class (Fauziyah et al., 2022; Muhtarom & Andi, 2022). This observation also found that the teacher lacked variety in using learning methods and mastery of the class was less than optimal. Based on this, it is very necessary to strengthen teachers and students of the Indonesian Learning Center under the coordination of Kuala Lumpur Indonesian Schools in Kuala Lumpur Malaysia in terms of learning engineering that is adapted to the needs of the 21st century with a system thinking approach.

One appropriate approach is used for active learning to take place, as well as honing students' abilities, namely using system thinking. Systems thinking is something that feels across all elements and is "interrelated" because they influence one another continuously over time and move towards a common goal. Therefore, it is very important for systems thinking to find out the interrelated problems between variables in the learning process and look for strategies for solving learning problems to improve the quality of the learning process (Casnan, Triwahyuni, et al., 2022).

METHOD

The service is carried out at the Indonesian School - Kuala Lumpur (SIKL). The service is carried out using a descriptive method with a qualitative approach with a system thinking approach. the system thinking approach is an approach to obtain an overall picture of the system, identify the root of the problem, gain an understanding of the lever variables, and be able to understand the impact of alternative solutions (Casnan, Triwahyuni, et al., 2022).

The implementation of community service is carried out through several stages as shown in Figure 1. The first stage, analyzing the conditions of the Indonesian School - Kuala Lumpur (SIKL) and identifying them in the form of observations and interviews. The second stage is collaborating with the Indonesian School - Kuala Lumpur (SIKL), Malaysia to implement system thinking in the learning process. The third stage, implementing system thinking in the learning process, as well as the process of collecting data and documenting activities. The last stage, compiling a scientific article report.
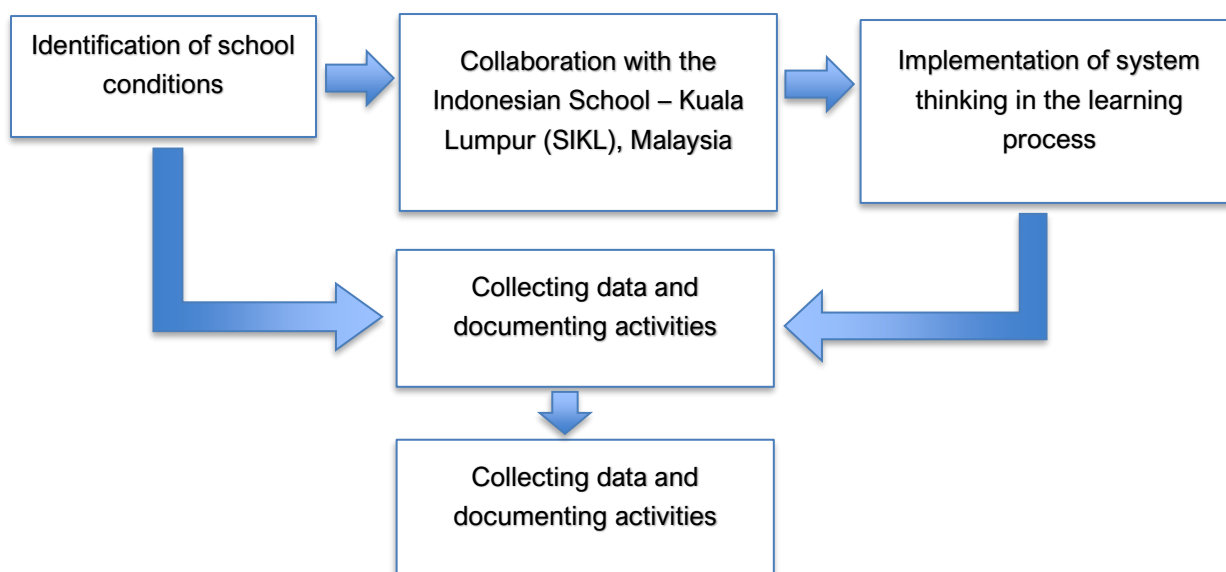
Figure 1. Stages of Community Service Implementation

RESULT AND DISCUSSION
Learning Innovation with System Thinking

Learning innovation is an effort to renew the various components needed in delivering subject matter in the form of knowledge from educators to students with the aim of improving the quality of ongoing education (Norhikmah et al., 2022; Purwadhi, 2019). One of the learning innovations is through the implementation of a learning model with a system thinking approach (Casnan, Purnawan, et al., 2022).

The implementation of system thinking in community service activities was carried out at the Indonesian School - of Kuala Lumpur (SIKL), Malaysia. This research activity was held in November 2022 with a sample of class XII high school students. In this case, System Thinking is used as an approach to understanding a problem, by looking at the "problem" as part of the overall system (Trilestari, 2004). System thinking during the learning process is discussing understanding mathematics. The stages of implementing system thinking are carried out starting from preparing materials for the learning process, the materials prepared are blackboards, note paper, markers, and also glue.

In the first step in the implementation of system thinking students were asked to write down any problems they experienced, especially in dealing with mathematics. Students are asked to write on note paper about what are the problems or obstacles in learning mathematics as shown in figure 2.

Figure 2. Students write down problems in learning Mathematics

In the second step in implementing system thinking, every student who has written down problems in learning mathematics is then pasted according to the provisions, there are those on the right, above, below, or on the sides with a circle around the writing understanding of mathematics. Each student takes turns and sequentially sticks together in an orderly manner.

Figure 3. Students stick paper notes containing problems in learning mathematics

All problems have been pasted on the blackboard, each student is welcome to make arrows as a relationship between problems in learning mathematics. The arrows are made in order to be able to determine what factors increase students' understanding of mathematics and reduce students' understanding of mathematics.

Figure 4. Students make interrelationships between problems

The last step in implementing system thinking is formulating key problems based on the results of system thinking from students. The results of system thinking from students at the Indonesian School - Kuala Lumpur (SIKL), Malaysia in analyzing problems in learning mathematics are shown in Figure 5.

Figure 5 shows that there are several factors that affect students' understanding of learning mathematics, including student accuracy, questions that are complicated and too complicated, long formulas, lack of interest in learning mathematics, and difficulty counting. The arrows mean the relationship between variables, be it accuracy, questions, formulas, interest, and difficulty in calculating. A plus sign (+) means a factor that influences positively or increases, while a negative sign (–) indicates a factor that influences negatively or reduces.

Figure 5. System thinking for analyzing mathematics learning problems

Figure 5 shows that there are several factors that affect students' understanding of learning mathematics, including student accuracy, questions that are complicated and too complicated, long formulas, lack of interest in learning mathematics, and difficulty counting. The arrows mean the relationship between variables, be it accuracy, questions, formulas, interest, and difficulty in calculating. A plus sign (+) means a factor that influences positively or increases, while a negative sign (–) indicates a factor that influences negatively or reduces.

Learning Innovation through learning models is a learning component and stages of learning activities that are used by teachers to help teachers achieve certain learning objectives (Hamdu et al., 2023). Therefore, to achieve optimal student attitude development, teachers are at the level of activity to cognitively understand the importance of attitude values so that teachers can practice them in everyday life as they get older (Octaviana et al., 2022). A student-centered active learning approach that focuses on questioning, critical thinking, and problem-solving. The system thinking approach in the learning process actively involves students in finding authentic and socially valid solutions to problems through investigation and collaboration with others (Bui & Baruch, 2010; Pratiwi et al., 2021).

System Thinking for Problem Solving

The use of system thinking can provide an overview of the problem or a matter that is being discussed. With the system thinking approach in learning, students can solve problems by looking at a problem, not as an event that occurs partially but as a whole as part of a system structure that is connected (Casnan, Triwahyuni, et al., 2022). Thus, the innovation of the systems thinking

approach is very important to be applied in ongoing learning process activities (Amri & Ahmadi, 2010; Norhikmah et al., 2022).

System thinking has several indicators, namely (a) producing optimal performance is a collaboration from each party that makes a reasonable contribution according to the potential and abilities of each party and (b) understanding the work of other units is a form of understanding to each -each party to create a harmonious and competent work (Trilestari, 2004).

Figure 4 shows that various things can affect the understanding of mathematics. Each student can find out what influences their ability to understand mathematics. In addition, students can also find solutions to what can be done to deal with problems based on the results of system thinking as shown in Table 1.

Table 1. Problem-solving from system thinking

No	Problem	Solution Plan
1.	Accuracy	Make stages of the process of solving math problems with examples (Nabila & Sulistiyaningsih, 2020)
	Long Formula	. Formulate the concept of mathematical logic . Create a collection of mathematical formulas (Mulyati & Guntarsih, 2018)
	Complicated	. Formulate the concept of mathematical logic (Hanafy, 2014) . Create a collection of mathematical formulas . Make stages of the process of solving math problems with examples
4.	Problem-solving many stages	Make stages of the process of solving math problems with examples
5.	Hard to work	Make stages of the process of solving math problems with examples
6.	Lack of interest	. Increase motivation to learn mathematics (Agustina & Kurniawan, 2020; Cece & Winata, 2019) . Develop a fun learning model (Nabila & Sulistiyaningsih, 2020) . Developing mathematics learning media (Suryati Sitepu, 2019)
7.	Difficult	. Formulate the concept of mathematical logic . Create a collection of mathematical formulas . Make stages of the process of solving math problems with examples

One appropriate approach is used for active learning to take place, as well as honing students' abilities, namely using system thinking. Systems thinking is an approach to seeing all elements of the system and is "interrelated" because they influence each other continuously at all times and move towards a common goal (Casnan, Purnawan, et al., 2022). Therefore, it is very important for systems thinking to know the interrelated problems between variables in the learning process and to find strategies for solving learning problems to improve the quality of the learning process.

CONCLUSION

Implementation of system thinking as a form of innovation in the learning process can train students and create a learning environment for active learning. Implementation of system thinking trains students to express opinions and determine factors or problems in learning mathematics. Learning Innovation with a System Thinking approach through interactive and student-centered

learning can improve creative thinking skills, and problem-solving skills to identify and find solutions to problems in the learning process to create quality Human Resources in the future.

REFERENCES

Afandi, M., Chamalah, E., & Wardani, O. P. (2013). Model Dan Metode Pembelajaran di Sekolah. *Perpustakaan Nasional Katalog Dalam Terbitan (KDT)*, *429*(2), 1–15.

Agustina, M. T., & Kurniawan, D. A. (2020). Motivasi Belajar Mahasiswa di Masa Pandemi Covid-19. *Jurnal Psikologi Perseptual*, *5*(2), 120. https://doi.org/10.24176/perseptual.v5i2.5168

Amri, S., & Ahmadi, I. K. (2010). *Proses Pembelajaran Kreatif dan Inovatif dalam Kelas: Metode, Landasan Teoritis, Praktis, dan Penerapannya*. Prestasi Pustaka.

Bui, H., & Baruch, Y. (2010). Creating learning organizations: A systems perspective. *Learning Organization*, *17*(3), 208–227. https://doi.org/10.1108/09696471011034919

Casnan, C., Purnawan, P., Firmansyah, I., & Triwahyuni, H. (2022). Evaluasi Proses Pembelajaran Dengan Pendekatan Systems Thinking [Evaluation Of The Learning Process With The Systems Thinking Approach]. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *12*(1), 31–38. https://doi.org/10.24246/j.js.2022.v12.i1.p31-38

Casnan, Triwahyuni, H., Ropiah, O., & Firmansyah, I. (2022). Evaluation of Online Learning Implementation with a System Thinking Approach. *Pendidikan Progresif*, *12*(3), 1106–1114. https://doi.org/10.23960/jpp.v12.i

Cece, C., & Winata, E. (2019). Pengaruh gaya mengajar dosen dan motivasi belajar terhadap prestasi belajar mahasiswa perguruan tinggi swasta kota medan. *Jurnal Penelitian Pendidikan Sosial Humaniora*, *4*(1), 448–454. https://www.neliti.com/id/publications/288168/pengaruh-gaya-mengajar-dosen-dan-motivasi-belajar-terhadap-prestasi-belajar-maha

Fauziyah, A. F., Amalia, N., Kartikasari, E. D., Hastuti, W., & Pradana, Y. A. (2022). Pengenalan Kebudayaan Indonesia melalui Boanding Literasi SB Hulu Kelang Malaysia. *Buletin KKN Pendidikan*, *4*(2), 161–166. https://doi.org/10.23917/bkkndik.v4i2.20449

Febyanti, Alamsyah, T. P., & Taufik, M. (2022). Proses Pemanfaatan Tablet Android Sebagai Media The Process of Android Tablets Use As Learning Media For Elementary School Students. *Primary : Jurnal Pendidikan Guru Sekolah Dasar*, *11*(3), 838–848.

Hamdu, G., Putri, A. R., & Merliana, A. (2023). Provision of Innovative Learning Development and Assessment for Teachers at SDIT Al Multazam , Kuningan District. *Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat LPPM-Universitas Muhammadiyah Tasikmalaya*, *6*(1), 3139–3145.

Hanafy, M. S. (2014). Konsep Belajar Dan Pembelajaran. *Lentera Pendidikan : Jurnal Ilmu Tarbiyah Dan Keguruan*, *17*(1), 66–79. https://doi.org/10.24252/lp.2014v17n1a5

Indarta, Y., Jalinus, N., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). Relevansi Kurikulum Merdeka Belajar dengan Model Pembelajaran Abad 21 dalam Perkembangan Era Society 5.0. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(2), 3011–3024.

Jayanti, D., Septiani, J. I., Sayekti, I. C., Prasojo, I., & Yuliana, I. (2021). Pengenalan Game Edukasi sebagai Digital Learning Culture pada Pembelajaran Sekolah Dasar. *Buletin KKN Pendidikan*, *3*(2), 184–193. https://doi.org/10.23917/bkkndik.v3i2.15735

Komara, E. (2014). *Belajar dan Pembelajaran Interaktif*. Refika Aditama.

Muhtarom, H., & Andi. (2022). Edukasi Nilai-nilai Karakter Pelajar Pancasila Terhadap Anak Imigran Indonesia di Wilayah Gaombak, Malaysia. *Buletin KKN Pendidikan*, *4*(2), 167–174. https://doi.org/10.23917/bkkndik.v4i2.19707

Mulyati, E., & Guntarsih. (2018). Meningkatkan hasil belajar matematika melalui penerapan model pembelajaran kooperatif tipe tgt. *Jurnal Cakrawala Pendas*, *4*(1), 26–32. http://jurnal.unma.ac.id/index.php/CP/article/download/709/714

Nabila, H., & Sulistiyaningsih, D. (2020). Analisis Kesulitan Belajar Matematika dalam Pembelajaran Daring Berbantuan Microsoft Teams Kelas XI SMA NEGERI 9 Semarang. *Edusainstech, Prosiding Seminar, FMIPA UNIKUS 2020*, 62–71.

Norhikmah, Fitria, N. R., Puspita, D., & Saudah. (2022). Inovasi Pembelajaran dimasa Pendemi: Implementasi Pembelajaran berbasis Proyek Pendekatan Destinasi Imajinasi. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(5), 3901–3910.

Octaviana, Sutomo, M., & Mashudi. (2022). Model Pembelajaran Dick and Carey Serta Implementasinya Dalam Pembelajaran PAI. *Jurnal Tawadhu*, *6*(2), 114–126.

Pratiwi, A., Fadlilatul Hikmah, Adi Apriadi Adiansha, & Suciyati. (2021). Analisis Penerapan Metode Games Education dalam Meningkatkan Motivasi Belajar Siswa Sekolah Dasar. *JagoMIPA: Jurnal Pendidikan Matematika Dan IPA*, *1*(1), 36–43. https://doi.org/10.53299/jagomipa.v1i1.27

Purwadhi. (2019). Pembelajaran Inovatif dalam Pembentukan Karakter Siswa. *MIMBAR PENDIDIKAN: Jurnal Indonesia Untuk Kajian Pendidikan*, *4*(1), 21–34.

Redhana, I. W. (2019). Mengembangkan Keterampilan Abad Ke-21 Dalam Proses Pembelajaran. *Jurnal Inovasi Pendidikan Kimia*, *13*(1), 2239 – 2253.

Sidik, Jamali, & Rosidin, D. N. (2021). Peran Guru Sebagai Fasilitator Pada Sistem Pembelajaran Jarak Jauh Era Pandemi Covid-19 di SMP Negeri 1 Kuningan dan SMA Negeri 2 Kuningan. *Campaign Journal*, *3*(1), 1–13.

Suryati Sitepu, E. (2019). *Analisis Kesesuaian Materi Ajar Dengan Tes Hasil Belajar Mahasiswa Di Lingkungan Fkip Uhn Medan*. *02*(01), 1–8.

Trilestari, E. W. (2004). *Systems Thinking dan System Dynamics Sebagai Suatu Pendekatan dalam Pengukuran Kinerja Pelayanan B . Keunggulan Pendekatan Systems Thinking dan System Dynamics*. 71–81.