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Development of the PLONG learning model as an innovation to develop communication and collaboration skills

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Abstract. *Introduction.* Communication and collaboration skills are very important skills in learning. These skills help students achieve learning success; however, many students have low collaboration and communication skills in schools. *Aim.* The present research aimed to demonstrate the potential of the PLONG (Playing, Learning, Doing, and Evaluating) learning model in developing students' communication and collaboration skills. *Methodology and research methods.* This research applied the ADDIE model, which encompasses needs analysis, model design, material and activity development, field implementation, and evaluation. The study involved 101 students and 10 classroom teachers as participants. The instruments employed included model feasibility assessments, a PLONG model group discussion forum, and a questionnaire measuring collaboration and communication skills. Data analysis incorporated both qualitative and quantitative methods. *Results and scientific novelty.* It has been established that the PLONG learning model effectively enhances students' communication and collaboration skills. These results are supported by an analysis comparing pre- and post-intervention data. This model increases students' motivation and readiness to work collaboratively in teams. The novelty of this study lies in the fact that the PLONG learning model is regarded as a comprehensive approach to education, allowing students to independently assess their learning outcomes during the process, which includes engaging game elements. Additionally, PLONG offers feedback that aids students in their improvement. *Practical significance.* With the PLONG model, students engage in play, learning, action, and assessment, fostering an active and enjoyable learning environment that promotes the optimal development of collaboration and communication skills.

Keywords: PLONG learning model, collaboration skills, communication skills

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Развитие навыков коммуникации и сотрудничества в образовании: возможности модели обучения PLONG

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Аннотация. Введение. Навыки общения и сотрудничества очень важны в обучении. Они помогают школьникам добиться успехов в учебе, однако многие ученики имеют низкие навыки сотрудничества и общения в школах. Целью этого исследования является представление возможностей модели обучения PLONG (игра, обучение, действие и оценка) для развития у учащихся навыков общения и сотрудничества. Методология, методы и методики. Применяется подход к исследованиям и разработкам ADDIE, включая анализ потребностей, разработку моделей, материалов и мероприятий, внедрение на местах и оценку. В исследовании принимали добровольное участие 101 ученик и 10 классных руководителей. Представлены инструменты осуществимости модели, групповой дискуссионный форум модели PLONG, сотрудничество по коммуникативным навыкам. Анализ данных предполагает использование как качественных, так и количественных методов. Результаты и научная новизна. Доказано, что модель обучения PLONG эффективна для развития у учащихся навыков общения и сотрудничества, что подтверждено анализом до и после вмешательства. Предлагаемая модель способствует формированию устойчивой мотивации, воспитывает готовность учеников работать в команде. Новизна данного исследования заключается в том, что модель обучения PLONG рассмотрена как комплексный способ обучения, когда школьники в процессе обучения, включающего игровые моменты, получают возможность самостоятельно оценить результаты своего обучения. Кроме того, PLONG предоставляет обратную связь, которая помогает учащимся совершенствоваться. Практическая значимость. С помощью модели PLONG учащиеся участвуют в игре, обучении, выполнении действий и оценке, что позволяет создать активное и увлекательное обучение и оптимально развивать навыки сотрудничества и общения.

Ключевые слова: модель обучения PLONG, навыки сотрудничества, коммуникативные навыки

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Desarrollo del modelo de aprendizaje PLONG como innovación para desarrollar habilidades de comunicación y colaboración

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Abstracto. Introducción. Las habilidades de comunicación y colaboración son muy importantes en el aprendizaje. Dichas habilidades ayudan a los estudiantes a tener éxito académico, pero muchos de ellos poseen habilidades bajas en colaboración y comunicación en las escuelas. **Objetivo.** El propósito de este estudio es presentar las capacidades del modelo de aprendizaje PLONG (Jugar, Aprender, Hacer y Evaluar) para desarrollar las habilidades de comunicación y colaboración de los estudiantes. **Metodología, métodos y procesos de investigación.** Se adopta el enfoque de investigación y desarrollo de ADDIE, que incluye análisis de necesidades, desarrollo tanto de modelos, materiales actividades, como su implementación en el campo y evaluaciones. En el estudio participaron voluntariamente 101 estudiantes y 10 profesores. Se presentan herramientas de viabilidad del modelo, foro de discusión grupal del modelo PLONG y colaboración en habilidades de comunicación. El análisis de datos implica el uso de métodos tanto cualitativos como cuantitativos. **Resultados y novedad científica.** Se ha demostrado que el modelo de enseñanza PLONG es eficaz en el desarrollo de las habilidades de comunicación y colaboración de los estudiantes, según lo respaldan los análisis previos y posteriores a la intervención. El modelo propuesto promueve la formación de una motivación sostenible y fomenta la disposición de los estudiantes para trabajar en equipo. La novedad de este estudio radica en que el modelo de enseñanza PLONG se considera como un método integral de enseñanza, cuando los escolares, en el proceso de aprendizaje, incluidos los momentos de juego, tienen la oportunidad de evaluar de forma independiente los resultados de su aprendizaje. Además, el sistema PLONG proporciona comentarios para ayudar a los estudiantes a mejorar. **Significado práctico.** Con el modelo PLONG, los estudiantes participan en juegos, aprendizaje, actividades y evaluaciones para crear un aprendizaje activo y atractivo y desarrollar de manera óptima habilidades de colaboración y comunicación.

Palabras clave: modelo de aprendizaje PLONG, habilidades de colaboración, habilidades de comunicación

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Introduction

Education is a component that has a very important role in shaping and fostering the progress of a society or nation. Education will provide useful knowledge and important skills to individuals and promote better personality growth. According to L. Alfita, A. L. Kadiyono, P. T. Nguyen et al., through education, a person can develop an active, informative, and responsible attitude toward society and the nation [1]. This opinion is in line with the concept of B. Bulkani, M. Fatchurahman, M. A. Setiawan, who noted that education will bring changes to a person [2]. Education has a role as a medium in encouraging creativity, self-development, and creating equality between individuals [3]. It can be understood that education is a lifelong process experienced by a person and is not just limited to learning in school [4].

Globalisation has made education a crucial factor in fostering worldwide co-operation, developing cultural sensitivity, and creating policies that promote self-improvement on a big scale [5]. The Ministry of Education has implemented

the 21st-century Education programme to address global concerns. This programme emphasises the development of critical thinking abilities, creativity, teamwork, and communication [6]. Teachers and parents have a very vital role in developing students' communication skills [7].

As highlighted in the paper, communication skills are vital in education since they ensure the clarity of learning objectives and enhance learning outcomes [8]. C. M. Claudia stated that the ability to express one's thoughts and opinions will encourage effective and useful discussions [9]. Aasma, N. Gulfam, J. Faiza explained that the ability to express thoughts can also create a friendly atmosphere and improve academic achievement [10]. As stated by I. Braga, A. Abreu, the same ability helps individuals succeed in their careers, positively impacting work quality, productivity, team member relations, and decision-making [11]. Developing communication skills will also create cognitive, behavioural, emotional, and value autonomy in a person to adapt and succeed in academic and social fields. Developing communication skills is also very important in bridging the learning process better and fostering lively social interactions in the classroom.

A research phenomenon that has emerged in several schools in Indonesia, such as Elementary School 1 Palangkaraya and Elementary School 5 Pahandut, shows that most students with poor communication skills have less success than students with good communication skills. The results of interviews dated 15th December 2023, showed that students with poor communication skills tend to be passive in class and have difficulty interacting. According to M. R. L. Odell, K. Dyer and M. D. Klett, effective communication is essential for building social relationships and maintaining mental health [12]. Communication skills need to be supported by collaboration so that learning is coherent. Findings also show that students with low collaboration skills tend to have no friends and like to be alone. Students with good collaboration skills tend to find it easier to interact and collaborate in learning and social environments at school [13]. Collaboration between teachers and other professionals is also very important to ensure the success of learning and other activities that students participate in [14]. The 21st century is a century where collaboration skills are an important element in achieving success in various fields [15]. S. Li, J. Pöysä-Tarhonen and P. Häkkinen noted that successful collaborative learning experiences are influenced by familiarity with collaborative learning, motivation, and collaborative task design [16].

Communication and collaboration skills help students build good relationships, face challenges, and learn better. These skills also appear to positively impact students' character, leadership, and social engagement [17]. As stated by H. AlAhmad, teachers are crucial in facilitating communication and creating a learning environment that focuses on students and suits their learning styles [18]. So that communication between educators and students can run well, a method that is appropriate and appropriate to needs is needed to encourage active participation and motivation of students in the learning community in which they participate [19].

Moreover, the conditions described above correspond to several previous research studies that clarify that enhancing collaboration and communication skills is imperative as they are determinant factors impacting students' skills [20]. Since students tend to have low levels of collaboration and communication abilities, it will be essential to find appropriate ways of managing these two aspects to maximise collaborative and communicative potential growth. One way that can be done is by designing a new learning model that suits the needs of students.

The learning models used in schools in Indonesia are mostly conventional in the form of lectures and assignments and tend to be less creative. This condition is proven by the results of interviews conducted on December 15, 2023, with teachers at SDN 2 Panarung and SDN 6 Bukit Tunggal, revealing that the majority of teachers still rely on conventional teacher-centred approaches, which are less adaptable to the needs of modern students. These findings align with research stating that conventional learning is ineffective in modern learning today [21]. Learning like this will ultimately fail to consider students' learning needs, making it difficult to use their study time well. Each student has a different understanding and ability to capture learning material content [22]. Based on these conditions, a new learning model is needed that suits needs, is easier to use, and prioritises meeting 21st-century skills needs.

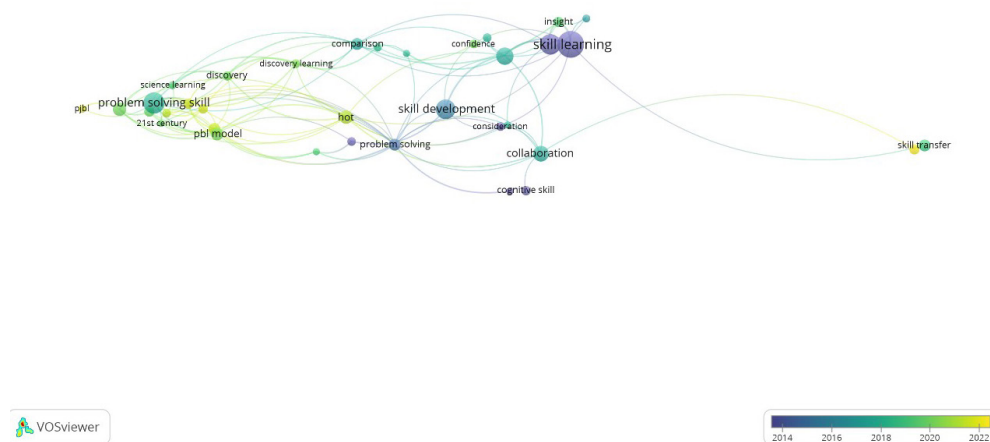


Fig. 1. Trends in learning models

The analysis in Figure 1 above shows that, with the help of the VOSviewer application, data was found explaining that Problem-Based Learning (PBL) is one of the most commonly used learning models today to develop collaboration and communication skills. However, research has shown that overloading learners with too many problems can be counterproductive and make learning difficult [23].

To overcome problems that arise at school, researchers must be able to design innovative and interesting learning models. The learning model that will be developed must prioritise the development of communication and collaboration skills. By developing an appropriate learning model, it will be possible to create an interesting and enjoyable learning environment so that students can develop communication and collaboration skills.

The PLONG (Playing, Learning, Doing, and Evaluating) learning model is innovative and emphasises vital aspects of learning. The PLONG learning model will provide students with a comprehensive learning experience by following a series of vital activities such as playing, learning, experiencing, interacting, communicating, reflecting, and evaluating. Students in learning need interaction and communication because by experiencing, they learn a lot through doing and direct experience, which activates many senses [24]. The classroom interaction patterns teachers implement are also very determining and can increase student involvement in the learning process. Communication is related to teachers' interactions with students in processing learning. Interaction is a characteristic of the continuity of learning itself, and it can even be used as a tool to predict learning outcomes. Reflection, part of this evaluation in the PLONG learning process, will provide experience to strengthen competence. This PLONG learning model can help students develop communication and collaboration skills, which are part of the 21st-century skills that students need to have to support the world's needs in the global era.

Literature Review

Playing

Playing in learning is a technique that can be used to create more enjoyable and easier learning for students to accept. According to B. J. Lindley, L. Mills, playing will help students be more active and involved in fun and interactive activities that can help them develop appropriate knowledge, skills, and attitudes in learning [25]. L. Arnott states that using games appropriate to the learning context will trigger active involvement in learning and produce motivation to be more enthusiastic and active in learning [26]. Based on existing understanding, it can be seen that playing is a process of creating conditions that are more active, lively, fun, and more easily accepted by students.

Learning

Learning refers to a communication process involving two parties, educators and students, to transfer useful information. G. Hall states that learning involves deliberately managing the environment to facilitate certain behaviours and produce responses [27]. Teachers consciously try to help students learn by following their interests and needs. This learning process will involve using systematic theories and procedures that can guide teaching and learning activities to run well, according to M. Mujahirain [28]. The learning process will produce new knowledge and skills that suit their needs, such as memorising and practising until, in the end, they can develop appropriate new abilities, according to K. T. Kelly [29].

Doing

The meaning of “doing” can have various meanings depending on the context. Doing in learning is an activity to try or carry out learning actions that have been followed. According to F. J. Pérez-Rivas, M. Rico-Blázquez, C. López-López, S. Domínguez-Fernández, J. L. Cobos-Serrano, M. J. Ajejas Bazán, doing in learning proves that students have mastered the skills or knowledge educators transfer to students [30]. J. Oelkers stated that learning is closely related to direct learning and learning implementation of learning [31]. Another meaning, according to K. G. Srinivasa, M. Kurni and K. Saritha, “doing” in learning is completing tasks, solving problems, and reflecting on the results obtained to improve the learning process [32]. From the understanding above, it can be understood that doing is an effort to take action and be involved in activities individually or in groups in the following learning.

Evaluating

B. Bulkani, M. A. Setiawan, W. Wahidah stated that learning evaluation is gathering data and information to determine a student’s progress and achievements [33]. Meanwhile, according to R. Acton, learning evaluation is assessing the quality of an educator’s learning system and identifying areas that need improvement [34]. Evaluation is one of the important skills that teachers must master because evaluation will help them manage the class, choose appropriate teaching methods, and motivate students to learn, according to O. A. Ponce, J. G. Galán, and N. Pagán-Maldonado [35]. So, it can be understood that evaluation in learning has a very important role. Evaluation will help teachers reflect on whether the learning they have implemented is appropriate so that teachers can prepare follow-up actions that suit students’ needs.

Collaboration and Communication Skills

Good collaboration and communication skills in learning make it possible to achieve satisfactory learning outcomes. Collaboration skills in learning are a process involving the exchange of views and also cooperation in learning groups. According to S. V. Agustya, K. Natalia and I. Irwansyah, communication skills are the ability to exchange information and ideas effectively with other people [36]. In the 21st century, these two skills are important components that must be developed. S.M. Rahayu, U. Rosidin, K. Herlina stated that these skills will encourage deeper learning and can be applied in various situations inside and outside the classroom [37]. B. M. Fulk stated that teachers have a significant role in facilitating and guiding the student learning process when implementing collaborative and communicative learning [38]. When people truly collaborate, they willingly participate in a shared task, appreciate interpersonal interactions, and have faith that their combined efforts will result in more successful outcomes.

Methodology, Materials and Methods

The research method used in this research is development research. The development model used is the ADDIE model. According to H. Kemouss, O. Abdenmour, M. Erradi et al. [39], H. A. Shahat et al. [40], and R. Suratnu [41], the ADDIE model

is development research emphasising five phases: analysis, design, development, implementation, and evaluation, and. This ADDIE model will analyse the problems that arise at this time, followed by designing the model design, developing the desired model, and arranging tools and support as needed to evaluate the effectiveness of the resulting model [42]. This ADDIE model allows feedback and improvements throughout the research process [43]. This ADDIE model will provide a complete systematic framework for developing needs in education, such as curriculum, learning models, and the latest theories according to needs.

In an effort to create a new, innovative learning model, researchers are trying to use the ADDIE model in designing the PLONG learning model. This ADDIE development stage will facilitate the preparation of a PLONG learning model appropriate to the audience's characteristics and learning objectives. The PLONG learning model aims to develop communication and collaboration skills in the learning context. The ADDIE approach allows us to follow a systematic and structured process in creating a learning model responsive to the learning needs. Figure 2 below shows the flow of the ADDIE-type development research approach.

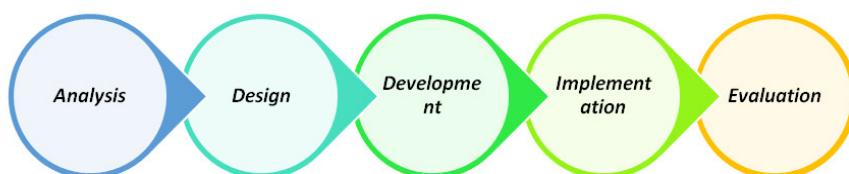


Fig. 2. Research flow for developing the ADDIE model

The development of the PLONG model with this Addie design follows five main stages. First, we carried out the analysis phase of problems and needs related to students' low communication and collaboration skills and the absence of appropriate innovative models to help address the needs of teachers in the field. This analysis stage was carried out by understanding the teacher's and student's conditions and other components involved in learning. At the design stage, we tried to design a PLONG learning model that included elements of Playing, Learning, Doing, and Evaluation in a structured manner. We also designed strategies to integrate communication and collaboration skills into the PLONG model. At this stage, the required instruments were also prepared. Models and instruments were designed based on theories relevant to the research. The development phase included creating learning materials and activities that support each PLONG stage, focusing on communication and collaboration skills. At this implementation stage, we implemented the model that had been developed, namely the PLONG model, in the classroom learning process by involving teachers, students, and other related parties. The fi-

nal stage of ADDIE was the evaluation stage, at which we tried to collect relevant research data to evaluate the effectiveness of the PLONG model in developing students' communication and collaboration skills.

Research Subject

The research subjects for developing the PLONG learning model were students and teachers in elementary schools spread across Palangkaraya. The schools are SD 1 Palangkaraya, SD 5 Pahandut, SD 2 Panarung, and SD 6 Bukit Tunggal. The schools were chosen due to their diverse educational contexts, environmental conditions, and student characteristics. The study involved a total of 101 students and 10 class teachers.

Data Collection Instrument

In this research, the data collection process was carried out using several relevant research instruments. First, a model needs interview was conducted with educators at the school to determine the desired model needs. Then, the model feasibility instrument was used to measure the validity of the model prepared, involving experts and practitioners in learning models. The PLONG model design was assessed using the Front Group Discussion (FGD) sheet. The FGD in this research is a forum for group discussions between teachers, researchers, and other stakeholders. The instrument used was a class observation sheet, which controlled student and teacher interactions while implementing the PLONG model. Communication and collaboration skills were recorded using a questionnaire that covers aspects of collaboration and communication skills.

Research Data Analysis

The data analysis used in research on developing the PLONG learning model for communication and collaboration skills is diverse. This research uses data analysis in two ways, namely quantitative and qualitative data analysis. Quantitative analysis in this study includes a paired samples t-test as a pre-post design, comparing two measurements taken before and after the intervention. The supporting application used to assist data analysis in this research is SPSS version 28.00. SPSS version 28.00 was used to compare significant differences between pretest and post-test interventions. Apart from that, we also utilised Claude AI to design the components of this model. Normality tests and homogeneity tests were carried out previously to ensure the suitability of the data. Qualitative analysis uses theme analysis techniques on observation and FGD data to identify patterns and themes related to the PLONG model.

Results

Stage 1: Analysis

In this first stage, we analysed the need to develop the PLONG Learning Model. In addition, we also studied and analysed the communication and collaboration skills possessed by the students. The data studied comes from various elementary schools spread across the Palangkaraya area. The schools where the research was conducted include Elementary School 1 Palangkaraya, Elementary School 5 Pahan-

dut, Elementary School 2 Panarung, and Elementary School 6 Bukit Tunggal. The findings obtained from these schools are described in Table 1.

Table 1
Analysis of problems and needs

School	Source	Results of needs analysis in the field
Elementary School 1 Palangkaraya	Diyah Catur Rini	The classroom teachers' learning tends to be monotonous and conventional, not supported by media and fun activities, so learning becomes stiff and passive.
Elementary School 5 Pahandut	Edison	Students in the learning process tend to be passive, and only teachers dominate the class. This condition impacts collaboration and communication skills that are not well-honed.
Elementary School 2 Panarung	Arkino	Teachers' learning model tends to be rigid and oriented towards solving problems only and can still not create active and enjoyable learning for students.
Elementary school 6 Bukit Tunggal	Farida	The current learning model is more concerned with solving problems than considering the needs of students. Teachers need innovative learning models that are more accessible and practical, especially for elementary school students.

Based on the analysis of the tables, it was found that most schools in Palangkaraya still use traditional learning methods. Learning oriented towards developing communication and collaboration skills still does not exist. The analysis of problems and needs in schools shows that innovative learning models are needed to help students be more active and creative and create enjoyable learning. The right learning model is needed to develop students' collaboration and communication skills so that 21st-century skills can be well honed. The PLONG learning model innovation is an alternative that can be used to increase learning effectiveness and develop the skills students need. Existing elementary school data shows that each student has a unique and different personality and characteristics. Therefore, the PLONG learning model can be used in learning activities to overcome these differences more effectively. This PLONG learning model will facilitate communication and collaboration skills to be well-formed in the learning process that will be implemented. Collaboration and communication skills will be felt in playing, learning, doing, and evaluating.

Stage 2: Design

At this design stage, we designed the structure and components of the structured learning model. The following components of the PLONG model will be developed:

Rational

The PLONG learning model is developed to help students with a variety of personal characteristics and learning styles be more actively involved in learning. The PLONG learning model consists of four main stages: playing, learning, doing, and evaluating. In the first stage, namely playing, students are involved in fun games that can stimulate collaboration and communication skills so that learning will be more lively and enjoyable and not boring. The second stage of learning is that students are involved in the learning process according to the lesson material being

followed. The doing stage is aimed at trying out what has been done, and the final evaluating stage is the process of evaluating what students have done from the beginning to the end of learning. The PLONG learning model is a learning model that will help students foster activeness, critical thinking, and collaboration by using various activities that are arranged systematically. With this PLONG learning model, students will also know where their strengths and weaknesses are. This model will also facilitate the development of communication and collaboration skills. Overall, the PLONG learning model that has been prepared offers a comprehensive and effective approach to developing students' communication and collaboration skills.

Objectives and Benefits

The PLONG learning model has the following goals and benefits: the PLONG learning model aims to create fun and easy learning for students to accept so that good collaboration and communication skills are created. With this PLONG learning model, several benefits can be obtained. These benefits help students develop active, creative, fun learning skills and guide social interaction through effective team communication.

PLONG Model Learning Planning

Planning for implementing the PLONG learning model requires specific steps that the teacher must prepare. This learning model must be adapted to the needs and characteristics of students and aligned with the planned learning objectives. The following are the planning steps that the teacher must carry out:

1. The instructor establishes clear learning objectives that are specific, quantifiable, attainable, relevant, and time-bound.
2. Student needs analysis. At this needs analysis stage, the teacher tries to carry out a comprehensive assessment regarding students' abilities, interests, and learning preferences to adjust the actions that will be taken.
3. Selection of learning activities and materials. At this stage, the teacher prepares various designs of learning materials obtained from the needs analysis results and determines what learning competencies will be achieved in the learning carried out.
4. Planning learning stages. The teacher will design the PLONG learning series that will be implemented. The learning stages designed by the teacher are packaged as a learning plan. In Figure 3, a design for the PLONG model learning structured into 4 main stages is presented.

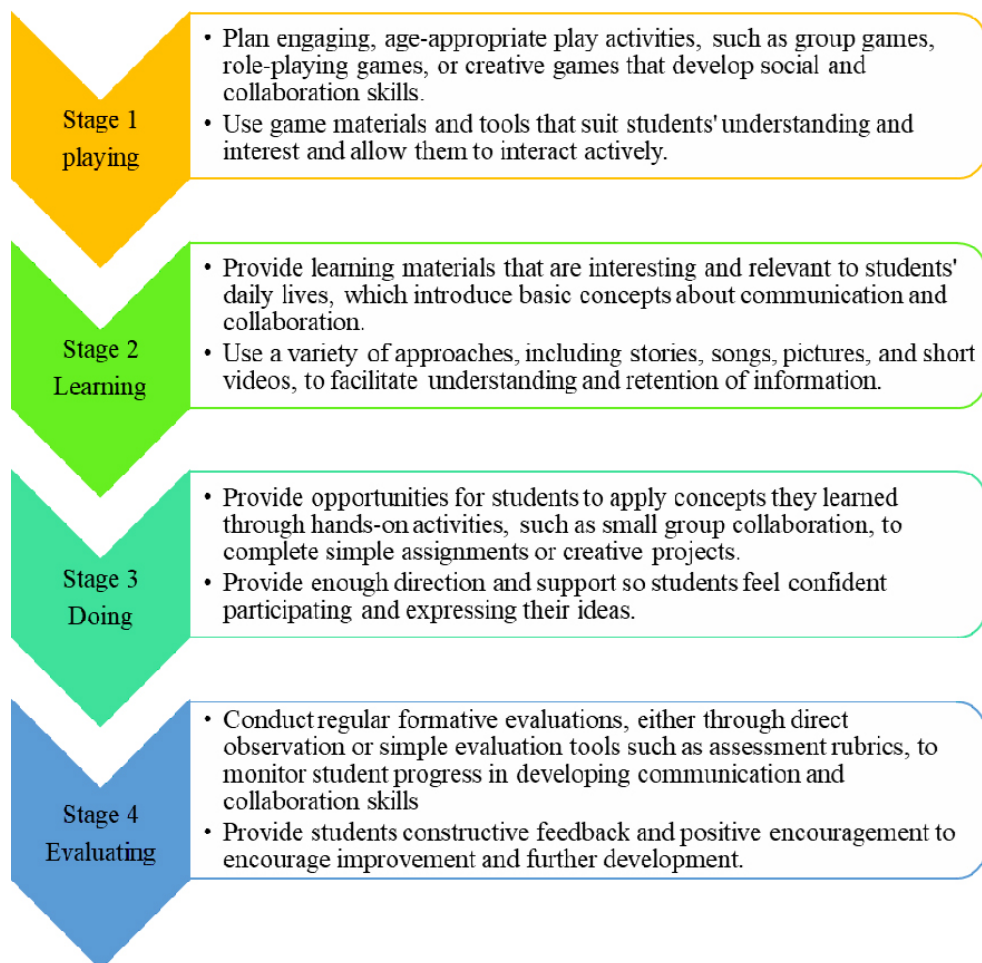


Fig. 3. PLONG stage design

The four stages of the PLONG learning model must be carried out systematically, step by step. When the teacher can design and implement this learning model, it will be able to help create learning that is fun, active, creative, and measurable with certainty.

5. Material and resource preparation stage. At this stage, the teacher is expected to prepare learning materials, reading materials, media, games, and other resources that suit learning needs.

2. At the time planning stage, the teacher prepares the time allocation for each learning stage to follow the learning implementation plan. This stage is intended so that teachers can organise the learning process effectively.

3. Role of the teacher and facilitator. The teacher or facilitator at this stage plays an important role in directing and ensuring the progress of the PLONG learn-

ing process. The teacher must be able to guide the PLONG stages in implementing them perfectly.

4. At the final stage, the teacher prepares instruments to measure the achievement of learning objectives and student progress following the expected learning objectives.

Implementation of PLONG Model Learning

The stages of implementing the PLONG learning model require teachers to carry out careful and comprehensive planning. At this stage, the teacher guides the systematic implementation of the PLONG learning model. In the initial stage, before implementing this learning model, the teacher distributes instruments related to collaboration and communication skills to determine students' initial conditions. After the instruments are divided, the learning process is carried out. The initial stage of the PLONG learning model is playing. At this stage, students are involved in interactive games or creative activities to develop their interest, activeness, and involvement in learning. In the second stage, namely learning, the teacher conveys the concept of learning material that he has prepared in various ways, such as through presentations, discussions, or independent exploration reinforced with relevant learning media. The next stage in the PLONG model is implementation. At this stage, the teacher must facilitate students in actively implementing the knowledge they have acquired by participating in activities such as projects, group assignments, or simulations that directly align with the learning process. The last phase of the PLONG model is evaluation. During this phase, the instructor urges pupils to contemplate their learning and get evaluations of their performance from either the teacher or their peers. Assessment is crucial in the PLONG model to guarantee thorough comprehension and continuous improvement of skills. Subsequently, it is necessary to reassess cooperation and communication abilities following the implementation of the PLONG model.

Weakness and Strength

The PLONG learning model has its weaknesses and strengths. The strengths of the PLONG learning model are: (1) learning is fun because there is an element of play; (2) students are required to be active because there is a doing spec which is intended so that all students can try and do the learning they are involved in; (3) this model helps students to understand the material in depth through the learning process; (4) the teacher can implement an evaluation process to measure the quality of learning. The PLONG model also emphasises developing communication and collaboration skills in students. The involvement of students in group activities can help students to gain direct experience in communication and collaboration. The evaluation stage in the PLONG learning model will help students reflect on their understanding and receive feedback from the learning that has been carried out, thus making it easier to improve skills on an ongoing basis. This learning model can be applied to various disciplines based on each student's unique needs and characteristics.

Meanwhile, the weaknesses of the PLONG learning model are as follows: this PLONG learning model requires thorough and careful preparation, which includes needs analysis, creating learning materials, learning media, and appropriate resources for each stage. In addition, the PLONG model learning process takes longer than traditional learning methods because it involves diverse activities. The PLONG learning model requires good classroom management skills to keep the learning process focused and students active in learning.

Stage 3: Development

At this stage, the researcher carefully designs the PLONG model that will be developed and its completeness. At this stage, researchers carefully plan to ensure the learning model is in line with the learning objectives set. The first stage of development involved asking teachers to assess the feasibility of the model with a model feasibility sheet and continuing with a PLONG model utilising Focus Group Discussion (FGD). The results of the feasibility analysis of the first model indicated that several adjustments were required in different aspects, such as the unclear rationale and lack of planning and implementation that were in line with the learning model. After improving the existing model, we conducted a feasibility test again. The data collected in Table 2 shows the results of the second feasibility test:

Table 2

PLONG model feasibility test results

Institution	Name	Rational	Aim	Benefit	Planning	Implementation
Elementary School 1 Palangkaraya	Diyah CR	4	4	4	4	4
	Ela	4	4	4	3	4
Elementary School 5 Pahandut	Edison	4	4	4	4	4
	Mulyani	4	4	3	4	4
Elementary School 2 Panarung	Arkino	4	4	4	4	4
	Sutinko	4	4	4	4	4
	Veronica	4	4	4	4	4
Elementary School 6 Bukit Tunggal	Farida	4	4	4	4	4
	Indah H	4	4	4	4	4
	Muslikhah	3	4	4	4	4

In addition to testing the feasibility of a learning model with trainees at a school, we also conducted a focus group discussion (FGD) with experts on learning models and practitioners. The results of the FGD in the first session showed that the model needed various improvements in every aspect. Followed by a second FGD session showed that the model that had been rearranged was suitable for testing. The FGD process was carried out with the help of experts in learning models and practitioners from schools, namely class teachers at elementary schools in Palangkaraya. FGDs conducted with experts and practitioners provided valuable insight into new perceptions and understanding of the model developed by us. Table 3 presents a summary of the PLONG model FGD results:

Table 3

PLONG model FGD results

No	Aspects of FGD	Description
1	Agreement on the PLONG concept	Learning model experts and school practitioners stated that the PLONG learning model concept offers a comprehensive learning approach that includes playing, learning, doing, and evaluating. Experts agree that the PLONG model, which is aimed at supporting the development of communication and collaboration skills in students, can provide new insights and concepts in education. Researchers must also be careful and detailed in explaining the concept of the PLONG learning model.
2	The importance of student interaction	Experts in learning models and teachers explain that the activeness of students and classroom management by teachers ensure the success of implementing the PLONG learning model. The playing, learning, and doing stages will help students develop communication and collaboration skills.
3	Success in facilitating active learning	Experts and practitioners recognise that the PLONG model effectively encourages active learning. Games, learning processes, and activities to try will create a quality and systematic learning process. Students will appear more active and involved in the learning carried out by the teacher.
4	Challenges in implementation	The challenges faced in the PLONG learning model include the preparation of learning to be carried out by the teacher, classroom management to be appropriate, and adequate provision of resources for interactive learning.
5	Recommendations for further development	Advice from experts and practitioners regarding the PLONG learning model is the need to develop a more detailed model framework that is easy for teachers as users to understand. It is hoped that the PLONG model can be implemented for all levels of education. There is a need for outreach regarding procedures for using the PLONG learning model.

The results of the FGD conducted by us illustrate that the PLONG model is an innovation that needs further development to enrich existing learning models in education. The PLONG learning model will facilitate exploring affective, cognitive, and psychomotor aspects well to improve the quality and learning outcomes.

Stage 4: Implementation

Before this implementation stage, we conducted a pretest on collaboration and communication skills to determine the initial condition of the students' collaboration and communication skills. After the implementation of the PLONG model was completed, the next we carried out post-tests. The prerequisite test results are if $\text{Sig} > 0.05$ in the normality test, then the data can be considered normal and homogeneous; however, if $\text{Sig} < 0.05$, the data is considered abnormal and not homogeneous. The results of the data normality analysis produced a Sig value of 0.210, while the results of the homogeneity analysis produced a Sig value of 0.120. As a result, these values indicate that the data is normal and homogeneous.

The analysis of paired samples statistics showed an increase between before and after treatment. The pretest data for collaboration skills yielded a score of 70.1032 and 68.7850 for communication skills. The results of the pretest and post-test analysis conducted by researchers showed that the average increase in collaboration skills increased from 68.5 to 81.25, and the average increase in communication skills increased from 68.75 to 82. The results of the existing statistical data analysis show that the pretest and post-test results show a better improvement related to collaboration skills and communication skills. The statistical study results indicate that

the PLONG learning model and cooperation and communication abilities have a significant link ($\text{Sig} = 0.012$). Figure 4 shows the averages score analysis before and after implementing the PLONG model.

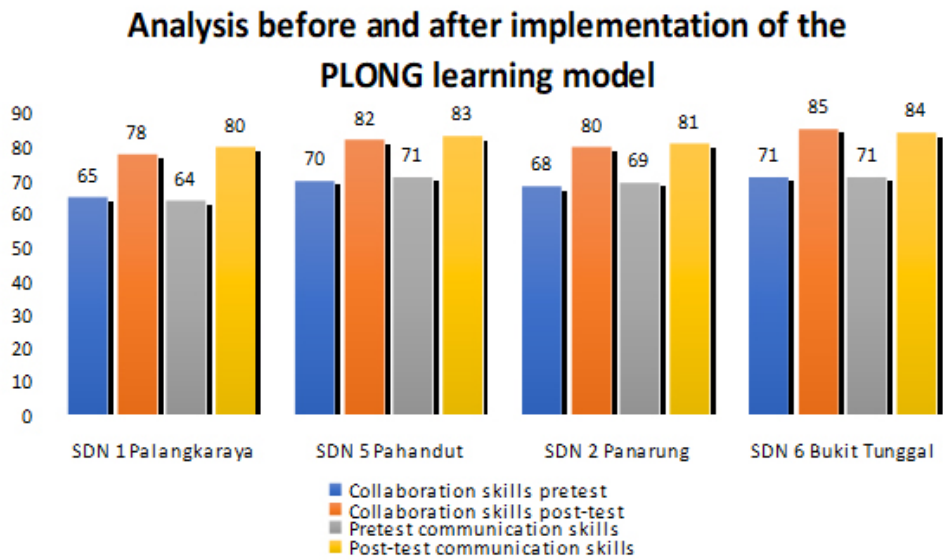


Fig. 4. Result in pretest and post-test

Data analysis obtained from the research shows a real increase in scores from the pretest to the post-test after implementing the PLONG learning model. The average result of testing collaboration skills increased by 12.75, and the average increase in communication skills was 13.25. Data for each school shows that elementary school 6 Bukit Tunggal got the highest score for improving collaboration skills, namely 80, while elementary school 2 Panarung got the highest score for communication skills, namely 84. Meanwhile, the school with the lowest increase in collaboration skills was Elementary School 1 Palangkaraya, 78, and Elementary School 1 Palangkaraya was with the lowest communication skills, with a score of 80.

Stage 5: Evaluation

The PLONG learning model effectiveness was evaluated in the final stage. This model was created based on a field needs analysis from several schools in Palangkaraya, which revealed that conventional learning methods are still dominating and do not support students' communication and collaboration skills. When this PLONG learning model is implemented, careful planning is required because several aspects must be fulfilled in implementing this learning model. Good classroom management is needed to carry out learning well during implementation. The PLONG learning model is active and fun and can develop students' collaboration and communication skills. This condition is proven by the statistical analysis results

with the help of SPSS version 28, which shows significant changes in collaboration and communication skills that benefit students.

Discussion

Collaboration skills and communication skills are 21st century skills that are useful in helping develop individuals to become superior and competitive individuals. Collaboration skills are very important for individuals to work together effectively in teams, sharing ideas to achieve predetermined common goals. Good collaboration skills will help individuals appreciate existing differences of opinion, resolve conflicts, and determine better solutions within a team. Apart from that, good communication skills will help the individual to be able to convey ideas, share information, and listen to other people's opinions well. Good communication skills will help strengthen interpersonal relationships, facilitate the productive exchange of ideas, and build trust. These collaboration and communication skills in education are complementary in the learning context. These skills will help students prepare to become good leaders and team members who can work together. By developing collaboration and communication skills, students can be better prepared to face future challenges and also be able to make positive contributions in various life contexts.

Collaboration and communication skills have an important role in creating quality education. Collaboration skills will help students prepare for teamwork in academic projects and in the future workplace. By working together, students will learn to appreciate seeing things from various points of view, solving problems, and determining goals to be achieved together. In addition, developing these skills will help students express their ideas clearly, actively consider other people's opinions, and communicate effectively throughout the learning process. Students who are skilled at communicating can collaborate well with their classmates, are able to make interesting presentations, and can participate actively in class discussions. The needs analysis results obtained from interviews at schools in Palangkaraya show that traditional teaching methods are still used, and students' collaboration and communication skills are still not well developed. Teachers need innovative, active, and fun models to make learning more lively and meaningful. Apart from that, another problem is students' low collaboration and communication skills. To overcome existing problems according to the above phenomena, a learning model that suits students' needs is needed. The PLONG learning model is a solution that can be used to develop students' collaboration and communication skills. The PLONG learning model combines different student learning styles and encourages them to participate actively by combining playing, learning, doing and evaluating activities.

The first process in implementing the PLONG learning model begins with preparing a systematically structured learning plan so that learning is in line with the goals you want to achieve. The results of implementation trials conducted by us showed a change in scores between the pretest and post-test. The calculation results mean an increase in collaboration skills of 12.75 and an average increase in

communication skills of 13.25. From the data for each school, it can be seen that 6 Bukit Tunggal got the highest score for improving collaboration skills, namely 80, and elementary school 2 Panarung got the highest score for communication skills, 84. Meanwhile, the school with the lowest increase in collaboration skills was Elementary School 1 Palangkaraya, with 78 communication skills. The lowest was at Elementary School 1 Palangkaraya, scoring 80. This statistical analysis shows a significant increase in collaboration and communication skills before and after implementing the PLONG learning model. So, it can be said that the PLONG learning model effectively develops students' collaboration and communication skills.

The findings of this study are in line with the research of K. T. Nesbitt, E. Blinkoff, R. M. Golinkoff and K. Hirsh-Pasek, who explain that students learn best when actively involved in meaningful, socially interactive, repetitive, and enjoyable learning experiences [44]. In addition, M. K. Wardhani's and M. Nduru's research states that learning through games can increase student activity even better and will attract attention, increase concentration, involve less active students, and develop students holistically [45]. M. Păiși-Lăzărescu stated that fun learning activities allow students to become active participants in building their understanding and cognitive abilities, improving research and organisational skills, and expressing their ideas and emotions [46].

The results of the study by A. Wagenaar, A. J. J. A. Scherpbier, H. P. A. Boshuizen and C. P. M. van der Vleuten also show that learning includes aspects of doing, actively overcoming gaps in knowledge and skills, learning by seeing things in practice, and preparation and evaluation [47]. In addition, S. D. Saputro's research highlights the importance of students' active involvement in the learning process [48]. In addition, the research by F. R. E. Wahyuni, W. Wlansah, D. Syafruddin and Y. Bustami emphasises the importance of teaching methods that increase student autonomy and equip them with learning skills [49]. Research on the PLONG learning model has significant practical, empirical, and theoretical implications for the development of communication skills and collaboration skills. The PLONG learning model paradigm offers teachers a learning model that is systematically and structured to help facilitate students in creating active and enjoyable learning so that learning goals and outcomes are achieved.

Applying the PLONG learning model in the classroom will create interesting and enjoyable student learning. This research explains playing, learning, doing, and assessing learning to help students develop communication and collaboration skills. This research provides new insights for teachers regarding learning models that are more comprehensive, systematic, and enjoyable. As a result, research on the PLONG model significantly impacts innovative and effective learning practices while enriching our theoretical understanding of complex learning processes.

The research implication of this PLONG learning model is to help develop students' communication and collaborative skills. This research also offers teachers a systematic, active and fun learning model. The PLONG learning model allows teachers to create an interesting and enjoyable learning atmosphere that will trigger stu-

dent activity. The results of the trials also prove that the PLONG learning model is effective for developing students' collaboration and communication skills. Furthermore, the incorporation of the PLONG model into the school curriculum can have a significant impact on education policy. Finally, the research increases understanding of effective learning processes in theoretically developing communication and collaboration skills.

Conclusions and Recommendations

Collaboration and communication skills for students have a very important role. These skills will help students develop their personalities to become better. Good collaboration and communication skills in students will trigger students to be more active in teams, share ideas, resolve conflicts, and achieve common goals. However, collaboration and communication skills are not easy to develop because there are still many schools in Palangkraya where students cannot develop collaboration and communication skills. Apart from these problems, problems were also found in schools in Palangkraya, and there are still many teachers who use conventional learning models when teaching and students tend to be passive. To overcome existing problems, the PLONG learning model creates more active and enjoyable learning through the flow of playing, learning, doing and evaluating. The implementation of the PLONG learning model also shows that this model is able to develop students' communication and collaborative skills. From this research, the recommendation given to future researchers is to integrate the PLONG learning model at all levels of education. This further research will strengthen existing research findings and provide new effects, concepts and insights regarding models that are relevant to learning.

References

1. Alfitra L., Kadiyono A.L., Nguyen P.T., Firdaus W., Wekke I.S. Educating the external conditions in the educational and cultural environment. *International Journal of Higher Education*. 2019;8(8):34–38. doi:10.5430/ijhe.v8n8p34
2. Bulkani B., Fatchurahman M., Setiawan M.A. Zonation system in admission of new student at state secondary school in Indonesia: how predictable to learning success. *Obrazovanie i nauka = The Education and Science Journal*. 2023;25(8):115–133. doi:10.17853/1994-5639-2023-8-115-133
3. Muzakkir, Hussin Z., Razak R.A. Teachers' beliefs towards character education curriculum in primary school: a systematic literature review. *Education 3-13*. 2022:1–15. doi:10.1080/03004279.2022.2142478
4. Yusop N.A. Systematic literature review: optimisation timetable in education to support Work-Life Balance (WLB). *Journal of Computing Research and Innovation*. 2022;7(2):316–326. doi:10.24191/jcrinn.v7i2.324
5. Khan M.M., Ahmad R., Fernald L.W. Diplomacy and education: a systematic review of literature. *Global Social Sciences Review*. 2020;5(2):1–9. doi:10.31703/gssr.2020(v-iii).01
6. Ponnusamy V.M., Hassan Z. Tamil schoolteachers' knowledge competency on implementing creativity, critical thinking, collaboration and communication skills in classroom learning. *International Journal of Academic Research in Progressive Education and Development*. 2023;12(2):1006–1015. doi:10.6007/IJARPED/v12-i2/17364

7. Hidayatulloh M.K.Y., Ashoumi H. The perspective of work readiness in vocational school students with 21st century communication and collaboration skills. *Cypriot Journal of Educational Sciences*. 2022;17(7):2199–2206. doi:10.18844/cjes.v17i7.7588
8. Lima K., Oliveira A., Lellis I., Tavares E., Bagata E. Social skills in the educational context: a systematic study: Habilidades sociais no contexto educacional: um estudo sistemático. *Concilium*. 2023;23(14):132–146. doi:10.53660/CLM-1628-23J36
9. Claudia C.M. Strategies for developing students' communication skills from the perspective of alternative pedagogies. In: *European Proceedings of Educational Sciences 2022; Education, Reflection, Development-ERD 2021*. doi:10.15405/epes.22032.9
10. Aasma, Gulfam N., Faiza J. A comparative study on communication skills of out of school and school going children with intellectual and developmental disabilities. *Journal of Business and Social Review in Emerging Economies*. 2022;8(2):597–604. doi:10.26710/jbsee.v8i2.2466
11. Braga I., Abreu A. Communication skills in higher education versus the labor market: different perceptions and valuations. In: Abreu A., Carvalho J.V., Liberato D., Galdames I.S., eds. *Advances in Tourism, Technology and Systems*. Vol. 340. Singapore: Springer Nature; 2023:229–345. doi:10.1007/978-981-19-9960-4_21
12. Odell M.R.L., Dyer K., Klett M.D. Collaboration and communication in science and technology education. In: Akpan B., Cavas B., Kennedy T., eds. *Contemporary Issues in Science and Technology Education*. Vol. 56. Cham: Springer Nature Switzerland; 2023:283–294. doi:10.1007/978-3-031-24259-5_20
13. Jaleniauskiene E., Leščinskij R., Jucevičienė P. Development of collaboration in the English for specific purposes courses: opportunities and challenges. *Journal of Teaching English for Specific and Academic Purposes*. 2019;7(3):311–327. doi:10.22190/JTESAP1903311J
14. Dula C.A.C., Porter A.L. Addressing challenges in skills-based education through innovation and collaboration. *American Journal of Pharmaceutical Education*. 2021;85(7):530–532. doi:10.5688/ajpe8788
15. Gallagher H.T., Gaenor D., Libby E., Jeanine. *Collaborating with Colleagues and Other Professionals. Inclusive education for the 21st century*. Routledge; 2019. 24 p.
16. Li S., Pöysä-Tarhonen J., Häkkinen P. Students' collaboration dispositions across diverse skills of collaborative problem solving in a computer-based assessment environment. *Computers in Human Behavior Reports*. 2023;11:100312. doi:10.1016/j.chbr.2023.100312
17. Rodrigues F., Soares I. Leadership and communication development in academic context: case study at Portuguese naval academy. In: *EDULEARN22 Proceedings*. 2022:6689–6695. doi:10.21125/edulearn.2022.1579
18. AlAhmad H. The role of educational communication in promoting a student-centered learning style in multicultural classrooms: a reflective essay on learning and teaching in higher education. *International Journal of Research in Education and Science*. 2021;7(3):838–851. doi:10.46328/ijres.2374
19. Klefbeck K. Educational approaches to improve communication skills of learners with autism spectrum disorder and comorbid intellectual disability: an integrative systematic review. *Scandinavian Journal of Educational Research*. 2023;67(1):51–68. doi:10.1080/00313831.2021.1983862
20. Swingler M.V., Roy A., Manoli A., Gardani M., Hasty W., Macfarlane D. Bridging the gap: skill development in curricular, co-curricular and extracurricular activities and the impact on readiness for employment. 2024:1–57. doi:10.35542/osf.io/dvhmf
21. Bo L., Ding X., Wang S. A comparative analysis of traditional teaching and PBL model. *Atlantis Press*. 2022;664:1686–1690. doi:10.2991/assehr.k.220504.306
22. Liu Y., Huang M., Wu C., Yang R., Imperato M. Design of an online self-study platform based on campus scenes. In: *2023 11th International Conference on Information and Education Technology (ICIET)*. 2023:77–81. doi:10.1109/ICIET56899.2023.10111270

23. Almeida de Souza C., Ferreira da Fonseca R. Considerações acerca do uso da Aprendizagem Baseada em Problemas (PBL) em um Curso Técnico Integrado ao Ensino Médio. *Revista de Educação Matemática*. 2020;17:e020049–e020049. (In Portuguese) doi:10.37001/remat25269062v17id443
24. Robbins T.L., Kegley K. Playing with Thinkertoys to build creative abilities through online instruction. *Thinking Skills and Creativity*. 2010;5(1):40–48. doi:10.1016/j.tsc.2009.07.001
25. Lindley B.J., Mills L. Playing to learn: learning to TALK. *British Journal of Special Education*. 2022;49(3):350–374. doi:10.1111/1467-8578.12411
26. Arnott L. Play, adventure and creativity: unearthing the excitement and fun of learning. *International Journal of Early Years Education*. 2023;31(2):305–308. doi:10.1080/09669760.2023.2202929
27. Hall G. *Learning, Psychology of Encyclopedia of Cognitive Science*. John Wiley & Sons, Ltd; 2006. doi:10.1002/0470018860.s00562
28. Muhajirah M. Basic of learning theory: (behaviorism, cognitivism, constructivism, and humanism). *IJAE International Journal of Asian Education*. 2020;1(1):37–42. doi:10.46966/ijae.v1i1.23
29. Kelly K.T. Learning theory and epistemology. In: Arló-Costa H., Hendricks V.F., van Benthem J., eds. *Readings in Formal Epistemology: Sourcebook*. Cham: Springer International Publishing; 2016:695–716. doi:10.1007/978-3-319-20451-2_33
30. Pérez-Rivas F.J., Rico-Blázquez M., López-López C., Domínguez-Fernández S., Cobos-Serrano J.L., Ajejas Bazán M.J. "Learning by doing", a model for improving the promotion of healthy lifestyles by student nurses. *BMC Nursing*. 2023;22(1):1–7. doi:10.1186/s12912-023-01398-3
31. Oelkers J. Learning by doing: Eine kleine Ehrenrettung eines grossen Schlagworts. In: Dernbach-Stolz S., Eigenmann P., Kamm C., Kessler S., eds. *Transformationen von Arbeit, Beruf und Bildung in internationaler Betrachtung*. Wiesbaden: Springer Fachmedien; 2021:115–131. (In German) doi:10.1007/978-3-658-32682-1_7
32. Srinivasa K.G., Kurni M., Saritha K. Learning by doing. In: Srinivasa K.G., Kurni M., Saritha K., eds. *Learning, Teaching, and Assessment Methods for Contemporary Learners: Pedagogy for the Digital Generation*. Singapore: Springer Nature; 2022:147–176. doi:10.1007/978-981-19-6734-4_7
33. Bulkani B., Setiawan M.A., Wahidah W. The discrepancy evaluation model in the implementation of online learning (on the basis of parents' perceptions). *Obrazovanie i nauka = The Education and Science Journal*. 2022;24(2):116–137. doi:10.17853/1994-5639-2022-2-116-137
34. Acton R. Mapping the evaluation of problem-oriented pedagogies in higher education: a systematic literature review. *Education Sciences*. 2019;9(4):269. doi:10.3390/educsci9040269
35. Ponce O.A., Galán J.G., Pagán-Maldonado N. *Research-Evaluation of Learning. Introduction to the Philosophy of Educational Research*. River Publishers; 202. 200 p. doi:10.1201/9781003338697
36. Agustya S.V., Natalia K., Irwansyah I. Communication through hashtags in social movements: a systematic literature review. *Journal of World Science*. 2023;2(10):1563–1573. doi:10.58344/jws.v2i10.447
37. Rahayu S.M., Rosidin U., Herlina K. Development of collaboration and communication skills assessment tools based on project based learning in improving high school students the soft skills. *Advances in Social Science, Education and Humanities Research*. 2021;545:163–166. doi:10.2991/as-sehr.k.210423.082
38. Fulk B.M. *Effective Communication in Collaboration and Consultation*. Collaboration. Routledge; 2011. 414 p.
39. Kemouss H., Abdenmour O., Erradi M., Khaldi M., Kemouss H., Abdenmour O., et al. *The ADDIE Pedagogical Engineering Model: From Analysis to Evaluation. Handbook of Research on Scripting, Media Coverage, and Implementation of E-Learning Training in LMS Platforms*. IGI Global; 2023. 29 p.
40. Shahat H.A., Gaber S.A., Aldawsari H.K. Using the ADDIE model to teach creativity in the synthesis of raw materials. *International Journal of Learning, Teaching and Educational Research*. 2023;22(6):262–281. doi:10.26803/ijlter.22.6.15

41. Suratnu R. The adoption of the addie model in designing an instructional module: the case of Malay language remove students. *IJIET (International Journal of Indonesian Education and Teaching)*. 2023;7(2):262–270. doi:10.24071/ijiet.v7i2.3521
42. Tian B., Xie Z. Thoughts and design of ideological and political construction based on the ADDIE model. *Applied Mathematics and Nonlinear Sciences*. 2023;8(2):2021–2032. doi:10.2478/amns.2023.1.00306
43. Gong W. Application of the ADDIE model in the teaching practice of basketball skills. *Applied Mathematics and Nonlinear Sciences*. 2023;8(2):1993–2002. doi:10.2478/amns.2023.1.00303
44. Nesbitt K.T., Blinkoff E., Golinkoff R.M., Hirsh-Pasek K. Making schools work: an equation for active playful learning. *Theory into Practice*. 2023;62(2):141–154. doi:10.1080/00405841.2023.2202136
45. Wardhani M.K., Nduru M. Method of learning through play to facilitate the activeness of kindergarten students. *JURNAL PENDIDIKAN DASAR NUSANTARA*. 2023;8(2):250–262. doi:10.29407/jpdn.v8i2.19185
46. Păiși-Lăzărescu M. Learning and play at early childhood. *LUMEN Proceedings*. 2017;2:303–309. doi:10.18662/lumproc.icsed2017.33
47. Wagenaar A., Scherpbier A.J.J.A., Boshuizen H.P.A., van der Vleuten C.P.M. The importance of active involvement in learning: a qualitative study on learning results and learning processes in different traineeships. *Advances in Health Sciences Education: Theory and Practice*. 2003;8(3):201–212. doi:10.1023/A:1026036707461
48. Saputro S.D. The application of student centered learning through lesson study on quality and learning results. *ISLLAC: Journal of Intensive Studies on Language, Literature, Art, and Culture*. 2018;2(2):84–91. doi:10.17977/um006v2i22018p084
49. Wahyuni F.R.E., Wliransah W., Syafruddin D., Bustami Y. The meta-analysis study of SAVI learning model on student's cognitive aspects in biology learning. *JPBIO (Jurnal Pendidikan Biologi)*. 2022;7(1):93–105. doi:10.31932/jpbio.v7i1.1550

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