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Constructivism-Based Learning Innovation Management: Case Study At SMPN 1 Limpung, Batang Regency

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ABSTRACT

This study aims to analyze the management of constructivism-based learning innovation at SMPN 1 Limpung, Batang Regency, covering planning, organizing, implementation, as well as evaluation and follow-up. This research employed a qualitative approach with a case study design. The research subjects included the principal, vice principal of curriculum, teachers, the school committee, parents, and students. Data were collected through in-depth interviews, observations, and documentation studies, and analyzed using data reduction, data display, and conclusion drawing techniques. The findings reveal that the planning of learning innovations was carried out through needs analysis, formulation of objectives aligned with the Pancasila Student Profile, integration of the Independent Curriculum, and stakeholder involvement. Organizing emphasized coordination through internal MGMP forums and the teacher's role as facilitator. Implementation was characterized by the application of constructivist learning models, active student participation, and the use of interactive digital media. Evaluation was conducted through principal supervision, curriculum observations, teacher reflection, and student feedback, with follow-up actions including teacher training, lesson study, and gradual provision of digital learning facilities. This study highlights the importance of school management support in the success of constructivism-based learning innovations.

Keywords: E *ducational management, learning innovation, constructivism, independent curriculum*

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INTRODUCTION

21st-century education demands a transformation in learning management, where students are no longer viewed as objects receiving knowledge, but rather as active subjects constructing knowledge through learning experiences (Jahani & Safaei, 2025). Learning management is a systematic process of planning, implementing, and evaluating teaching and learning activities aimed at achieving effective learning (Kurnadi and Machali, 2020: 73).

Learning management involves the coordination of all resources, such as teachers, students, media and learning environments to achieve educational goals optimally (Hong dkk., 2025). Learning management in the context of this research is a systematic and collaborative process carried out by teachers to design, organize, implement, and evaluate student-centered learning experiences and encourage active knowledge construction, with the aim of creating an innovative learning environment and empowering teachers to develop new and effective learning practices (Siddiqi dkk., 2025). The components of Learning Management consist of: Learning Planning, Learning Organization, and Learning Evaluation.

The role of the principal plays a central and crucial role in the successful implementation of effective learning management in schools (Guo dkk., 2024). Strong and visionary leadership from the principal is the foundation for creating a school culture that supports quality learning. The following are some of the principal's main roles: (1) Visionary and Director; (2) Facilitator and Supporter; (3) Model and Driver of Innovation; (4) Teacher Capacity Developer; (5) Creator of a Culture of Collaboration; and (6) Evaluator and Feedback Provider. The roles of teachers in learning are as follows: (1) Learning Planner; (2) Learning Implementer; (3) Motivator and Facilitator; (4) Classroom Management; and (5) Learning Evaluator

In the current context, Nasarudin (2023:66) states that learning innovation is a continuous process that adapts the learning process to technological advances and student needs to make it more contextual and transformative (Hosseini dkk., 2024). This definition emphasizes that innovation should not be static, but must be dynamic in accordance with technological developments and the characteristics of today's students (Q. Wang, 2024). Learning innovation does not only include changes in teaching methods, but also encompasses all components of the teaching and learning process that can enrich students' learning experiences (Abacar dkk., 2025). The following are forms of learning innovation according to experts and field practice: Innovation in Learning Methods, Innovation in Media and Technology, Innovation in Learning Evaluation, Innovation in Learning Design, Innovation in Classroom Management, Innovation in Character Building, and Innovation in Learning Environments.

Learning innovation often faces various obstacles. One major obstacle is resistance to change, both from teachers and school leaders (Bach dkk., 2025). Many teachers remain comfortable with old methods, making them reluctant to try new approaches (Yixin dkk., 2025). Lack of training and self-development exacerbates this situation, as without competency development, teachers will struggle to design innovative learning (Cao dkk., 2025). Limited resources, particularly in geographically or economically disadvantaged schools, are a significant barrier, particularly for technology-based innovation, necessitating innovation that is relevant and responsive to these demands.

The view of learning that emphasizes that knowledge is actively constructed by individuals through direct experience, social interaction, and personal reflection, in this

approach can answer and provide a solution to the problems in this study (Al-Qazzaz dkk., 2024). Students are not passive recipients of information, but rather as active learners who construct understanding based on the context and meaning they create themselves. This view is in accordance with those put forward by Piaget (1973) and Vygotsky (1978), namely Constructivism, which is one of the relevant approaches to answer these demands, because it emphasizes active student involvement, collaboration, and critical thinking processes (Fuchs dkk., 2025). In Indonesia, the application of constructivism is further strengthened by the presence of the Independent Curriculum oriented towards the development of the Pancasila Student Profile as a national learning goal (Kemendikbudristek, 2021). This curriculum emphasizes flexibility, meaningfulness, and integration of cross-disciplinary projects through the Pancasila Student Profile Strengthening Project (P5). Therefore, appropriate management of learning innovation is essential so that the principles of constructivism can be consistently applied in schools.

SMPN 1 Limpung, Batang Regency is one of the state schools that has implemented innovative learning methods.Constructivism-based (Echevin dkk., 2025). This innovation is realized through P5-based learning objective planning and organization through the Subject Teacher Consultation (MGMP) forum.what is done at school, the implementation of active learning supported by interactive media, and ongoing evaluation through principal supervision and teacher reflection (Retno dkk., 2025). However, challenges also exist, such as limited digital resources, differences in teacher readiness, and inconsistent documentation of diagnostic assessments.

RESEARCH METHODOLOGY

This research employed a qualitative approach with a case study design. This approach was chosen because it is suitable for in-depth understanding of the process of constructivism-based learning innovation management in a real-life school context. According to Sugiyono (2019), qualitative research allows researchers to explore meaning, understand interactions, and describe phenomena in a naturalistic way.

The research subjects consisted of the principal, vice principal for curriculum, subject teachers, students, school committee members, and parents (Yang dkk., 2024). Subjects were selected using a purposive sampling technique, selecting informants deemed to have the most understanding and direct involvement in implementing constructivist learning innovations. The object of the research is constructivism-based learning innovation management at SMPN 1 Limpung, Batang Regency, which includes four main aspects: planning, organizing, implementing, and evaluating and following up. The research was conducted at SMPN 1 Limpung, Batang Regency, Central Java, from June to September 2025. This school was chosen because it has implemented the Independent Curriculum with a focus on constructivist learning innovation.

Data is collected through:winterview, oobservationand Sdocumentation study. Data analysis was carried out using the Miles & Huberman interactive model which includes: Data reduction,pPresentation of data in the form of descriptive narratives, tables and charts to facilitate understandingand pedraw conclusions.

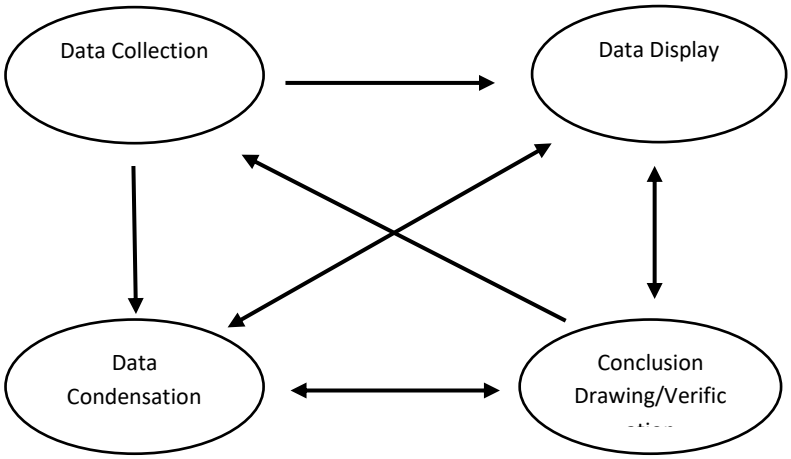

Figure 1. Interactive Data Analysis Model (Miles and Huberman, 2019: 25)

Data validity was tested through source and technical triangulation. Source triangulation was conducted by comparing data from the principal, teachers, students, parents, and the school committee. Technical triangulation was conducted by combining the results of interviews, observations, and documentation.

RESULT AND DISCUSSION

The research results show that SMPN 1 Limpung, Batang Regency, has systematically implemented a constructivist approach to learning, in line with the Independent Curriculum policy and the strengthening of the Pancasila Student Profile. These efforts are evident through innovations in lesson planning, collaborative team building and coordination, the implementation of active project-based methods, the use of technology, and the use of authentic evaluation.

The presentation of the results of this research will be presented based on four main sub-focuses, namely: (1) Planning constructivist learning innovations, (2) Organizing constructivist learning innovations, (3) Implementing constructivist learning innovations, (4) Evaluation and follow-up of constructivist learning innovations.

Each sub-focus will be described in detail, including direct statements from informants to ensure data authenticity. Thus, the results of this study are expected to provide a concrete picture of constructivist learning innovation management practices at SMP Negeri 1 Limpung.

Table 1. Mapping Theory vs Field Findings

Aspect	Theory in Literature Review	Field Findings	Relation (Support/Reject)
Planning	Planning is the setting of goals and strategies (management). Piaget (1973): knowledge is built through activity. Vygotsky (1978): the importance of	Student needs analysis through diagnostic assessments, MGMP, and work meetings. Objectives refer to the Pancasila Student Profile, 4C, and HOTS.	SupportPiaget & Vygotsky (activity-based planning & ZPD). Supportmanagement (planning). Not quite rightwith Tyler because the assessment

	understanding the zone of proximal development. Tyler (in Ornstein & Hunkins, 2018): evaluation of the basic needs of curriculum planning.	Implementation of PBL, PjBL, and discovery learning. Limited integration of P5. Assessment documentation is inconsistent.	documentation was not neat.
Organizing	Organizing is the division of roles & responsibilities (management). Vygotsky (1978): scaffolding & social interaction. Bruner (1966): the importance of learning structure (discovery learning). Fullan (2007): innovation is successful if it is collaborative.	The principal establishes policies and resources. The vice principal coordinates the curriculum and the MGMP. Teachers organize classes for discussions, experiments, and presentations. The committee and parents support facilities and motivation. Digital resources are adequate but limited.	Supportmanagement (organizing). SupportVygotsky & Bruner (collaborative classroom). SupportFullan (stakeholder collaboration). Not quite rightwith Hwang (2020) due to technological limitations.
Implementation	Implementation (actuating): mobilizing resources (management). Dewey (1938): learning by doing. Piaget (1973): knowledge from concrete activities. Vygotsky (1978): media as a cultural tool expands the ZPD. Rogers (2003): gradual adoption of innovation.	Teachers as facilitators. Students actively participate in discussions, experiments, and projects. Interactive media: PhET, Google Maps, Canva, and vlogs. Student products: experimental reports, digital maps, short stories, posters, and vlogs. Challenges: uneven student engagement, limited digital resources, and suboptimal integration of local contexts.	Support management (actuating). SupportDewey, Piaget, Vygotsky (activities & media). SupportRogers (gradual adoption of innovation). Not quite rightwith ideal theory due to limited facilities & student consistency.
Evaluation &	Evaluation	The principal	Supportmanagement

Follow-up	(controlling) in management: ensuring activities are according to plan. Bruner (1966): the importance of assessing thinking processes. Schön (1983): reflection as improvement. Rogers (2003): implementation & confirmation stages of innovation. Sagala & Widodo (2022): holistic evaluation is important for learning revision.	supervises classes. The curriculum vice principal observes teaching materials. Teachers reflect on authentic learning and assessment. Students provide feedback via questionnaires. Follow-up: lesson study, peer teaching, teacher training, revision of teaching modules, procurement of facilities. Teacher reflections have not been consistently documented.	(controlling). SupportBruner & Schön (process assessment & reflection). SupportRogers (follow-up as confirmation of innovation). Not quite rightwith Sagala & Widodo because the reflection has not been neatly documented.

Figure 2. constructivism-based learning innovation management at SMPN 1 Limpung

The research results in the table and diagram above indicate that constructivism-based learning innovation management at SMPN 1 Limpung, Batang Regency, has been implemented through four main aspects: planning, organizing, implementing, and

evaluating and following up. These findings can be analyzed within the theoretical framework of constructivism, learning innovation, and educational management.

1. Learning Innovation Planning

Innovation planning at SMPN 1 Limpung began with an analysis of student needs through diagnostic assessments, classroom observations, and MGMP discussions. The principal stated:

> "We formulate our learning objectives based on the Pancasila student profile, where students become active participants in learning. We use problem-based and project-based learning approaches to encourage critical, collaborative, and creative thinking." (KS, August 25, 2025).

The findings indicate that planning is conducted through needs analysis, goal formulation based on the Pancasila Student Profile, and integration of the Independent Curriculum and P5. This supports the views of Piaget (1973), who emphasized the importance of students' cognitive developmental stages in designing learning, and Vygotsky (1978), who emphasized the role of the zone of proximal development (ZPD) and scaffolding. Needs analysis through diagnostic assessment and probing questions is a concrete form of application of both theories.

The integration of the Independent Curriculum into planning also aligns with Trilling and Fadel's (2009) view of the importance of 21st-century skills (the 4Cs: critical thinking, creativity, collaboration, and communication). Thus, this school's innovation planning supports both constructivism and 21st-century skills theory.

However, the shortcomings of diagnostic assessment documentation and the limited integration of P5 across subjects indicate that constructivist theory has not been fully internalized in administrative practice. This presents an area for development in management planning.

2. Organizing Learning Innovation

Organizing innovation involves the roles of the principal, curriculum vice-chancellor, teachers, committees, and parents. The curriculum vice-chancellor said:

> "Coordination is carried out through the school's MGMP forum and regular coordination meetings facilitated by the Learning Innovation Team. In these forums, teachers share lesson plans, materials, and strategies that align with constructivist principles." (Deputy Head of Curriculum, August 26, 2025).

This finding aligns with Mulyasa's (2018) view that educational management emphasizes coordination between components to achieve learning objectives. The principal acts as a policy director, while the curriculum vice-chancellor and the MGMP coordinate teaching materials. Teachers act as facilitators, and the committee and parents act as supporters.

These results also support the theory of Joyce, Weil, and Calhoun (2015), which emphasizes the importance of conducive classroom design in the constructivist learning model. Classroom organization with collaborative space, experimental corners, and democratic forums (as in PPKn) is an implementation of this theory.

However, the existence of inconsistent initial assessment documentation shows that organizing innovation still faces administrative obstacles.

3. Implementation of Learning Innovation

The implementation of the innovation demonstrates a shift in the teacher's role from information center to facilitator. A science teacher stated:

> "I use a guided inquiry method. Students are given trigger questions and directed to find answers through observation or experimentation." (Science Teacher 1, August 27, 2025).

Students also felt the benefits. An eighth-grade student said:

> "It's easier to understand the lesson because we can exchange ideas, and it makes learning more fun." (Student VIII, August 28, 2025).

This aligns with the constructivist theories of Piaget (1973) and Vygotsky (1978). Students actively discuss, experiment, and present their results, supporting Bruner's discovery learning theory and inquiry-based learning, widely described in modern learning literature (Slavin, 2018).

The use of interactive digital media in science, social studies, and Indonesian supports Sani's (2019) view on the importance of HOTS-based learning. This also aligns with Trilling and Fadel's (2009) theory regarding technology integration as part of 21st-century skills.

However, limited digital resources and uneven student engagement indicate a gap between theory and practice. According to Arends (2015), constructivist learning requires adequate support for students to learn independently and collaboratively.

4. Evaluation and Follow-up of Learning Innovations

The evaluation was conducted through supervision by the principal, observations by the curriculum vice principal, teacher reflections, and student feedback (Villoth dkk., 2025). The principal stated:

> "Monitoring is carried out through classroom supervision, observations by the vice principal for curriculum, and evaluation of student learning outcomes. We also use a student satisfaction questionnaire regarding learning." (Principal, August 25, 2025).

Student reflections also reinforced these findings. One ninth-grade student said:

> "I was happy and challenged, because I could show my abilities and hone my speaking skills." (Student IX, August 28, 2025).

This supports Sanjaya's (2019) view on the importance of authentic assessment in constructivist learning. Assessment that encompasses the process, product, and student attitudes aligns with the authentic assessment approach.

Follow-up in the form of lesson study, peer teaching, interactive media training, and revision of teaching modules is in line with the view of Darling-Hammond and Bransford (2005) that teacher professional development is a key factor in the success of educational innovation.

However, constraints such as limited digital resources and differences in teacher readiness indicate that educational management theory has not been fully implemented. Tilaar (2015) emphasized that successful educational management requires systemic support, including sustainable policies, facilities, and school culture.

Based on the description above, it can be concluded that the research results at SMPN 1 Limpung generally support constructivism theories (Piaget, Vygotsky, Bruner, Dewey), learning innovation (Rogers, Fullan), and educational management (planning, organizing, implementing, and evaluating functions). However, this study also revealed limitations in implementation in the field, such as inconsistent documentation, limited digital resources, and varying teacher readiness (Y. Wang dkk., 2025). This gap occurs because the gap between theory and practice shows that constructivism-based learning innovation management requires an adaptive approach according to the school context. Thus, this study strengthens and enriches existing theories by providing an empirical overview of the challenges of implementing learning innovation at the junior high school level.

CONCLUSION

This study shows that constructivism-based learning innovation management at SMPN 1 Limpung, Batang Regency has been implemented systematically through four main aspects.

1. Planning is conducted through needs analysis, goal formulation based on the Pancasila Student Profile, integration of the Independent Curriculum and P5, and stakeholder engagement. However, documentation of diagnostic assessments and consistency of P5 integration still need to be strengthened.
2. Organizing emphasizes internal MGMP coordination, the role of teachers as facilitators, and support from the principal, committee, and parents. Although classroom organization supports active learning, administration of initial student assessments is not yet fully uniform.
3. Implementation. Innovation is characterized by a shift in the teacher's role to facilitator, active student involvement, and the use of interactive digital media. Learning products such as experimental reports, digital maps, and creative works demonstrate the success of the constructivist approach. However, limited digital resources and uneven student engagement remain obstacles.
4. Evaluation and follow-up. This was carried out through principal supervision, curriculum vice principal observations, teacher reflections, and student feedback. Follow-up actions, including lesson study, peer teaching, teacher training, and the provision of digital resources, demonstrated a continuous cycle of improvement, although teacher readiness and resources still needed to be improved.

Overall, this study confirms that school management support is a key factor in the success of constructivist learning innovation, although there are still challenges in the aspects of documentation, facilities, and teacher readiness.

REFERENCES

Abacar, K., Çolakoğlu Özkaya, Ş., Biyikli, E., Buğdayci, O., Denizli, A., Koçak, B., Çöteli, M. B., Akdoğan, D., Gökduman, A., & Atagündüz, P. (2025). ABS0910 DEVELOPMENT OF A DEEP LEARNING-BASED ARTIFICIAL INTELLIGENCE TOOL FOR AUTOMATED mSASSS CALCULATION IN ANKYLOSING SPONDYLITIS. *EULAR 2025: European Congress of Rheumatology*, *84*, 2149–2150. https://doi.org/10.1016/j.ard.2025.06.1772

Al-Qazzaz, N. K., Alrahhal, M., Jaafer, S. H., Ali, S. H. B. M., & Ahmad, S. A. (2024). Automatic diagnosis of epileptic seizures using entropy-based features and multimodel deep learning approaches. *Medical Engineering & Physics*, *130*, 104206. https://doi.org/10.1016/j.medengphy.2024.104206

Arends, RI (2015). Learning to teach (10th ed.). McGraw-Hill Education.

Bach, K. M., Hofer, S. I., & Bichler, S. (2025). Adaptive learning, instruction, and teaching in schools: Unraveling context, sources, implementation, and goals in a systematic review. *Learning and Individual Differences*, *124*, 102781. https://doi.org/10.1016/j.lindif.2025.102781

Cao, M., Dai, Z., Chen, J., Yin, H., Zhang, X., Wu, J., Thanh, H. V., & Soltanian, M. R. (2025). An integrated framework of deep learning and entropy theory for enhanced high-dimensional permeability field identification in heterogeneous aquifers. *Water Research*, *268*, 122706. https://doi.org/10.1016/j.watres.2024.122706

Darling-Hammond, L., & Bransford, J. (2005). Preparing teachers for a changing world: What teachers should learn and be able to do. Jossey-Bass.

Echevin, D., Fotso, G., Bouroubi, Y., Coulombe, H., & Li, Q. (2025). Combining survey and census data for improved poverty prediction using semi-supervised deep learning. *Journal of Development Economics*, *172*, 103385. https://doi.org/10.1016/j.jdeveco.2024.103385

Fuchs, P., Thaler, S., Röcken, S., & Zavadlav, J. (2025). chemtrain: Learning deep potential models via automatic differentiation and statistical physics. *Computer Physics Communications*, *310*, 109512. https://doi.org/10.1016/j.cpc.2025.109512

Guo, M., Janson, B., & Peng, Y. (2024). A spatiotemporal deep learning approach for pedestrian crash risk prediction based on POI trip characteristics and pedestrian exposure intensity. *Accident Analysis & Prevention*, *198*, 107493. https://doi.org/10.1016/j.aap.2024.107493

Hong, L., Xu, M., Liu, Y., Zhang, X., & Fan, C. (2025). A deep learning dismantling approach for understanding the structural vulnerability of complex networks. *Chaos, Solitons & Fractals*, *194*, 116148. https://doi.org/10.1016/j.chaos.2025.116148

Hosseini, R., Lim, S., Tong, D., Sohn, G., & Seyedabrishami, S. (2024). A specialized inclusive road dataset with elevation profiles for realistic pedestrian navigation using open geospatial data and deep learning. *Computers, Environment and*

Urban Systems, *114*, 102199. https://doi.org/10.1016/j.compenvurbsys.2024.102199

Jahani, H., & Safaei, A. A. (2025). 5—Neural signals processing using deep learning for diagnosis of cognitive disorders. Dalam A. S. El-Baz & J. S. Suri (Ed.), *Signal Processing Strategies* (hlm. 91–118). Academic Press. https://doi.org/10.1016/B978-0-323-95437-2.00005-7

Joyce, B., Weil, M., & Calhoun, E. (2015). Models of teaching (9th ed.). Pearson

Ministry of Education, Culture, Research, and Technology. (2021). Guidebook for implementing the independent curriculum. Ministry of Education, Culture, Research, and Technology.

Mulyasa, E. (2018). School-based management: Concept, strategy, and implementation. Rosdakarya Youth.

Piaget, J. (1973). To understand is to invent: The future of education. Grossman.

Retno, R. S., Purnomo, P., Hidayat, A., & Mashfufah, A. (2025). Conceptual framework design for STEM-integrated project-based learning (PjBL-STEM) for elementary schools. *Asian Education and Development Studies*, *14*(3), 579–604. https://doi.org/10.1108/AEDS-08-2024-0188

Sani, RA (2019). HOTS (Higher Order Thinking Skills) based learning. Tira Smart.

Sanjaya, W. (2019). Learning strategies oriented to educational process standards. Prenadamedia Group.

Siddiqi, M. H., Alshammeri, M., Khan, J., Khan, M. F., Khan, A., Alruwaili, M., Alhwaiti, Y., Alanazi, S., & Ahmad, I. (2025). A Hybrid Framework Combining Rule-Based and Deep Learning Approaches for Data-Driven Verdict Recommendations. *Computers, Materials and Continua*, *83*(3), 5345–5371. https://doi.org/10.32604/cmc.2025.062340

Slavin, R.E. (2018). Educational psychology: Theory and practice (12th ed.). Pearson.

Sugiyono. (2019). Educational research methods: Quantitative, qualitative, and R&D approaches. Alfabeta.

Tilaar, HAR (2015). National education management: A study of future education. Rosdakarya Youth.

Trilling, B., & Fadel, C. (2009). 21st century skills: Learning for life in our times. Jossey-Bass.

Uno, HB (2020). Learning model: Creating a creative and effective teaching and learning process. Bumi Aksara.

Villoth, J. P., Zivkovic, M., Zivkovic, T., Abdel-salam, M., Hammad, M., Jovanovic, L., Simic, V., & Bacanin, N. (2025). Two-tier deep and machine learning approach optimized by adaptive multi-population firefly algorithm for software

defects prediction. *Neurocomputing*, *630*, 129695. https://doi.org/10.1016/j.neucom.2025.129695

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Wang, Q. (2024). A study on the design of a deep learning model for classroom based on user participation and game chemistry processes. *Entertainment Computing*, *51*, 100727. https://doi.org/10.1016/j.entcom.2024.100727

Wang, Y., Chen, K., Zeng, Y., Meng, C., Pan, C., & Tang, Z. (2025). Zero-shot multi-modal large language models v.s. Supervised deep learning: A comparative analysis on CT-based intracranial hemorrhage subtyping. *Brain Hemorrhages*. https://doi.org/10.1016/j.hest.2025.10.004

Yang, Y., Wang, Q., Wu, D., Hang, T., Ding, H., Wu, Y., & Liu, Q. (2024). Constructing child-friendly cities: Comprehensive evaluation of street-level child-friendliness using the method of empathy-based stories, street view images, and deep learning. *Cities*, *154*, 105385. https://doi.org/10.1016/j.cities.2024.105385

Yixin, Z., Yang, L., Guofan, J., yuchen, Y., Jian, Z., Yang, J., Alizadehsani, R., Tadeusiewicz, R., & Pławiak, P. (2025). An off-policy deep reinforcement learning-based active learning for crime scene investigation image classification. *Information Sciences*, *710*, 122074. https://doi.org/10.1016/j.ins.2025.122074