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Utilization of School Resources for Science Learning in Early Childhood Education: A Systematic Literature Review

Siti Sumarni[1], Asma Kurniati[2], la Jeti[3]
[1,2,3] Universitas Muhammadiyah Buton, Baubau, Indonesia
e-mail: *[1]sittysumarni9@gmail.com, [2]asmakurniati@gmail.com, [3]lajeti469@gmail.com

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ABSTRACT

Optimal utilization of school resources is the key to providing concrete and meaningful science learning for early childhood. This study aims to systematically review the literature on strategies for utilizing school environmental resources to develop science learning in Early Childhood Education (ECE). The method employed is a Systematic Literature Review (SLR) using the PRISMA protocol, sourcing data from SINTA 1-3 accredited journals such as Jurnal Murhum, Obsesi, UNJ, Undiksha, and UIN Sunan Kalijaga. Out of 516 identified articles, 9 met the inclusion criteria (2019–2025) for further analysis. The findings indicate that utilized school resources fall into three main categories: the physical environment (school grounds and coastal ecosystems), biotic components (plants and trees), and abiotic components (natural loose parts). Integrating these resources through Contextual and STEAM approaches has proven effective in enhancing children's cognitive abilities, naturalist intelligence, and environmental

literacy (eco-literacy). This study offers practical implications suggesting that financial constraints are not barriers; teacher creativity in transforming school environmental facilities into real laboratories can create profound learning experiences. This research is expected to serve as a policy reference for school principals in organizing learning ecosystems and as a guide for teachers to reduce reliance on manufactured media.

Introduction

Science education in early childhood has a fundamental role in developing critical thinking skills, solving problems, and fostering scientific attitudes from an early age (Yaswinda et al., 2023). Introducing science in PAUD is not just about mastering concepts, but rather focuses on science process skills where children can actively explore the objects around them (Fardiah et al., 2019). However, the reality in the field shows that science learning is often neglected or only taught conventionally using worksheets, so it does not stimulate children's natural curiosity (Agustin et al., 2022). Early childhood education teachers often experience obstacles in providing varied science learning media, which results in the learning process becoming monotonous and less meaningful (Rusdawati & Eliza, 2022). In addition, many educators still feel confused about translating the scientific approach into concrete and enjoyable play activities for children (Artha et al., 2020). Therefore, a learning strategy is needed that can overcome media limitations while optimizing the potential for children's cognitive stimulation through

easily accessible resources (Yaswinda et al., 2023).

One of the most relevant approaches to the concrete learning characteristics of early childhood is learning based on the use of the school environment (Anggraini et al., 2022). The natural environment in schools provides a natural laboratory rich in real learning objects, allowing children to observe, predict, and infer scientific phenomena directly.(Suryani & Seto, 2020)Utilizing school resources, such as parks, gardens, or sandy play areas, has been shown to significantly improve children's cognitive abilities and science process skills compared to classroom learning (Yaswinda et al., 2023). In addition, the use of the surrounding environment as a learning resource is in line with the principles of contextual education, where children learn from what is close and familiar in their daily lives (Ardoin & Heimlich, 2021). This strategy is also an effective solution for PAUD units in overcoming the limitations of expensive manufactured science demonstration tools (Rusdawati & Eliza, 2022).

Although the benefits of nature-based learning have been widely recognized, previous research has tended to focus more on the development of digital media or videos for science literacy (Rusdawati & Eliza, 2022). Several other studies have focused on the use of specific Educational Game Tools (EA) or factory-made loose parts in science learning (Widayati et al., 2020). There is still limited literature that specifically examines how schools manage and utilize "dormant assets" in the form of natural resources already present in the schoolyard as the

main medium for science learning (Yaswinda et al., 2023). Most previous studies have only looked at the end result in the form of cognitive improvement, but have not explored how teachers utilize these resources on a daily basis (Fardiah et al., 2019).

This research provides novelty by focusing on strategies for optimizing school ecological resources whose potential is often not recognized by educators (Anggraini et al., 2022). In contrast to research that develops new media products, this research emphasizes the utilization or empowerment aspect of existing physical school environmental assets to build science process skills.(Yaswinda et al., 2023)This research will explore in depth how teacher and child interactions with natural elements in schools can transform ordinary play areas into science inquiry areas (Agustin et al., 2022).

Based on this background, this study aims to analyze the use of natural resources in the school environment to develop science learning in early childhood education (PAUD). Specifically, this study aims to describe teacher strategies in managing the school environment as a resource for interactive and enjoyable science learning.(Suryani & Seto, 2020)

Theoretically, the results of this study are expected to enrich the science of early childhood education, especially regarding nature-based science learning models (Yaswinda et al., 2023). Practically, this research provides guidance for PAUD teachers to be more creative in utilizing school environmental facilities without relying on expensive

manufactured media (Rusdawati & Eliza, 2022). For school principals, this research can be the basis for policies in arranging school environments that support a science learning ecosystem (Anggraini et al., 2022). For students, utilizing these resources is beneficial in providing concrete, meaningful learning experiences and fostering a love of nature (Sobel, 2025).

Methods

This study used the Systematic Literature Review (SLR) method to collect, evaluate, and synthesize relevant research findings. This approach provides a comprehensive mapping of existing evidence and identifies research gaps. The review procedure was structured according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and accuracy in the literature selection process.(Ambarita & Gampu, 2025).

Search Procedure and Framework This study protocol was prepared using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency, accuracy, and replicability of the literature selection process. The initial step of the research began by formulating the study focus using the PICO (Population, Intervention, Comparison, Outcome) framework to answer the problem formulation "How is the utilization of natural resources in schools in developing science learning in early childhood education?".

Based on this framework, it was determined that the population in

this study would be early childhood children aged 0-8 years. The intervention studied was the utilization of school resources (natural, physical, and environmental) for science learning. There was no specific comparison because this study focused on analyzing the impact of the intervention itself. The expected outcome was the development of the quality of science learning or children's scientific abilities.

The databases used in the literature search were conducted comprehensively through reputable, accredited national journal databases in the field of early childhood education, including the Murhum Journal, Obsesi Journal, Jurnal (UNJ), Undiksha Journal, and the Golden Age Journal (UIN Sunan Kalijaga). The search strings used were arranged using Boolean operators, including "science," "early childhood," and "school resources." The use of these specific keywords aimed to capture articles that were truly relevant to the research variables.

Table 1. Criteria format

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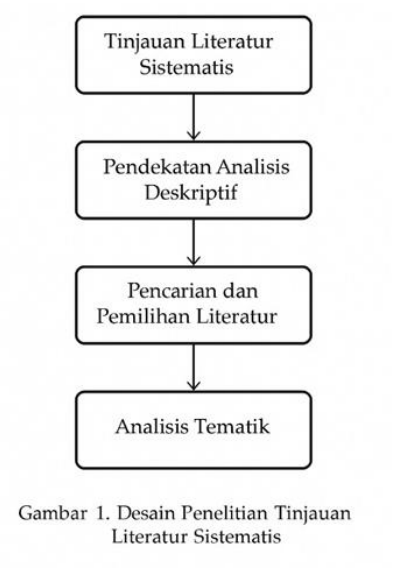
Inclusion Criteria	Exclusion Criteria
• Articles accredited by SINTA 1, 2, and 3 • Publication year range from 2019-2025 • focused on early childhood (0-8 years) • explicitly analyze the use of school resources for science learning in PAUD	• Year of publication below 2019 • focusing on higher levels of education such as teenagers (elementary school grades 4-5 and high school/vocational school) • Does not explicitly discuss the use of school resources in the context of science

The literature selection process was conducted through three systematic stages following the PRISMA flowchart. 1) Identification: In the initial search stage through the predetermined journal database, 516 articles containing relevant keywords were found. 2) Screening: The first screening stage was carried out based on publication year limitations, which reduced the number of data to 222 articles. Next, further screening was carried out based on the relevance of the title and abstract, leaving 39 articles that potentially met the requirements. 3) Eligibility: The 39 articles were then read in full (full-text) to evaluate their suitability with the inclusion and exclusion criteria. Based on the

in-depth evaluation, the final results were 9 articles that met all criteria and were included in the final analysis.

The data analysis technique used in this study was a thematic analysis approach. Data from nine selected articles were extracted and categorized into main themes related to the use of natural resources and their impact on science learning. The findings were then synthesized to answer the research questions and provide practical recommendations for early childhood education educators.



Gambar 1. Desain Penelitian Tinjauan Literatur Sistematis

Result and Discussions

Results

1. Overview of the Literature Selection Process

Based on a systematic search through various SINTA 1-3 accredited journal databases such as the Obsesi Journal, Murhum Journal,

UNDIKSHA Journal, UNJ Journal, and the Sunan Kalijaga Golden Age Journal, this study initially identified 516 articles relevant to the search keywords. After going through a screening stage based on the inclusion criteria of publication year (2019–2025) and content relevance to early childhood education, the number of articles was narrowed down to 39 documents. In the final stage of the eligibility test, nine main articles were determined as the final sample because they explicitly discussed the use of school resources for science learning. These nine articles represent a variety of research methodologies, including Classroom Action Research (CAR), descriptive qualitative, and Research and Development (R&D), providing a comprehensive overview of science learning practices in the field (Nadlifah & Latif, 2024). The demographic data of the research locations also varies, covering schools in coastal areas rich in maritime resources to urban schools that make creative use of limited land.(Setyaningsih et al., 2024).

Table 2. PRISMA Flow

Selection Stages	Number of Articles
Articles Found through Database	516
Articles Filtered by Year	222
Articles Filtered by Title and Abstract	39
Full Article Read for Eligibility Evaluation	9
Articles Included in the Final Analysis	9

2. Summary of Study Findings

The data extracted from the nine articles were then classified based on

the study's focus and key findings. Broadly speaking, the findings indicate that utilized school resources fall into three main clusters: the physical environment (yard), biotic components (plants), and abiotic components (inanimate objects). A detailed summary of the author's identity, title, and key findings of each study is presented in Table 3 below.

Table 3. Summary of Literature Studies on School Resource Utilization

No	Author (Year)	Title	Key Findings
1	(Fardiah et al., 2019)	Improving Early Childhood Cognitive Abilities through Science Learning	Science learning improves children's cognitive and logical thinking abilities.
2	(Nadlifah & Latif, 2024)	Creative Freedom and Holistic Growth: Implementation of the STEAM Approach in Islamic Early Childhood Education	The STEAM approach in Islamic schools supports the holistic growth of children.
3	(Watini, 2019)	A Contextual Approach to Improving Science	Contextual approaches significantly

No	Author (Year)	Title	Key Findings
		Learning Outcomes in Early Childhood	improve science learning outcomes.
4	(Kurnia Juita et al., 2024)	Mung Bean Sprouts Experiment to Improve Early Childhood Science Skills	Experimenting with natural materials builds a foundation of science skills from an early age.
5	(Zulfa et al., nd)	Literacy Trees as a Learning Resource to Cultivate Children's Environmental Awareness in Muara Gembong	Utilizing trees as a source of literacy fosters environmental awareness.
6	(Arini & Fajarwati, 2020)	Natural Material Media to Develop Classification Skills in Early Childhood	Natural materials around the school effectively develop classification skills.
7	(Priyanti & Warmansyah,	The Effect of Loose Parts Media on Early	Nature-based loose parts media

No	Author (Year)	Title	Key Findings
	2021)	Childhood Naturalist Intelligence	enhances children's naturalist intelligence.
8	(Priadi & Fatria, 2024)	The Development of Early Childhood Naturalist Intelligence through Environmental Education	Environmental education through gardening enhances naturalist intelligence.
9	(Setyaningsih et al., 2024)	Fostering Eco-literacy and Naturalistic Intelligence through Environmentally Based Education in Coastal Preschool Vol	Coastal environment-based education develops children's eco-literacy.

3. Description of Findings by Resource Category

Findings on the Utilization of the Surrounding Environment (Page)

Studies show that schoolyards are the most dominantly utilized macro resource. Setyaningsih et al., (2024) found that the integration of the physical environment of schools, particularly in coastal areas, allows children to learn about ecosystems directly. Meanwhile (Priadi & Fatria, 2024) found that gardening activities in schoolyards consistently increased children's physical and emotional engagement with science materials. This finding indicates that the availability of open space in schools is positively correlated with children's opportunities for scientific exploration.(Watini, 2019).

Findings on the Utilization of Living Creatures (Biotic)

In the biotic category(Kurnia Juita et al., 2024)found that the use of living objects (plants) provided a more dynamic learning response than artificial objects. The germination process observed by children provided empirical evidence of the life cycle.(Zulfa et al., nd)also found that interaction with trees at school not only has a cognitive impact but also an affective one, namely the growth of a desire to care for plants.

Findings on the Utilization of Natural Objects (Abiotic)

Research on abiotic components highlights the effectiveness of loose parts (Priyanti & Warmansyah, 2021), noted a significant increase in naturalist intelligence scores in the experimental group using stones, twigs, and sand compared to the control group. Arini & Fajarwati (2020) added that variations in texture and shape in abiotic natural objects enrich children's vocabulary and classification skills.

Discussion

Science learning in early childhood education (PAUD) is not simply the transfer of knowledge, but rather the process of constructing understanding through physical interaction, in line with Jean Piaget's theory of cognitive development. However, the effectiveness of this process is highly dependent on the availability of resources. Referring to Simon Nicholson's Loose Parts theory, the availability of loose materials in the school environment provides unlimited variables for children to experiment with. A literature review in SINTA-accredited journals (2019-2025) shows a shift from the use of manufactured teaching aids to utilizing the natural school environment as a 'third teacher' (Malaguzzi), which has been proven effective in stimulating the science process skills of children aged 0-8 years.

a. Utilization of the Surrounding Environment (Yard) for Science Learning in Early Childhood Education

The literature analysis confirms that open spaces and the physical environment of schools serve as highly accessible natural laboratories for science activities. Specifically, schools located in coastal areas have an advantage in introducing maritime ecology concepts, which have been shown to effectively improve children's environmental literacy through direct interaction with coastal ecosystems (Setyaningsih et al., 2024). On the other hand, arranging the outdoor space for gardening activities provides an opportunity for children to observe the natural cycle in real life, which has a positive impact on increasing their naturalist intelligence (Priadi & Fatria, 2024). In order for this strategy

to run optimally, strong managerial support is needed, so that these findings can be used as a policy basis for school principals in designing a school environment ecosystem that is conducive to science learning (Anggraini et al., 2022). The effectiveness of utilizing the school yard is also strengthened by the application of a contextual approach, where the teacher plays a role in connecting objects in the yard with relevant science concepts (Watini, 2019). Thus, the schoolyard transforms from a mere play area into a center for meaningful science learning resources if managed with the right pedagogy (Setyaningsih et al., 2024; Watini, 2019).

b. Utilization of Living Things (Biotic) for Science Learning in Early Childhood Education

Using biotic components, or living things, available in schools is a powerful method for introducing the principles of biology and growth. Empirical evidence shows that simple experiments using plants, such as mung beans, significantly help children understand the germination process and the basic needs of living organisms.(Kurnia Juita et al., 2024)Apart from that, the existence of trees in the school environment can be innovated into "Literacy Trees", which not only function to teach the structure of plants, but also instill the values of caring for the environment.(Zulfa et al., nd)Direct interaction with living things provides diverse sensory stimulation and supports children's holistic development through the integration of the STEAM approach (Nadlifah & Latif, 2024). Through observation of biotic components, children are

trained to develop scientific inquiry skills, such as observing, predicting, and concluding natural phenomena (Kurnia Juita et al., 2024). This is in line with efforts to enrich PAUD science, where the biotic nature-based learning model is a crucial foundation for children's understanding of science (Yaswinda et al., 2023).

c. Utilization of Natural Objects (Abiotic) for Science Learning in Early Childhood Education

In addition to biological elements, abiotic components such as rocks, soil, water, and dry twigs in schools hold great potential as science education media. The use of loose materials derived from abiotic natural objects has been shown to significantly impact children's creativity and naturalistic intelligence compared to conventional methods (Priyanti & Warmansyah, 2021)These objects are highly effective in classification activities, where children learn to group objects based on physical attributes such as texture, color, or size, a fundamental skill in the science process (Arini & Fajarwati, 2020). Furthermore, science learning that utilizes abiotic objects around the school has been shown to hone children's cognitive abilities, particularly in logical thinking and problem-solving.(Fardiah et al., 2019)Such simple experiments using natural materials, such as experiments on the growth of mung bean sprouts, allow children to carry out scientific inquiries through observing the growth process.(Kurnia Juita et al., 2024)From a practical perspective, these findings serve as a guide for PAUD teachers to innovate by utilizing available abiotic facilities without relying on

expensive manufactured teaching aids (Rusdawati & Eliza, 2022). For students, interaction with these abiotic resources provides a concrete, in-depth learning experience and fosters a love for the universe (Emmoth, 2025).

d. Science Integration in Contextual and STEAM Approaches

The successful utilization of school resources is largely determined by the appropriate pedagogical approach employed by educators. The application of a contextual approach (Contextual Teaching and Learning) has been proven effective in improving science learning outcomes because the material is directly connected to real-world situations experienced by children at school.(Watini, 2019)When science learning is linked to the context of the school environment, there is a significant increase in children's cognitive aspects, including the ability to think logically and systematically (Fardiah et al., 2019). In addition, the integration of school resources in the STEAM (Science, Technology, Engineering, Arts, Mathematics) approach provides creative freedom for children to explore holistically (Nadlifah & Latif, 2024). The synergy between the availability of school resources and appropriate learning methods is what ultimately enriches the scientific knowledge of early childhood education, especially in science learning models.(Yaswinda et al., 2023)Therefore, teachers play an important role in transforming school objects and environments into optimal means of cognitive development.(Fardiah et al., 2019).

Conclusion

This systematic literature review concludes that the utilization of school resources, both natural and man-made, plays a crucial role in optimizing science learning in early childhood education. Findings from nine articles confirm that the utilization of school resources in early childhood science learning falls into three main categories: the physical environment (yards and coastal ecosystems), biotic components (plants and trees), and abiotic components (loose natural objects). Through a contextual and STEAM approach, it has been proven effective in improving cognitive abilities, naturalistic intelligence, and fostering environmental stewardship (eco-literacy) in children. The main implication of this study is that limited, expensive facilities are not a barrier, as teachers' creativity in transforming school resources into real-life laboratories is key to providing concrete, meaningful, and sustainable science learning experiences for early childhood.

References

Agustin, M., Suryana, S. I., & Pratama, Y. A. (2022). Penguatan Pembelajaran Sains di PAUD Saat dan Pasca Belajar dari Rumah (BDR). Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 6(6), 7264–7272. https://doi.org/10.31004/obsesi.v6i6.3734

Ambarita, M. R., & Gampu, G. G. (2025). Bercerita dan Pengaturan Emosi pada Anak Usia Dini: Tinjauan Literatur Sistematis. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 9(5), 1559–1567. https://doi.org/10.31004/obsesi.v9i5.7043

Anggraini, D. D., Gupita, N., Kusuma, D. P., & Puspitasari, R. N. (2022). Optimalisasi pemanfaatan lingkungan sekolah pada kegiatan pembelajaran luar kelas dalam pendidikan anak usia dini. SELING: Jurnal Program Studi PGRA, 8(2), 199-207. https://doi.org/10.29062/seling.v8i2.1233

Ardoin, N. M., & Heimlich, J. E. (2021). Environmental learning in everyday life: foundations of meaning and a context for change. Environmental Education Research, 27(12), 1681-1699. https://doi.org/10.1080/13504622.2021.1992354

Arini, I., & Fajarwati, A. (2020). Media Bahan Alam Untuk Mengembangkan Kemampuan Klasifikasi Pada Anak Usia Dini. JIV-Jurnal Ilmiah Visi, 15(2), 117–126. https://doi.org/10.21009/jiv.1502.3

Artha, R. S., Suryana, D., & Mayar, F. (2020). E-Comic: Media for Understanding Flood Disaster Mitigation in Early Childhood Education. JPUD - Jurnal Pendidikan Usia Dini, 14(2), 341–351. https://doi.org/10.21009/jpud.142.12

Emmoth, L. (2025). Learning under Trees: Learning Envrionments that foster Creativity, Collaboration, and Curiosity. https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1973469&dswid=-2529

Rusdawati, R., & Eliza, D. (2022). Pengembangan Video Pembelajaran Literasi Sains Anak Usia Dini 5-6 Tahun untuk Belajar dari Rumah. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 6(4), 3648–3658. https://doi.org/10.31004/obsesi.v6i4.1750

Fardiah, F., Murwani, S., & Dhieni, N. (2019). Meningkatkan Kemampuan Kognitif Anak Usia Dini melalui Pembelajaran Sains. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 4(1), 133. https://doi.org/10.31004/obsesi.v4i1.254

Kurnia Juita, A., Nafsia, A., & Fatima Palu, M. (2024). Eksperimen Kecambah Kacang Hijau dalam Meningkatkan Kemampuan Sains Anak Usia Dini. Murhum : Jurnal Pendidikan Anak Usia Dini, 5(2), 624–633. https://doi.org/10.37985/murhum.v5i2.939

Nadlifah, & Latif, M. A. (2024). Creative Freedom and Holistic Growth: Implementation of the STEAM Approach in Islamic Early Childhood Education. Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini, 9(4), 689–702. https://doi.org/10.14421/jga.2024.94-09

Priyanti, N., & Warmansyah, J. (2021). The effect of loose parts media on early childhood naturalist intelligence. JPUD-Jurnal Pendidikan

Usia Dini, 15(2), 239-257. https://doi.org/10.21009/JPUD.152.03

Priadi, A., & Fatria, E. (2024). The Development of Early Childhood Naturalist Intelligence through Environmental Education . JPUD - Jurnal Pendidikan Usia Dini, 18(1), 30–52. https://doi.org/10.21009/JPUD.181.03

Setyaningsih, D., Handasah, R. R., Krobo, A., Tandilo Mamma, A., Olua, E., Iryouw, V., Pendidikan, J., & Dini, U. (2024). Fostering Eco-literacy and Naturalistic Intelligence through Environmentally Based Education in Coastal Preschool Vol. 18(1), 1693–1602. https://doi.org/10.21009/JPUD.181.18

Suryani, L., & Seto, S. B. (2020). Penerapan Media Audio Visual untuk Meningkatan Perilaku Cinta Lingkungan pada Golden Age. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 5(1), 900–908. https://doi.org/10.31004/obsesi.v5i1.601

Sobel, D. (2025). Childhood and nature: Design principles for educators. Cornell University Press.

Watini, S. (2019). Pendekatan Kontekstual dalam Meningkatkan Hasil Belajar Sains pada Anak Usia Dini. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 3(1), 82. https://doi.org/10.31004/obsesi.v3i1.111

Widayati, J. R., Safrina, R., & Supriyati, Y. (2020). Analisis Pengembangan Literasi Sains Anak Usia Dini melalui Alat Permainan Edukatif. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 5(1), 654. https://doi.org/10.31004/obsesi.v5i1.692

Yaswinda, Y., Putri, D. M. E., & Irsakinah, I. (2023). Pembelajaran Sains Berbasis Pemanfaatan Lingkungan untuk Peningkatan Kognitif Anak Usia Dini. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 7(1), 94–103. https://doi.org/10.31004/obsesi.v7i1.2842

Zulfa, V., & Nugraheni, P. L. (2023, October). Pohon Literasi Sebagai Sumber Belajar untuk Menumbuhkembangkan Kepedulian Lingkungan Anak di Muara Gembong. In Prosiding Seminar Nasional Pengabdian Kepada Masyarakat (Vol. 4, pp. SNPPM2023L-12). Retrieved http://journal.unj.ac.id/unj/index.php/snppm