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DEVELOPMENT OF MATHEMATICS LEARNING MEDIA SMART SNAKES AND LADDER STATISTICS (UTAPTIK) IN PRIMARY SCHOOL STATISTICS MATERIALS

Lutfiah Heriyanti[1*], Khavisa Pranata[2]
[1,2]Primary School Teacher Education, Universitas Muhammadiyah Prof Dr Hamka, Jawa Barat, Indonesia
*Correspondence: heriyantiluthfiah@gmail.com

ABSTRACT

Learning media is an important element in the learning process, functioning as a valuable instrument for transmitting knowledge. The learning media used in education must be appropriate to the needs and characteristics of students. In class 6 at SDN Pasirangin 05 the majority of students are actively involved in the learning process. Therefore, it is very appropriate to utilize learning media that fosters innovation, fun, and increases students' understanding of the subject matter. The objectives of this research are: (1) Designing and constructing UTAPTIK learning teaching materials. (2) What is the level of validity of the UTAPTIK media used in learning mathematical statistics concepts? (3) Knowing students' responses to UTAPTIK game media. Researchers used Research and Development methodology to conduct research. This research methodology uses the ADDIE development paradigm, namely the Analyze, Design, Development, Implement and Evaluate stages. This research uses data collection methodology such as filling out questionnaires, making observations, and documenting findings. This research resulted in the development of UTAPTIK learning media which consists of several components such as a game arena, dice, game guide book, and statistics cards. The results of this research are UTAPTIK products with product validation results showing very valid criteria determined by a score of 97% from material expert validators. In addition, the criteria were considered valid with a score of 76% from media expert validators. The validation results by material expert validators and media expert validators are classified as very valid so that the media can be tested. The student questionnaire obtained a score of 94% in the very valid category. The smart statistical snakes and ladders game media (UTAPTIK) is classified as very valid and worthy of being integrated into the learning process of class VI students.

Keywords: Mathematics Learning, Learning Media, Snakes and Ladders

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PRELIMINARY

Mathematics is one of the subjects taught in elementary schools. Mathematics is based on the basic operations of addition, subtraction, multiplication, and division (Leby et al., 2023). Mathematics serves as the fundamental foundation of science and technology, and plays an important role in enhancing human cognitive capacity (Siagian, 2016).

Mathematics education equips students with skills to improve everyday life by fostering logical thinking, critical thinking, and collaboration (Rachmantika & Wardono, 2019).

Due to the need for formulas and calculations, learning mathematics is considered a difficult task by students, causing their reluctance to explore the topic. Mathematics is a crucial subject that must be included in the curriculum to improve students' problem-solving abilities and creativity (Saputri & Wahyuni, 2024).

Astawayasa believes that mathematics education must be interesting, stimulating, interactive, interesting and provide opportunities for students to use their knowledge to develop critical thinking and reasoning skills (Rusmini et al., 2024). Defa (2022) suggests that to improve the quality of mathematics teaching, educators must carefully select appropriate media, tactics, and approaches. Likewise, the choice and utilization of educational resources depends on the needs and characteristics of the student, necessitating the need for adaptation.

It is important to prioritize teaching materials and learning media in the teaching and learning process because they are vital components that are utilized in the process (Ramadhina & Pranata, 2022). By utilizing appropriate educational resources, students can participate in the learning process more actively and prevent feelings of monotony (Rohima, 2023). Furthermore, this educational facility can improve the quality of students' academic achievements, thereby creating satisfaction for them.

Firmadani (2020) states that the term "media" comes from Latin and is the plural form of the word "medium" which directly means "intermediary or introduction" based on study materials in Latin. As a consequence, educators only use media as a means to perfect learning. Therefore, media can help educators in the process of acquiring knowledge. Junaidi (2019) emphasized that the integration of educational media in the classroom can stimulate students' learning motivation, spark their curiosity, foster the development of new interests, and even have a psychological impact on them. Game media is a learning tool that prioritizes fun mathematics education.

According to Haris & Nurjannah (2022), game media provides interesting and effective techniques for students to improve their understanding of mathematical ideas, methodologies and concepts. Snakes and Ladders Media offers assignments specifically designed to capture students' interest, allowing them to channel their energy into learning.

According to Utami et al., (2024), Incorporating fun educational activities can improve students' understanding of mathematical concepts, principles, and methods,

resulting in a more lasting impact. The media game “Snakes and Ladders” offers a platform for self-expression and encourages creative thinking.

Because of children's love of games, the inclusion of the educational game Snakes and Ladders can be a catalyst for students' active involvement in the mathematics learning process. Engaging in a game of snakes and ladders is an interesting and enjoyable pastime that can increase children's social contacts with their classmates (Setiawati & Suyadi, 2021). Tumaloto & Baan (2023), found that incorporating the snakes and ladders game as an effective teaching tool can attract students' interest, prevent boredom and foster a greater level of enthusiasm during the learning process.

Several previous studies have examined the creation of the snakes and ladders game, including the work of Destyaningrum & Arini (2023), their study focused on developing a marine-themed version of the game in mathematics learning for fourth grade elementary school students, especially in the area of measuring time and length. The research results show that marine media received a score of 91.60%, while material experts and education experts each gave a score of 92.50% and 92%. Small-scale research provides results of 93%, while large-scale research provides results of 95.68%.

The research findings on the development of snakes and ladders game media in class IV school assignment materials show the validity and practice of using media-based evaluation in various learning materials (Durrotunnisa & Nur, 2020). Lestari (2021) is developing game media which aims to improve social studies learning outcomes for elementary school students. The increase in learning outcomes ranged from 1.7% to 61.24% with an average increase of 30.21%.

This research differs from previous studies in terms of its specialization. Specifically, creating media related to snakes and ladders using flash cards. Apart from that, it also examines the integration of snakes and ladders into MTK statistics material for class VI elementary school, which is called UTAPTIK.

Based on the background material above, it is clear that there are problems in current mathematics teaching methods in schools, especially in the field of statistics. For example, students consider learning mathematics to be difficult because it requires formulas and calculations, which causes their reluctance to study mathematics subjects. Therefore, to improve student understanding, it is very important for students to receive teaching through innovative contextual media during the learning process. Based on these findings, researchers want to develop contextual media for smart statistical snakes and ladders that

meets the validity criteria to be integrated into the mathematics curriculum for class VI, namely at SDN Pasirangin 05.

METHODS

The research methodology used in developing UTAPTIK media in this research is Research and Development. Sukmadinata (Fadillah & Ninawati, 2020) states that research and development is producing new products and improving the quality of existing products. The research model used in this research to create UTAPTIK game media is the ADDIE (Analyze, Design, Development, Implementation, Evaluation) model for conducting research and development. To improve fundamental learning outcomes, the incorporation of learning product design is used in the ADDIE approach (Hidayat & Nizar, 2021).

Ramadhina & Pranata (2022), describes the steps in ADDIE research as follows: 1) Analyze, namely the field problem is analyzed at this stage and the necessary improvements are determined based on the needs of the research technique. 2) Design, at this stage the process includes selecting learning activities, selecting research media, and creating UTAPTIK learning media designs. Design activities are the next phase of the analytical step. In this phase, the process of selecting learning activities and learning media, as well as developing learning media designs, takes place. 3) Development, at this stage, the results of the product design process are converted into physical goods, which are then evaluated by experts in the field of materials and media to ensure their validity. 4) Implementation, at this stage, applies the media that has been created to the learning process. 5) Evaluation, at this stage a comprehensive evaluation is carried out to find and implement improvements to the goods that have been developed and operated. Apart from developing a product, this research also aims to determine the level of validity of the UTAPTIK media in learning statistics and to determine students' responses to this UTAPTIK media.

The type of research instrument used in this research is a questionnaire instrument using a Likert scale assessment. Researchers collected data through conducting surveys and then analyzing the descriptive data obtained. Data collection in this research was carried out by collecting responses from media experts, namely media expert lecturers at the PGSD study program, material experts, namely material expert lecturers at the PGSD study program, students and class VI teachers at SDN Pasirangin 05.

This research, which was conducted at SDN Pasirangin 05, was attended by small and large groups. A small group of 8 class VI students became the sample at the development stage, while a large group of 24 class VI students became the sample at the implementation stage. Researchers conducted research to determine the methodology for making UTAPTIK learning products, as well as to assess the validity of the media developed.

In this research, analysts examine data findings to measure media validation. Using descriptive percentage methodology using the following formula:

$$P = \frac{f}{n} \times 100\ \%$$

Definition:

P= percentage

f = frequency

n = number of students

Table 1. Validator Validity Instrument Weight Score Category

Score	Category
1	Very Invalid
2	Invalid
3	Quite Valid
4	Valid
5	Very Valid

Table 2. Validity Weight Score Percentage Category

Percentage (%)	Category
0 – 19 %	Very Invalid
20 – 39 %	Invalid
40 – 59 %	Quite Valid
60 – 79 %	Valid
80 – 100 %	Very Valid

Learning media can be said to be valid when the media expert validation results and material expert validation results reach a minimum valid percentage score.

Table 3. Student Response Weight Score Category

Score	Category
1	Strongly Disagree
2	Don't agree
3	Simply Agree
4	Agree
5	Strongly Agree

Table 4. Student Response Weight Score Percentage Category

Percentage (%)	Category
0 – 19 %	Very Invalid
20 – 39 %	Invalid
40 – 59 %	Quite Valid
60 – 79 %	Valid
80 – 100 %	Very Valid

RESULT AND DISCUSSION

The initial stage of the development process is conducting analysis. Snakes and Ladders Media was created after analyzing the needs of students and educators, as well as evaluating children's conditions through observation activities carried out at school. Research findings show that students at SDN Pasirangin 05 still face challenges in understanding mathematics, especially in the field of statistics. In addition, schools lack appropriate educational resources for teaching statistics. Based on the explanation above, researchers proactively took on the task of creating snakes and ladders media that was linked to statistical content.

The second development stage involves designing. Researchers modified this UTAPTIK media by including unique characteristics that are not found in other snakes and ladders media. Adobe Illustrator was used to create a visually appealing snakes and ladders board design, with the aim of capturing students' interest.

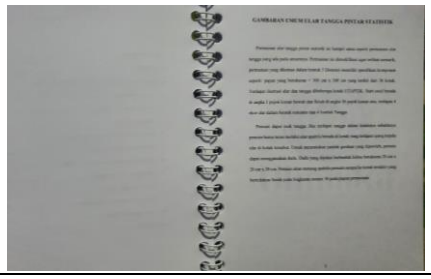
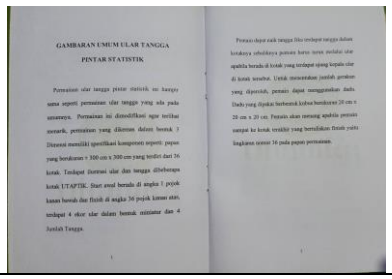
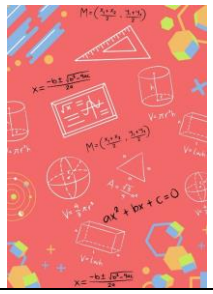
This UTAPTIK media is filled with 40 question cards containing arithmetic questions specifically related to class VI statistics subjects. To guarantee the durability and tear resistance of UTAPTIK media, the manufacturing process uses Korean 440 gsm flexi banner material. The UTATIK media playground has dimensions of 300 cm × 300 cm and is designed to be foldable for easy storage of media components. The difference between the snakes and ladders game and UTPTIK.

Table 5. Difference between Snakes and Ladders and UTAPTIK

Component	Snakes and ladders game	UTAPTIK Games
Board	The board contains 100 squares	The board contains 36 squares
Dice	Size 3 cm x 3 cm x 3 cm	Size 15 cm x 15 cm x 15 cm
Pawn	Made from plastic	The student body itself
Game guide	Packaged in book form	Packaged in the form of a guidebook measuring A6 10.5 cm x 14.8 cm
Modification	There are no question cards	There are 40 statistics question cards

Figure 1. UTAPTIK Media

Table 6. Game guide before and after revision

1. The size of the writing in the guidebook is not large enough	
Before Revision	After Revision
	
2. The size of the writing on the question card is not large enough	
Before Revision	After Revision
	
3. The front color of the statistics card is differentiated from the color of the back of the card	
Before Revision	After Revision
	
4. The sides of the dice must be flat so that when you throw the dice correctly	
Before Revision	After Revision
	

The media created in this research is the Snake and Ladders Smart Statistics version (UTAPTIK), a statistical tool presented in board form and printed on banner material measuring 3 meters x 3 meters. The choice of this material is intended to make it easier to store Ular Media media. Intelligent Statistical Rating System (UTAPTIK). Smart Statistics Snakes and Ladders (UTAPTIK) combines various types of statistical questions which are presented in the form of flash cards. This feature enhances meaningful learning for students, especially in the area of mathematics. Chapter on statistics.

This third stage includes verification of the development process through assessment of material expert validators and learning media expert validators. The aim is to determine the level of validity of the media. The validator of the research material was assessed by PGSD lecturers and obtained a score of 97% which shows a high level of validity. The media validator, which was also carried out by PGSD lecturers, achieved a score of 76% on valid criteria. Based on the description provided, UTATIK media has been considered valid and has undergone testing with adjustments in research classes. Based on studies conducted by scholars, it was found that UTAPTIK is very reliable for use in the educational process, this is proven by validation results from both subject matter experts and media experts.

Table 7. Media Expert Validation

Aspect	Score (%)	Category
Visual	74	Valid
Technical	80	Very valid
User manual	80	Very valid
Typography	70	Valid
Attractiveness	80	Very valid

Table 7 presents the results of media expert validation consisting of five aspects. The visual aspect gets a percentage of 74%, the technical aspect gets a percentage of 80%, the user guide aspect gets a percentage of 80%, the typography aspect gets a percentage of 70%, and the tensile strength aspect gets a percentage of 80%. Therefore, the media expert's assessment of UTAPTIK media is included in the "valid" category for its suitability in the teaching and learning process.

Table 8. Material Expert Validation

Aspect	Score (%)	Category
Suitability of Media to Material	100	Very valid
Material Contents	92	Very valid
Update of Material	100	Very valid

Validation findings from material expert validators are shown in table 8. There are three aspects assessed: media suitability, content quality, and material up-to-dateness. Got a score of 100% for media suitability, 92% for material content, and 100% for material up-to-dateness. Therefore, it can be concluded that the statistical data presented on UTAPTIK media has been verified by expert validators with the category "very valid" for use in the teaching and learning process.

Implementation is the fourth stage of development, where testing is carried out. The experiment consisted of two distinct stages: a small group trial stage and a large group trial stage. The phase I small group trial of using UTAPTIK media involved 8 class VI students at SDN Pasirangin 05. Through careful observation, it was seen that the students really enjoyed using UTAPTIK media and showed extraordinary proficiency in solving all the questions. Researchers distributed response questionnaires to students after using UTAPTIK media to assess the efficacy of UTAPTIK media in the teaching and learning process. The questionnaire yielded an average response rate of 95%.

Table 9. Small Group Student Responses

Aspect	Score (%)	Category
Media	94	Strongly agree
Material	97	Strongly agree

The final results of the questionnaire answers are shown in table 9. The questionnaire responses from students in small groups consisted of two aspects, namely the media component received an assessment of 94%, and the content aspect received an assessment of 97%.

Researchers distributed response questionnaires to students after using UTAPTIK media to assess the effectiveness of UTAPTIK media in the teaching and learning process. The response rate averaged 94% of the questionnaires administered during the phase II study. The results of this extensive group test show that the majority of students' responses to UTAPTIK show high efficacy in facilitating mathematics learning, especially in the domain of statistics.

Table 10. Large Group Student Responses

Aspect	Score (%)	Category
Media	93	Strongly agree
Material	95	Strongly agree

The final results of the questionnaire answers are shown in table 10. The student response questionnaire in large groups consists of two aspects, namely the media component which received an assessment of 93% and the content aspect received an assessment of 95%.

The fifth development stage is carrying out an evaluation, namely providing recommendations and input from UTAPTIK media. The media validator provided several suggestions and input, namely as follows: a) the size of the letters on the question cards and guidebook is inadequate, b) if UTAPTIK is played in a group then the size of one box on the utaptik is enlarged, ideally if the group consists of 4 people, the size of the box minimum 72cm to ensure accurate number results when thrown. The material validator provides recommendations and input, which include: a) modifying UTAPTIK so that it can be used both inside and outside the classroom, b) inserting different variations of questions into flash cards, c) increasing the font size in the guidebook and question cards. UTAPTIK media is very credible and has gone through rigorous testing and adjustment in research classes.

Based on the findings of this research conducted by researchers, it shows that media experts and material experts provide very valid assessments of UTAPTIK media. These findings show that this media is valid and can be used in statistics learning to help teachers in conveying statistics material. The results of this research are in line with previous research, namely research conducted by Destyaningrum & Arini (2023), where the research focused on developing a marine-themed version of the game in mathematics learning for fourth grade elementary school students, especially in the field of measuring time and length. This research found that the media developed was valid for use in mathematics learning.

CONCLUSION

Based on research conducted by researchers, the results of this research are UTAPTIK learning media with a media expert validation level of 76% in the "valid" category. Likewise, material validation carried out by material experts resulted in a validation rate of 97% in the "very valid" category. The research was conducted on small and large groups at SDN Pasirangin 05. Of the 8 students surveyed, 95% of them gave responses in the very valid category. Among the 24 students surveyed, 94% of them gave responses in the very valid category. After assessing the opinions of material experts and media experts, as well as conducting research on small and large groups, the results were obtained that the smart statistics snakes and ladders media is very valid to use as a learning tool for mathematical statistics material.

REFERENCES

Defa. (2022). Pengembangan Media Ular Tangga Bilangan Bulat Pada Pelajaran Matematika di Sekolah Dasar Defa. *All Rights Reserved P-ISSN*, *6*(2), 2580–2586. https://doi.org/10.26811/didaktika.v6i2.419

Destyaningrum, M, & Arini, N. W. (2023). Pengembangan Media LAUT (Lompat Aksi Ular Tangga) Pada Pembelajaran Matematika Materi Pengukuran Waktu, Dan Panjang Kelas 4 Di Sekolah Dasar. *Jurnal Elementaria Edukasia*, *6*(3), 1187–1200. https://doi.org/10.31949/jee.v6i3.6268

Durrotunnisa, & Nur, H. R. (2020). Jurnal basicedu. Jurnal Basicedu,. *Jurnal Basicedu*, *5*(5), 3(2), 524–532. https://journal.uii.ac.id/ajie/article/view/971

Ella H. Tumaloto, & Bulu Baan, A. (2023). Edukasi Permainan Ular Tangga Terhadap Tingkat Kebugaran Siswa. *Jurnal Inovasi Pengabdian Masyarakat Pendidikan*, *4*(1), 11–25. https://doi.org/10.33369/jurnalinovasi.v4i1.28609

Fadillah, muhammad rijal, & Ninawati, M. (2020). Pengembangan Media Pop Up Book Berbasis Kontekstual Pada Materi Perkembangbiakan Hewan Kelas Vi Sdn Anyelir 1 Depok the Development of Pop Up Book Media Based on Contextual for Animal Breeding Subject of. *Jurnal Penelitian Pendidikaan*, *7*(November), 1–10. https://doi.org/10.25134/pedagogi.v7i2.3532.Diajukan

Firmadani, F. (2020). Media Pembelajaran Berbasis Teknologi Sebagai Inovasi Pembelajaran Era Revolusi Industri 4.0. *Prosiding Konferensi Pendidikan Nasional*, *2*(1), 93–97. http://ejurnal.mercubuana-yogya.ac.id/index.php/Prosiding_KoPeN/article/view/1084/660

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation and Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Haris, I., & Nurjannah. (2022). Penggunaan Permainan Ular Tangga Sebagai Media Pembelajaran Matematika. *Jurnal Masyarakat Madani Indonesia*, *1*(2), 33–37. https://doi.org/10.59025/js.v1i2.7

Junaidi, J. (2019). Peran Media Pembelajaran Dalam Proses Belajar Mengajar. *Diklat Review : Jurnal Manajemen Pendidikan Dan Pelatihan*, *3*(1), 45–56. https://doi.org/10.35446/diklatreview.v3i1.349

Leby, L. N. B., Margo Irianto, D., & Yuniarti, Y. (2023). Analisis Kesulitan Belajar Operasi Hitung Pembagian Matematika Pada Siswa Kelas 3. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan Dan Hasil Penelitian*, *9*(1), 37–42. https://doi.org/10.26740/jrpd.v9n1.p37-42

Lestari, I. C. (2021). 79 | P a g e. *Penerapan Media Permainan Ular Tangga Terhadap Peningkatan Hasil Belajar Mata Pelajaran IPS Di Sekolah Dasar*, *2*(1), 79–87.

Rachmantika, A. R., & Wardono. (2019). Peran Kemampuan Berpikir Kritis Siswa Pada Pembelajaran Matematika Dengan Pemecahan Masalah. *Prosiding Seminar Nasional Matematika*, *2*(1), 441.

Ramadhina, S. R., & Pranata, K. (2022). Pengembangan E-Modul Berbasis Aplikasi Flipbook di Sekolah Dasar. *Jurnal Basicedu*, *6*(4), 7265–7274. https://doi.org/10.31004/basicedu.v6i4.3470

Rohima, N. (2023). Penggunaan Media Pembelajaran Untuk Meningkatkan Keterampilan Belajar Pada Siswa. *Publikasi Pembelajaran*, *1*(1), 1–12.

Rusmini, M. A., Ariawan, I. P. W., & Tatminingsih, S. (2024). The Effect of Parental Role, Learning Discipline, and Achievement Motivation on Learning Outcomes of Elementary Mathematics. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *9*(1), 63–74. https://doi.org/10.31943/mathline.v9i1.429

Saputri, W. A., & Wahyuni, S. (2024). *Development Study: Ethnomathematics-Based*. *9*(May), 381–402.

Siagian, M. D. (2016). Kemampuan koneksi matematik dalam pembelajaran matematika. *MES: Journal of Matematics Education and Science2*, *2*(1), 58–67.

Setiawati, F. A., & Suyadi. (2021). Penerapan Strategi Pembelajaran Melalui Permainan Ular Tangga Tantangan Dalam Meningkatkan Perkembangan Kognitif Pada Anak Usia Dini. *Jurnal Buah Hati*, *8*(1), 49–61. https://doi.org/10.46244/buahhati.v8i1.1274

Utami, N. A., Nababan, E. B., & Eko Susilo, B. (2024). Media Pembelajaran Matematika Dalam Permainan Sudoku: Systematic Literature Review. *PRISMA, Prosiding Seminar Nasional Matematika*, *7*, 489–495. https://proceeding.unnes.ac.id/prisma