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AFAS Game Development To Improve Basic Locomotive Movements

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ABSTRACT

This research and development (R&D) aimed to produce a valid, practical, and effective AFAS Game model for improving students' basic locomotor skills at SD Inpres Ako. The AFAS Game was developed as a game-based Physical Education (PJOK) learning medium tailored to the developmental characteristics of elementary school students. The resulting product is an AFAS Game Guidebook containing four types of games: Zona Lapangan, Lasulome, Laber, and Lagape, designed to stimulate walking, running, and jumping skills in a structured and enjoyable manner. The development procedure refers to the Borg & Gall model, which consists of ten steps. However, in this study, it was simplified to seven stages: needs analysis, product design, design validation, small-scale trials, product revision, large-scale trials, and final product development. The simplification of the stages was carried out considering time, cost, and field conditions. The research subjects were fifth-grade students at SD Inpres Ako, with the validation process involving material experts, media experts, and PJOK teachers as practitioners. The results showed that the AFAS Game has a high level of feasibility and validity. Validation from material experts obtained a percentage of 92.30% (very good category), validation from practitioners/teachers was 88.46% (good category), validation from media experts was 86.53% (good category), and small group trials reached 85.38% (good category). These findings indicate that the AFAS Game is feasible and valid for use as an alternative learning medium. Thus, the AFAS Game can be used to support the PJOK learning process and improve basic locomotor movements of elementary school students effectively and contextually.

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C. Analysis and interpretation of data;
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INTRODUCTION

Physical Education, Sports, and Health (PJOK) at the elementary school level plays a strategic role in supporting children's holistic physical, motor, cognitive, and psychomotor development. One of the primary goals of PJOK is to develop fundamental movement skills as a foundation for more complex physical activities and sports in the future (Gallahue, Ozmun, & Goodway, 2019; Logan et al., 2018). Fundamental movement, particularly locomotor movements such as walking, running, jumping, and hopping, is a fundamental skill that significantly determines the quality of children's participation in daily physical activities and advanced sports learning (Robinson et al., 2015; Barnett et al., 2016).

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However, various studies indicate that elementary school students' mastery of basic locomotor movements is still at a suboptimal level, particularly in school environments with limited facilities, varied methods, and innovations in PJOK learning (Brian et al., 2019; Hulteen et al., 2020). This condition is also reflected in the local context at SD Inpres Ako, where initial observations indicate that some fifth-grade students experience difficulties in efficient running techniques, coordinating jumps, and controlling movement transitions. These problems not only impact the quality of motor skills but also have the potential to reduce students' interest, motivation, and confidence in participating in physical education (PJOK) lessons (Lubans et al., 2016; Fairclough et al., 2022).

Factors contributing to low locomotor mastery in elementary schools are generally related to conventional learning approaches, centered on teacher instruction, monotonous repetitive exercises, and the minimal use of contextual and enjoyable educational media and games (Casey & Goodyear, 2015; Angga & Sari, 2025). Therefore, learning innovations are needed that can transform PJOK activities into active, meaningful learning experiences that align with the developmental characteristics of elementary school-aged children.

Game-based learning approaches in Physical Education (PJOK) have been widely recommended as an effective strategy for increasing student engagement, movement quality, and learning motivation (Kirk, 2013; Harvey & Jarrett, 2014). Games allow students to move naturally, exploratively, and contextually, making fundamental movement learning less mechanical and more meaningful and enjoyable (Misrawati, 2018; Rozana & Bantali, 2020).

Empirical research shows that educational games can significantly improve elementary school students' coordination, balance, agility, and locomotor skills compared to conventional training methods (Morgan et al., 2018; Wick et al., 2017). In addition to physical aspects, games also contribute to the development of social skills, teamwork, emotional regulation, and self-confidence (Bailey et al., 2019; Beni et al., 2017). Wati and Rezki (2025) emphasized that mastering locomotor movements through a fun approach is a crucial prerequisite for long-term success in sports learning.

In recent years, research and development (R&D) in Physical Education and Health has begun to focus on designing structured educational games, based on student needs, and aligned with curriculum objectives (Setiawan et al., 2021; Hastie, Casey, & Tarter, 2020). However, most of the games developed are still general in nature and have not been specifically designed to improve locomotor movement quality through progressive and contextual stages tailored to the characteristics of elementary school students.

Although the literature indicates that game-based approaches are effective in physical education (PJOK) learning, several research gaps remain. First, most studies focus on the general effectiveness of games, without developing specific game models that explicitly target measurable improvements in basic locomotor skills (Logan et al., 2021; Brian et al., 2020). Second, there is limited research on developing educational games based on elementary school contexts in areas with limited resources, such as SD Inpres Ako, that considers the real-world conditions of teachers and students.

Third, previous research tends to assess learning outcomes descriptively, without systematically integrating aspects of game design, product validity, and its impact on

motor skills. Therefore, development research is needed that not only produces educational game products but also tests their feasibility, practicality, and effectiveness in improving basic locomotor skills in elementary school students.

Based on the aforementioned research problems and gaps, this study aims to develop the AFAS game as a valid, practical, and effective physical education (PJOK) learning medium for improving the basic locomotor skills of fifth-grade students at SD Inpres Ako. Specifically, this study aims to: (1) design an AFAS game that is appropriate to the developmental characteristics of elementary school students, (2) test the game's feasibility through expert validation and limited trials, and (3) analyze the effectiveness of the AFAS game on improving students' basic locomotor skills.

The novelty of this research lies in the development of an AFAS game that is structured, contextual, and directly oriented toward locomotor movement quality, rather than simply a play activity. Furthermore, this study integrates a needs-based development approach with empirical evaluation of motor skills, thus expected to provide theoretical and practical contributions to the development of innovative PJOK learning in elementary schools, particularly in school contexts with limited resources.

METHODS

This research employed a Research and Development (R&D) approach, aiming to produce a product in the form of an AFAS game as a learning medium for Physical Education (PJOK) to improve students' basic locomotor skills at SD Inpres Ako. The R&D approach was chosen because it enabled researchers not only to design learning products but also to empirically test their feasibility, practicality, and effectiveness in real-life learning contexts (Gall, Gall, & Borg, 2014; Creswell & Plano Clark, 2018). Research and development is understood as a systematic process for developing, validating, and refining educational products to ensure they are scientifically sound and applicable (Mesra, 2023; Plomp & Nieveen, 2013).

The primary reference for the development model is the Borg and Gall model, which is cyclical and iterative, and classically consists of ten development steps (Emzir, 2013). However, in line with the principle of flexibility in R&D research, not all stages must be implemented rigidly; instead, they can be adapted to the research needs, time constraints, costs, and field conditions (Slamet, 2022; Branch, 2018). Therefore, this research was conducted through seven main stages: (1) initial data collection and needs analysis, (2) AFAS game product design, (3) design validation by experts, (4) small-scale trials, (5) revisions based on the results of the small-scale trials, (6) large-scale trials, and (7) final product development.

The needs analysis stage was conducted through observations of physical education (PJOK) lessons, interviews with teachers, and a curriculum review to identify problems with students' basic locomotor movements and learning characteristics at SD Inpres Ako. The product design stage focused on designing an AFAS game that emphasized elements of fun, safety, movement progression, and suitability to the developmental characteristics of elementary school students, as recommended in the literature on play-based learning and children's motor development (Gallahue et al., 2019; Hastie et al., 2020).

Design validation was conducted by three validators: one Physical Education (PJOK) subject matter expert, one instructional media expert, and one Physical Education (PJOK) teacher as a practitioner. Validation aimed to assess the product's content, construction, appearance, and usability, as recommended in educational development research (Nieveen, 2013; Sugiyono, 2019). Subsequently, a small-scale trial was conducted with 20 fifth-grade students to obtain initial feedback on the clarity of the game rules, difficulty level, and student responses. The results of this trial were used as the basis for product revisions before proceeding to a large-scale trial involving 34 fifth-grade students.

Research data was collected through expert validation sheets, basic locomotor skill observation sheets, and learning documentation. Data analysis was conducted using descriptive quantitative and qualitative methods to assess the product's feasibility and changes in students' locomotor skills after implementing the AFAS game, as recommended in evidence-based PJOK learning development studies (Morgan et al., 2018; Logan et al., 2021).

Through this stage, the research is expected to produce a valid, practical, and effective AFAS game as a PJOK learning innovation to improve basic locomotor movements of elementary school students.

RESULTS AND DISCUSSION

Result

The results of the development research indicate that the AFAS Game developed has a high level of feasibility and validity, based on validation by experts and practitioners, as well as trials with students as the target users. A summary of the validation and trial results is presented in Table 1.

Table 1.
AFAS Game Validation and Trial Results

No	Evaluation Stage	Assessor Subjects	Eligibility Percentage (%)	Category	Decision
1	Material Expert Validation	PJOK Expert (Basic Locomotor Movement)	92,30	Very Good	Used
2	Media Expert Validation	Learning Media Expert	86,53	Good	Used
3	Practitioner Validation	Elementary School PJOK Teacher	88,46	Good	Used
4	Small Group Trial	20 fifth-grade students	85,38	Good	Used
5	Large Group Trial	34 fifth-grade students	76,27	Good	Used

Empirically, validation by material experts yielded the highest feasibility percentage (92.30%) with a Very Good rating. These findings indicate that the AFAS game content meets the pedagogical principles of Physical Education (PJOK), is appropriate for learning objectives, and is relevant to the elementary school curriculum, particularly in the development of basic locomotor movements.

The media expert validation results showed a feasibility percentage of 86.53%, with a Good rating. This assessment confirmed that the AFAS game has an attractive visual design, is easy to use, and supports active student engagement in PJOK learning. The appearance, clarity of game rules, and activity safety were deemed appropriate for the characteristics of elementary school students.

Furthermore, validation by Physical Education practitioners/teachers yielded a feasibility percentage of 88.46%, with a Good rating. Teachers assessed that the AFAS game is easy to implement in the school environment, is relevant to field conditions, and has the potential to effectively improve the quality of the learning process and student motor skills.

During the small group trial phase, student responses showed a feasibility percentage of 85.38%, with a Good rating. These results indicate that the AFAS game is well-received by students, increases learning interest, and encourages active engagement in locomotor activities.

Meanwhile, in the large group trial, the feasibility percentage reached 76.27%, categorized as Good. Although this percentage decreased compared to the small group, these results still demonstrate that the AFAS game is suitable for widespread use and adapts to the heterogeneity of student abilities within a class.

Overall, the study results confirm that the AFAS game is feasible, valid, and can be used as a physical education (PJOK) learning medium to improve basic locomotor skills in students at SD Inpres Ako.

Discussion

The results of the development research indicate that the AFAS Game has a high level of feasibility and validity based on assessments by subject matter experts, media experts, practitioners, and student responses in small and large group trials. These findings confirm that the AFAS Game is conceptually and empirically feasible for use as a Physical Education (PJOK) learning medium to improve elementary school students' basic locomotor skills. High validity in terms of content indicates that the game's structure, learning objectives, and movement activity content align with the principles of child motor development and the demands of the PJOK curriculum (Gallahue, Ozmun, & Goodway, 2019; Logan et al., 2018).

Theoretically, basic locomotor movements are the primary foundation for the development of more complex sports skills and physical activities at later stages of development. Immaturity of locomotor skills at elementary school age has the potential to hinder children's active participation in PJOK learning and long-term physical activity (Barnett et al., 2016; Robinson et al., 2015). Therefore, the existence of learning media specifically designed to stimulate locomotor movements is a crucial need in modern PJOK learning.

The game-based learning approach used in the development of the AFAS Game aligns with the developmental characteristics of elementary school students, who tend to enjoy playful, exploratory, and healthy competitive activities. Hapiz and Kusumawardani (2025) emphasized that educational games can create a fun learning environment while indirectly developing motor skills. The findings of this study support this view, as student responses in the pilot test demonstrated a positive level of acceptance of the AFAS Game, both in small and large groups. This indicates that the AFAS Game can increase student motivation, engagement, and active participation in Physical Education (PJOK) learning, as also reported in previous research (Bailey et al., 2019; Beni et al., 2017).

From an empirical perspective, the pilot test results indicate that the AFAS Game is not only feasible in design but also applicable in real-life learning contexts. Validation by

media experts and practitioners indicates that the game is easy to implement, safe, and suitable for elementary school field conditions with limited resources. These findings are consistent with research by Morgan et al. (2018) and Wick et al. (2017) stated that simple, structured and contextual movement games are more effective in improving motor skills than monotonous technical exercises.

The difference in feasibility percentages between small and large group trials indicates variations in student responses influenced by heterogeneity in motor skills, level of understanding of the game rules, and classroom dynamics. However, the feasibility category, which remained at the "good" level, indicates that the AFAS game is adaptive and can be used on a broader classroom scale. This aligns with the findings of Brian et al. (2020) and Hulteen et al. (2020), which emphasize that the effectiveness of game-based learning is strongly influenced by student characteristics and the implementation context.

In terms of scientific contribution, this study reinforces the existing literature on physical education and health (PJOK), which emphasizes the importance of developing specific and targeted game-based learning media, rather than simply general play activities. The AFAS game is systematically designed to stimulate key aspects of basic locomotor movements, thereby increasing not only the enjoyment of learning but also the quality of students' movements in a gradual and measurable manner. This approach aligns with current research recommendations that encourage the integration of instructional design, child developmental needs, and empirical evaluation of motor skills (Hastie, Casey, & Tarter, 2020; Fairclough et al., 2022).

Overall, this discussion confirms that the AFAS Game is a relevant, contextual, and evidence-based innovation in PJOK learning, and has the potential to be an alternative solution to improve basic locomotor movements of elementary school students, especially in schools with limited resources such as SD Inpres Ako.

CONCLUSION

Based on the results of the research and development conducted, it can be concluded that this study successfully produced a final product in the form of the AFAS Game, a learning medium for Physical Education (PJOK), systematically designed to improve students' basic locomotor skills at SD Inpres Ako. Conceptually, the development of the AFAS Game was based on the developmental characteristics of elementary school students, who tend to enjoy playful activities. Therefore, a game-based approach is a relevant, contextual, and pedagogical learning strategy for stimulating basic motor skills.

Empirically, the validation and trial results indicate that the AFAS Game has a high level of feasibility and validity. Validation by material experts achieved a 92.30% rating, categorized as very good, indicating the game's substance aligns with the learning objectives and principles of locomotor development. Assessments by learning practitioners/teachers reached 88.46% and by media experts 86.53%, both categorized as good, confirming that the AFAS Game is easy to implement, engaging, and appropriate for elementary school learning environments. Furthermore, student responses in both

small group trials (85.38%) and large group trials (76.27%) were also in the good category, indicating positive product acceptance and usability in the field.

Thus, it can be concluded that the AFAS Game is feasible and valid for use as an alternative learning medium in Physical Education (PJOK) to improve basic locomotor movements in elementary school students, and has the potential to support more active, enjoyable, and meaningful learning.

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Finally, the author hopes that the results of this study can provide a real contribution to the development of innovative, evidence-based PJOK learning that is oriented towards improving the quality of basic movements of elementary school students.

REFERENCES

Bailey, R., Hillman, C., Arent, S., & Petitpas, A. (2019). Physical activity: An underestimated investment in human capital? Journal of Physical Activity and Health, 16(1), 1–9. https://doi.org/10.1123/jpah.2018-0403

Barnett, L. M., Stodden, D., Cohen, K., Smith, J. J., Lubans, D. R., & Lenoir, M. (2016). Fundamental movement skills: An important focus. Sports Medicine, 46(5), 673–682. https://doi.org/10.1007/s40279-015-0450-4

Beni, S., Fletcher, T., & Ní Chróinín, D. (2017). Meaningful experiences in physical education. Physical Education and Sport Pedagogy, 22(3), 305–320. https://doi.org/10.1080/17408989.2015.1112779

Brian, A., Pennell, A., Taunton, S., Starrett, A., Howard-Shaughnessy, C., & Goodway, J. D. (2019). Motor competence levels. Journal of Teaching in Physical Education, 38(2), 163–173. https://doi.org/10.1123/jtpe.2018-0167

Brian, A., Goodway, J. D., Logan, S. W., & Sutherland, S. (2020). SKIPing toward motor competence. Journal of Physical Education, Recreation & Dance, 91(1), 38–45. https://doi.org/10.1080/07303084.2019.1683239

Casey, A., & Goodyear, V. A. (2015). Can cooperative learning achieve learning outcomes? Quest, 67(1), 56–72. https://doi.org/10.1080/00336297.2014.984733

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications. https://us.sagepub.com

Fairclough, S. J., Hackett, A. F., Davies, I. G., Gobbi, R., Mackintosh, K. A., Warburton, G. L., & Boddy, L. M. (2022). Promoting physical activity in primary schools. Sports Medicine, 52, 219–235. https://doi.org/10.1007/s40279-021-01500-3

Gallahue, D. L., Ozmun, J. C., & Goodway, J. D. (2019). Understanding motor development (8th ed.). McGraw-Hill Education. https://www.mheducation.com

Gall, M. D., Gall, J. P., & Borg, W. R. (2014). Educational research: An introduction (9th ed.). Pearson Education. https://www.pearson.com

Harvey, S., & Jarrett, K. (2014). A review of the game-centred approaches. Physical Education and Sport Pedagogy, 19(3), 278–300. https://doi.org/10.1080/17408989.2012.754005

Hastie, P. A., Casey, A., & Tarter, A. M. (2020). Game-based approaches in physical education. Journal of Teaching in Physical Education, 39(1), 1–7. https://doi.org/10.1123/jtpe.2019-0125

Hulteen, R. M., Morgan, P. J., Barnett, L. M., Stodden, D. F., & Lubans, D. R. (2020). Development of fundamental movement skills. Sports Medicine, 50(12), 2093–2106. https://doi.org/10.1007/s40279-020-01309-5

Kirk, D. (2013). Educational value and models-based practice. Educational Philosophy and Theory, 45(9), 973–986. https://doi.org/10.1080/00131857.2013.785352

Logan, S. W., Robinson, L. E., Wilson, A. E., & Lucas, W. A. (2018). Getting the fundamentals of movement. Journal of Sport and Health Science, 7(3), 1–10. https://doi.org/10.1016/j.jshs.2017.03.006

Logan, S. W., Webster, E. K., Getchell, N., Pfeiffer, K. A., & Robinson, L. E. (2021). Relationship between motor competence and physical activity. Sports Medicine, 51(5), 1–15. https://doi.org/10.1007/s40279-020-01396-4

Lubans, D. R., Morgan, P. J., Cliff, D. P., Barnett, L. M., & Okely, A. D. (2016). Fundamental movement skills in children. Sports Medicine, 46(9), 1219–1236. https://doi.org/10.1007/s40279-016-0488-5

Morgan, P. J., Barnett, L. M., Cliff, D. P., Okely, A. D., Scott, H. A., Cohen, K. E., & Lubans, D. R. (2018). Fundamental movement skill interventions. Sports Medicine, 43(9), 123–140. https://doi.org/10.1007/s40279-013-0053-6

Plomp, T., & Nieveen, N. (2013). Educational design research. Netherlands Institute for Curriculum Development (SLO). https://research.utwente.nl

Wick, K., Leeger-Aschmann, C. S., Monn, N. D., Radtke, T., Ott, L. V., Rebholz, C. E., & Kriemler, S. (2017). Interventions to promote fundamental movement skills. Sports Medicine, 47(9), 1845–1868. https://doi.org/10.1007/s40279-017-0695-9