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Enhancing Principals' Physical Education Managerial Competence: An ADDIE-SDGs Model with AI and Grit

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ARTICLE INFO	ABSTRACT
	Introduction: Effective training for school principals of physical education is essential to enhance their managerial competencies, which directly impacts school performance and educational quality. Traditional training models often lack integration of strengths-based and resilience-building approaches, which are critical in today's dynamic educational environment. The ADDIE framework, combined with Appreciative Inquiry (AI) and Grit, offers a comprehensive approach to developing sustainable leadership competencies aligned with global development goals. **Objective:** This study aims to develop a Sustainable Development Goals (SDGs)-oriented training management model for school principals based on the ADDIE framework, integrated with Appreciative Inquiry and Grit, to improve their managerial competencies. **Methods:** Using a Research and Development (R&D) approach with a mixed-methods design, qualitative data were collected through expert interviews, focus group discussions, and observations. Quantitative data were analyzed via validity testing, paired-sample t-tests, and N-Gain Score calculations. Participants were high school principals from North Sumatra Region I Education Office, selected purposively. **Results:** The developed SDGs training management model demonstrated high validity with an Aiken's V of 0.90. The model significantly improved managerial competencies, evidenced by an N-Gain Score of 0.73, categorized as high. The Appreciative Inquiry component fostered strengths-based leadership, while the Grit element enhanced resilience and perseverance in addressing managerial challenges. Findings suggest that integrating ADDIE with AI and Grit creates a flexible and effective physical education training model that promotes sustainable leadership development. This approach contrasts with conventional problem-focused training by emphasizing positive capacities and resilience, aligning with contemporary educational leadership needs. The model's adaptability and digitalization potential further enhance its applicability across diverse educational contexts. **Conclusions:** The study successfully developed and validated an innovative SDGs-oriented training management model for school principals that integrates ADDIE, Appreciative Inquiry, and Grit. This model effectively enhances managerial competencies by fostering strengths and resilience, offering valuable guidance for policymakers and educational institutions aiming to strengthen principal leadership. **Keywords**: ADDIE training model, appreciative inquiry (AI), grit, managerial competence, physical education school principals, sustainable development goals (SDGs)

INTRODUCTION

Education is the cornerstone of human resource development and plays a critical role in fostering superior and competitive individuals. In the educational ecosystem, physical education school principals occupy a pivotal position as leaders responsible for the successful implementation of a school's vision and mission, resource management, and the enhancement of learning quality. Principals with strong managerial competencies are essential for creating a

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conducive, effective, and adaptive educational environment. However, the reality on the ground suggests a significant gap in managerial competencies among school principals in Indonesia, which hinders the optimal management of schools.

The competency assessment report from the Ministry of Education and Culture (2019) highlights this issue by revealing that the average competency test score for school principals in Indonesia stands at a relatively low 56.37. Principals in North Sumatra Province score even lower, with an average of 53.71, compared to provinces like Yogyakarta (61.47). A preliminary survey conducted at the North Sumatra Region I Education Office Branch found that 65% of school principals lacked an understanding of how to prepare strategic plans aligned with the school's vision and mission. Additionally, 70% faced challenges in human resource management, while 60% struggled with data-driven decision-making. These deficiencies in managerial competence adversely affect learning innovation, school management, and the ability to lead organizational change effectively.

To address these gaps, various training programs have been implemented, both nationally and internationally. In Indonesia, principal training is primarily delivered through the Principal Strengthening Training program organized by the Ministry of Education, Culture, Research, and Technology. A widely adopted model for this training is the In-On-In approach, which integrates in-class learning (in-service learning 1), on-the-job learning, and advanced evaluation (in-service learning 2). While research, such as Andriani et al. (2021), suggests that the curriculum in this model is comprehensive and coherent, it also reveals shortcomings, particularly in aligning the curriculum with current physical education principal duties and enhancing the quality of mentoring during internships.

Similarly, Wahyudi et al. (2024) proposed a participatory humanist-based managerial competency training model, emphasizing participatory management, communication skills, decision-making, and collaboration. While this approach demonstrated increased motivation and job satisfaction among school principals, it also highlighted significant limitations, particularly the absence of a strength-based approach that leverages principals' existing competencies.

Many existing training programs are primarily problem-focused, aiming to identify and address deficiencies in leadership. However, this approach often overlooks the opportunity to explore and maximize the strengths and potential of school principals. Evaluations of these programs, such as Kartika (2018), using the CIPP (Context, Input, Process, Product) evaluation model, reveal clear objectives and legal frameworks but underline areas needing improvement. Key issues include instructor competence, material quality, and program implementation strategies. These weaknesses raise concerns about whether such training programs effectively meet the practical needs of school principals.

Furthermore, despite the intention of these training programs to enhance principals' performance, their actual impact remains ambiguous. Studies by Wibowo et al. (2021) and Bush (2018) note that many principals continue to struggle with implementing effective management styles that influence school performance. Bush critiques the inadequate preparation of new principals, who often rely on informal apprenticeship models that fail to equip them with essential leadership competencies. This points to a critical gap in systematic leadership preparation.

The ADDIE model (Analysis, Design, Development, Implementation, Evaluation) is a commonly used framework for training management, valued for its systematic and structured approach. However, its application in physical education principal training reveals notable weaknesses. First, the model lacks a strength-based approach to harness participants' potential. Second, it does not adequately focus on developing resilience and perseverance for long-term managerial challenges. Third, the linear nature of the ADDIE model makes it less flexible in accommodating dynamic feedback during the training process. Cheung (2016) argues that while ADDIE offers systematic planning, it is insufficiently responsive to the dynamic and evolving needs of school principals.

Internationally, countries such as Finland and Singapore offer more innovative training approaches for physical education school principals. In Finland, transformational leadership training emphasizes collaboration, joint decision-making, and self-exploration of leadership potential. Singapore's model emphasizes instructional leadership, continuous professional development, and cultural alignment. Training in Singapore often incorporates case study-based learning and collaborative exercises (Lahtero et al., 2017; Cheng, 2017; Huang & Benoliel, 2023;

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Tan, 2022). These international practices highlight the need for Indonesia to enhance its principal training models, particularly in terms of personalization, leadership resilience, and flexibility in training feedback mechanisms.

To address these gaps, this study proposes the development of an ADDIE-based training management model integrated with Appreciative Inquiry (AI) and Grit. This new model aims to provide a comprehensive and adaptive framework for physical education principal training that leverages participants' strengths while fostering resilience and perseverance in leadership.

Appreciative Inquiry (AI), developed by David Cooperrider, is a collaborative, strength-based approach to organizational change that aligns with principles of positive psychology. AI focuses on identifying and amplifying the positive core of individuals and organizations, using these strengths as a foundation for planning and implementing change (Cockell et al., 2020; Cooperrider et al., 2013). Research demonstrates that AI enhances the effectiveness of school leadership by fostering a positive and productive school culture (Hakkari et al., 2022). During the COVID-19 pandemic, AI was shown to provide hope and direction to organizations facing significant challenges (Cooperrider & Fry, 2020). Additionally, AI-based strategic planning positively impacts individual and institutional performance (He & Oxendine, 2019; White, 2022).

Meanwhile, Grit, as conceptualized by Duckworth (2016), emphasizes perseverance and passion for long-term goals. A Grit-based training approach focuses on equipping trainees with mental resilience, enabling them to navigate challenges with determination. Studies by Muenks et al. (2017) and Caza and Posner (2019) highlight the critical role of Grit in fostering effective leadership. Principals with high levels of Grit are better equipped to handle adversity, maintain focus on long-term objectives, and inspire their teams to persevere. Moreover, Saeed and Khan (2022) found that Grit significantly influences teacher job satisfaction, as resilient leaders create supportive and empowering work environments.

The integration of AI and Grit into the ADDIE framework offers several advantages. First, AI introduces a strength-based dimension to the systematic structure of ADDIE, enabling participants to explore and build upon their existing competencies. Second, incorporating Grit fosters resilience and perseverance, preparing principals to address long-term challenges. Third, the enhanced model adopts a more dynamic and iterative approach, allowing for continuous feedback and adjustments during the training process. Lastly, the model is data-driven, tailored to the specific needs of school principals, as identified through a needs analysis conducted at the North Sumatra Region I Education Office Branch.

In the digital era, physical education school principals face increasing demands to adopt technology for data-based decision-making, school administration, and online learning management. Additionally, they must navigate high expectations from teachers, students, and parents for innovative educational practices. These challenges necessitate not only strong managerial skills but also psychological resilience and adaptability. Research by Adams et al. (2017), Urick et al. (2021), and Mahfouz (2018) underscores the importance of resilience in leadership. Principals who are adaptable and innovative in addressing challenges are more likely to succeed (Jauro et al., 2023).

However, the psychological toll of school leadership is significant, often resulting in high turnover rates due to burnout. Effective coping strategies are essential for principals to balance their professional responsibilities with personal well-being. This study's proposed training model addresses these challenges by instilling a positive, resilient, and adaptive mindset in school principals, equipping them to lead in complex and dynamic environments.

OBJECTIVES

This study fills a critical gap in the literature by developing an innovative training management model that integrates Appreciative Inquiry and Grit within the ADDIE framework. By combining strengths-based and resilience-focused strategies, the model offers a holistic approach to enhancing the managerial competencies of physical education school principals. This research contributes to both academic and practical domains by providing a new framework for principal training in Indonesia, aligning with international best practices while addressing local needs.

The proposed model not only improves technical competencies but also cultivates visionary, resilient, and committed educational leaders capable of driving sustainable transformation in Indonesia's education system. The findings of

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this study are expected to inform policy development and serve as a reference for educational institutions seeking to enhance school leadership effectiveness in the modern era.

LITERATURE REVIEW

Managerial Competence

Competence which means proficiency and ability can be obtained through education, training, and independent learning by utilizing various learning resources [1]. Competence plays a very important role in efforts to achieve job success, especially in jobs that require certain qualifications from the people who carry out the task. Competence is related to the goals to be achieved in the field of work and is related to the desire to master the skills or proficiency to do the work and more broadly related to the effort to create events and not act passively.

Competence is also defined as an ability to carry out or do work that is based on skills and knowledge and supported by the work attitude demanded by the job [2]. The term competency can be interpreted from various aspects, not only related to physical and mental, but also related to spiritual aspects. A person who is considered to have the competence to carry out a task if the person concerned meets the standards in his attitude, knowledge, skills and work results in accordance with those set or recognized by an institution or government (Komtri, 2017).

The definition of competence is in principle the same as the definition of competence according to the fact that competence is the ability Robbins et al., (2014) or capacity of a person to do various tasks in a job, where this ability is determined by two factors, namely intellectual ability and physical ability. In more detail, Spencer stated that competence shows the characteristics that underlie behavior that describes motives, personal characteristics (traits), self-concept, values, knowledge or expertise that a superior performer brings in the workplace (Suriansyah & Aslamiah , 2012).

Competence is the ability, knowing, authority, and power to decide or determine something [6]. Meanwhile, according to the definition of competence, it is a combination of knowledge, skills, values, and attitudes that are reflected in the habit of thinking and acting. A person's competence is the basic characteristic of an individual associated with the standard of effective performance criteria. Competence, in addition to determining a person's behavior and performance, also determines whether a person does his job well based on the standard criteria that have been determined [7].

From the opinion mentioned above, it is clear that a competency must be supported by knowledge, skills, and attitudes, which means that without knowledge, skills, and attitudes, it is impossible for a certain competence to appear. A person's competence can be measured, including: knowledge, skills, and attitudes in completing a job or task in accordance with the set performance (work ability). Thus, competence shows the skills or knowledge characterized by professionalism in a certain field as the most important. Competence as a characteristic of a person is related to effective performance in a job or situation. Competence is the basic traits possessed or part of the personality that is deep and inherent in a person as well as predictable behavior in various circumstances and work tasks as an encouragement to have achievements and the desire to strive to carry out tasks effectively.

The principal as a manager needs managerial competence to be able to manage his school effectively and efficiently [8]. Referring to Robbins' opinion, the managerial competence of the principal can be understood as the ability of the principal to carry out the functions of planning, organizing, leading and controlling all school resources effectively and efficiently (Robbins et al., 2014).

Training Management

Training Management can be interpreted as training management which includes training planning, organizing, implementing, and evaluating [9]. Activities in training management include:

1. Setting goals,
2. Planning/Designing Training Programs,
3. Implementation, Checking/Supervision and Control,
4. Education and training development.

Appropriate and professional management of training can provide functional meaning of training to individuals, organizations, and communities. Training does need to be organized, therefore, management in training is needed as a systematic and planned effort to optimize all training components, in order to achieve training goals effectively and efficiently [10]. The management component consists of curriculum, human resources, facilities/infrastructure, and costs. The training objectives in question are: forming, improving and changing knowledge, attitudes and behaviors, as well as skills, in order to achieve certain desired standards [11]. After setting the goal, the next activity is to make a plan or design the training program.

Training planning is the process of systematically changing employee behavior to achieve organizational goals. Planning determines the need for exercise and its recommendations. Developing training patterns and programs according to the recommendations along with training methods and facilities. Designing a training program is the initial activity of preparing for the implementation of education and training/training which is very crucial [12]. In addition to having the goal of producing a quality program and in accordance with the needs of participants and their organizations, it can also set a training strategy (determining the need for training or education outside of training). A training learning designer must first explore existing learning models, the use of models in learning program design is very useful in producing quality and realistic programs [13].

Design is a planning process that describes the sequence of activities (systematic) regarding a program. There are three important elements that must be considered:

1. purpose (what should be achieved);
2. method (how to achieve the goal);
3. format (in the state of how to determine the design you want to achieve).

Once everything about the training is planned, the next stage is implementation. This implementation stage can be divided into three steps, namely the preparatory step (administrative and educational preparation), the implementation step, and the reporting step.

This education and training development activity cannot be separated from the design of a training, therefore it is a continuation of the design process of a training [14]. It is very important for officials engaged in education and training to know well their roles and contributions, whether as program developers or training implementers, or to carry out the role of both. Program development is a process of creating learning materials, learning activities and delivering them to students/training with the intention of achieving specific measurable learning goals. Therefore, the process of education and training development is a set of procedures that are organized and used to develop education and training programs and or education and training materials.

Appreciative Inquiry (AI)

Cooperrider & Whitney describes that Appreciative Inquiry is an asset-based approach to organizational and social engagement that utilizes questions and dialogue to help participants uncover existing strengths, advantages, or opportunities in their communities, organizations, or teams [15]. Appreciative Inquiry (AI) is an asset-based and collaborative approach to organizational and social engagement that uses questions and dialogues to help participants uncover the strengths, strengths, or opportunities that exist in their community, organization, or team.

AI uses the key principles of positive psychology and positive education. The AI approach believes that everyone has a positive core that can contribute to success [16], [17]. This positive core is the potential and asset of the organization. Thus, in its implementation, AI begins by exploring the positives, successes that have been achieved and the strengths that the organization has, before the organization steps on the next stage in planning for change.

Appreciative Inquiry is a philosophy, a foundation of thinking that focuses on collaborative efforts to find the positive in a person, in an organization and the world around it both in the past, present and future [18]. It is also argued that we are currently living in an era that requires eyes that can see and reveal the right and good. If the organization builds more of its positive sides, then the strength of human resources in the organization will certainly increase and then the organization will develop sustainably (Lewis et al., 2016).

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Appreciative Inquiry is a positive psychology and strengths-based approach combined into one package [19]. The affirmative change method, Appreciative Inquiry, begins by finding the healthiest and most positive attributes that already exist in the living system and expanding, improving, and strengthening those attributes and abilities. Through a structured Appreciative Inquiry process, organization members become active and inspirational participants in realizing the organization's goals immediately, and become part of the collective experience. Positive core consists of the best attributes of life systems and, in organizations, examples include successful strategies and experiences, existing knowledge and wisdom, loyal customers, exemplary products and services, skills and behaviors, brand identity, reputation, processes and systems, leadership, values, vision, and so on [20]. When people or organizations align themselves with their positive core, they are not only connected to their strengths and talents, they also ignite their positive emotions and expand their thoughts and actions to include new possibilities (Stratton-Kessel, 2010)

When focusing on the positive aspects of the human experience, people become more energized and engage in the investigative process longer. This means that AI-inspired changes will benefit from a positive experience and are more likely to succeed because it encourages positive feelings and well-being in participants [22]. Since AI essentially aims to harness positive feelings of well-being as a mechanism for change, it is potentially suitable for investigations aimed at promoting well-being in the long term.

Concept of Grit (Passion and Perseverance)

The theory of grit was introduced by Angela Duckworth. Grit (persistence) is how a person or individual maintains perseverance and great enthusiasm or desire to achieve long-term goals despite obstacles, obstacles, challenges, difficulties, or despair. Grit is a personality related to perseverance and a great desire for long-term goals so as to contribute to achievements (Duckworth, 2016).

Vivekananda (2018) defines grit is the extent of how the individual displays the behavior of maintaining his perseverance and enthusiasm in challenging circumstances to achieve the expected long-term goals. Meanwhile, according to the U.S. The Department of Education defines grit as resilience to achieve noble or long-term goals in the face of challenges and obstacles, using students' psychological resources, such as academic mindsets, effortful control, and strategies. Grit is demonstrated by working hard to face challenges, maintaining effort and interest over the years despite being faced with failures, challenges, and difficulties in the process [25].

Grit can also be interpreted as determination in character and ambition for long-term goals. Grit belongs to the trait personality group and is a non-cognitive factor that affects success [26]. Grit is a character similar to consciousness or self-control, where the character is specifically related to long-term stamina towards an individual's goals [27].

Grit in psychology is concerned with perseverance, resilience, resilience, ambition, hard work, the need for achievement and awareness of the individual [28]. Grit is one way to determine where a person can put their efforts to survive in the face of life's challenges or not [29]. A person with a high grit will be better able to achieve his goals and meet his needs or satisfaction so that he will try hard to face challenges and maintain his efforts (Duckworth, 2016).

Based on the explanation above, it can be concluded that grit is endurance and enthusiasm to achieve long-term goals. Individuals who have persistence will try to pursue their goals that have been determined by keeping trying and being consistent with their choices.

METHODS

Participants

Participants for this study were selected using purposive sampling techniques, ensuring that the subjects chosen were relevant to the research objectives and could provide valuable insights into the training model's development and implementation. This research was carried out at the North Sumatra Education Office Branch Region I. The research period was carried out from February 2024 to August 2024. The subject of the research in this paper is the Branch of the Education Office of Region I of North Sumatra in the Medan region. In this study, the determination of samples for the research subjects was carried out through purposive sampling techniques.

Procedure

1. Quantitative Data Collection
2. Qualitative data were gathered through a series of methods, including:
3. Interviews with Experts: Engaging with educational professionals to gain insights into the training model's design and implementation.
4. Focus Group Discussions (FGD): Facilitating discussions among stakeholders to explore diverse perspectives on the training model.
5. Documentation Review: Analysing existing materials related to the training model development process.

The qualitative data were subjected to thematic analysis, following a systematic process that included data transcription, coding, categorization of findings, and drawing conclusions. This analysis aimed to identify recurring patterns and themes pertinent to the development of the ADDIE training management model, particularly through the lenses of Appreciative Inquiry and Grit (Braun & Clarke, 2006).

Quantitative Data Collection

Quantitative data were collected through:

1. Model Validation Questionnaires: Administered to experts to assess the training model's content and structure.
2. Training Model Trials: Evaluating the model's effectiveness through pre-test and post-test assessments of school principals' managerial competencies.

The validity of the instruments was established using Aiken's V method to measure expert agreement, while reliability was assessed through Cronbach's Alpha. To evaluate the training model's effectiveness, statistical analyses were performed on pre-test and post-test results. The normality of the data was tested using either the Kolmogorov-Smirnov or Shapiro-Wilk methods, and homogeneity was assessed using Levene's Test. The paired sample t-test was employed to analyze differences between pre-test and post-test scores, and the N-Gain Score calculation was utilized for a more nuanced understanding of training effectiveness.

Data Analysis

Descriptive statistics were applied to analyze trainee feedback, assessing satisfaction levels and the perceived utility of the developed training model. The findings from qualitative and quantitative analyses were integrated through triangulation techniques. This included:

1. Source Triangulation: Comparing results from interviews, FGDs, and validation questionnaires to ensure consistency and reliability.
2. Method Triangulation: Cross-examining qualitative and quantitative findings to enhance the robustness of the conclusions drawn.

This thorough analytical framework will be used in the research to validate, evaluate, and assess the influence of the training model that has been established on improving the managerial competences of school principals.

RESULTS

Research Findings

This research employed a mixed-methods Research and Development (R&D) approach, guided by Romiszowski's ADDIE model (Analyze, Design, Develop, Implement, Evaluate), to develop and evaluate a training model aimed at enhancing the managerial competencies of school principals in North Sumatra, Indonesia. The study, conducted between February and August 2024, focused on Branch Region I of the North Sumatra Education Office in Medan. The integration of qualitative and quantitative data provided a comprehensive understanding of the model's effectiveness and impact.

Analysis Stage

The initial phase focused on analyzing the existing managerial competencies of school principals within the target region. A needs assessment, involving a survey of 30 school principals, identified key areas requiring improvement. The survey assessed competencies across five domains: strategic planning, human resource management, change leadership, data-driven decision-making, and school program evaluation.

Table 1. Mean and Standard Deviation of Initial Competencies of School Principals

No	Aspects of Managerial Competence	Mean($\bar{x}$)	Standard Deviation (SD)	Category
1	School Strategic Planning	3.00	0.75	Moderate
2	HR Management	2.80	0.90	Poor
3	Change Leadership	2.80	0.85	Poor
4	Decision	2.50	0.85	Poor
5	School Program Evaluation	4.00	0.70	Moderate
	Total Average	3.02	0.81	Moderate

Table 1 reveals significant variability in principal competencies. While school program evaluation demonstrated a satisfactory level (Mean = 4.00), the remaining four domains exhibited scores indicating a need for substantial improvement (Moderate or Poor categories). Consequently, the training model focused on enhancing strategic planning, human resource management, change leadership, and data-driven decision-making.

Design Stage

The design phase involved developing a training curriculum based on the ADDIE model, integrating Appreciative Inquiry (AI) and Grit as core pedagogical approaches. AI facilitated the exploration of existing strengths and potential, while Grit fostered resilience and perseverance in the face of challenges. The curriculum comprised four modules:

1. Appreciative Inquiry in School Leadership: Exploring AI principles and their application in school management and organizational culture building.
2. Strengthening Grit in School Management: Understanding Grit's role in leadership and developing strategies to enhance resilience.
3. Strategic Planning Based on Appreciative Inquiry: Utilizing strength-based SWOT analysis to develop school visions and strategies.
4. Grit-Based School Management Implementation and Evaluation: Implementing change management strategies emphasizing perseverance and resilience, coupled with success measurement and reflective practice.

Instructional methods included experiential learning, case studies, simulations, and reflective discussions. Training materials encompassed digital and print modules, practical implementation guidelines, and case studies of successful AI and Grit applications. Supplementary media included inspirational videos, infographics, and interactive schemes. A draft implementation guidebook and training modules were also developed.

A validation instrument, incorporating indicators of suitability, relevance, AI/Grit integration, and ease of implementation, was designed and piloted with education and training management experts. The instrument's validity was assessed using Aiken's V, and reliability using Cronbach's Alpha. The diagram of the Training Management Model based on ADDIE, Appreciative Inquiry, and Grit can be seen in Figure 1.
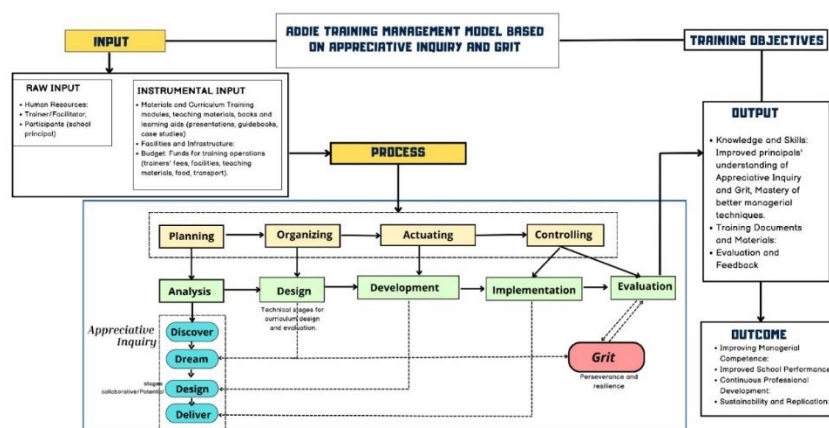
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Figure 1. Final model of ADDIE training model based on AI and GRIT

Development Stage

The Development Stage represents the third phase of the ADDIE model, focusing on the creation of training products derived from the design established in the preceding phase. This stage involved the development of various training tools, expert validation tests, and Focus Group Discussions (FGDs) with practitioners, followed by necessary revisions to ensure the model's effectiveness prior to implementation.

During this phase, teaching materials and training modules were crafted, drawing upon the principles of Appreciative Inquiry and Grit. The training modules were produced in both digital and print formats, encompassing a comprehensive array of resources centered on strength- and resilience-based school leadership. Additionally, a training model implementation guidebook was developed to serve as a primary reference for school principals and training facilitators. The training materials included case studies, simulation scenarios, and reflective exercises aimed at enhancing participants' comprehension of the concepts presented.

To bolster the training's effectiveness, various learning media were also created. Interactive learning videos were produced to provide practical illustrations of how Appreciative Inquiry and Grit can be applied in school leadership contexts. An infographic summarizing the core concepts of the training model was also developed to facilitate participants' understanding.

To ensure the feasibility of the training products, the validation was conducted by experts in education and training management. This validation encompassed several aspects: planning, organization, implementation (actuating), and supervision and evaluation (controlling). The validation results, summarized from Table 2 until Table 5, indicated a high level of validity for the developed model. Specifically, the majority of aspects received an Aiken's V value exceeding 0.83, confirming that the training model based on Appreciative Inquiry and Grit is both feasible and appropriate for enhancing the managerial competencies of school principals.

Table 2. Validation of Planning Aspects

No	Validation Aspects	Expert 1	Expert 2	Expert 3	Aiken's V
1	Clarity of formulation of training objectives	5	4	5	0.92
2	Accuracy of training needs analysis	4	5	4	0.83
3	Model integration with Appreciative Inquiry	5	5	5	1
4	The relationship between the planning aspect in POAC and the ADDIE Analysis stage	4	4	5	0.83
5	Alignment of training objectives with Grit indicators	5	5	4	0.92
	Average				0.90

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Table 3. Validation of Organizing Aspects

No	Validation Aspects	Expert 1	Expert 2	Expert 3	Aiken's V
6	Clarity of structure and division of roles in the model	4	5	5	0.92
7	Accuracy of AI-based curriculum preparation	5	4	5	0.92
8	Suitability of material design with leadership	4	5	4	0.83
9	The relevance of organizing in POAC to the Design ADDIE stage	5	4	5	0.92
10	Availability of Grit-based modules and tools	4	4	5	0.83
	Average				0.88

Table 4. Validation of Implementation Aspects (Actuating)

No	Validation Aspects	Expert 1	Expert 2	Expert 3	Aiken's V
11	Effectiveness of training methods	5	5	4	0.92
12	Participant engagement in AI	4	5	5	0.92
13	Clarity of the model implementation stages	5	4	5	0.92
14	The relationship between the implementation aspects in POAC and the Development and Implementation stage of ADDIE	4	5	4	0.83
15	The effectiveness of the model in building a Grit culture	5	5	5	1.00
	Average				0.92

Table 5. Validation of Supervision and Evaluation (Controlling) Aspects

No	Validation Aspects	Expert 1	Expert 2	Expert 3	Aiken's V
16	Clarity of monitoring and evaluation systems	4	4	5	0.83
17	Accuracy of evaluation instruments	5	5	4	0.92
18	The relevance of training evaluation to AI	4	5	5	0.92
19	The relationship between supervision in POAC and the ADDIE Evaluation stage	5	4	5	0.92
20	The effectiveness of Grit-based feedback	4	5	5	0.92
	Average				0.90

In addition to expert validation, FGDs were conducted with school principals and education practitioners to gather direct feedback from potential users of the training model. The purpose of these discussions was to assess the model's applicability in real-world contexts and to identify areas for improvement. Feedback from the FGDs indicated that the training model was well-received and deemed relevant for enhancing the managerial competencies of school principals. Suggestions from participants were incorporated into the training modules, particularly regarding case studies and material delivery methods, to better align with field needs.

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Table 6. Results and Inputs from the FGD

Aspects Discussed	Input from the FGD	Revision Actions
Case Studies	More real-world examples are needed	Adding more principal experience-based case studies
Delivery Method	The need for a more interactive approach	Developing more simulations and reflective discussions
Training Duration	Some participants proposed time flexibility	Provides learning options for time flexibility
Training Evaluation	There needs to be a more concrete assessment	Adding more structured evaluation instruments

Following the validation and FGDs as is shown in Table 6, revisions were made to the modules, teaching materials, and learning strategies employed in the training. Adjustments were made to ensure that case studies were more contextual and relevant to the real challenges faced by school principals. Furthermore, feedback from both experts and FGD participants was integrated into the evaluation design, enhancing the training's effectiveness in improving the managerial competencies of school principals.

The Development Stage culminated in the production of training products that are now ready for testing in the subsequent Implementation Stage. The model has undergone extensive refinement based on input from experts and practitioners, positioning it to positively impact the managerial competencies of school principals.

Implementation Stage

The Implementation Stage of this study aims to evaluate the effectiveness of the training management model developed based on the validated design from the previous stage. This phase involves a series of training sessions for school principals, utilizing the ADDIE approach grounded in Appreciative Inquiry and Grit. The primary objective is to ascertain the model's applicability in real-world contexts and to gather participant feedback for further enhancements.

Implementation occurs in two phases: Limited Trials and Field Testing. The initial phase involves preparation for implementation, which includes selecting trial locations and participants, scheduling training sessions, and preparing teaching materials, modules, and evaluation tools. The training sessions encompass various aspects of Appreciative Inquiry and Grit, employing methods such as group discussions, case studies, simulations, and reflections on leadership practices. Each session is followed by formative evaluations to assess participants' understanding. Additionally, monitoring and observation are conducted through direct participant engagement, interviews, FGDs, and documentation of training activities via video recordings and field notes.

The results from the implementation reveal several key findings. Firstly, participant engagement during the training was notably high. The Appreciative Inquiry method fostered active exploration of positive leadership experiences, while the Grit-based approach facilitated the development of perseverance and motivation among participants. Secondly, there was a significant enhancement in participants' understanding of Grit-based leadership concepts, as evidenced by pre-test and post-test results. Participants demonstrated improved capabilities in applying optimistic and solution-oriented leadership strategies to address school-related challenges.

However, the implementation phase also encountered challenges. Some participants struggled with the self-reflection methods inherent in Appreciative Inquiry, and the limited training duration hindered deeper exploration of each module. Additionally, some participants expressed the need for ongoing support post-training to ensure the sustainability of the implementation.

Feedback from FGDs involving participants and facilitators yielded valuable insights. Participants suggested the inclusion of additional sessions to deepen their understanding of leadership concepts and practices, as well as

adjustments to the Appreciative Inquiry materials to better reflect the challenges faced by school principals. There was also a call for integrating the training model with mentoring programs to provide ongoing guidance for school principals.

Overall, the implementation of the ADDIE training model based on Appreciative Inquiry and Grit has proven effective in enhancing the managerial competencies of school principals. Nonetheless, several aspects require refinement to optimize the training experience. Recommendations include extending the training duration for more in-depth coverage of materials, developing a mentoring mechanism to support the application of training outcomes, contextualizing case studies and examples to reflect real school conditions, and conducting long-term evaluations to assess the training's impact on principal performance as is shown in Table 7 below.

Table 7. Training Results

Implementation Stage	Number of Participants	Training Methods	Observation Results
Limited Trial	10 Principals	Discussion, Simulation, Reflection	Responsive, enthusiastic, requires revision on specific modules
Field Testing	30 Principals	Discussion, Case Study, Mentoring	High participation, increased understanding, takes longer for reflection

Evaluation Stage

The Evaluation Stage employed two primary approaches: measuring the model's effectiveness using the N-Gain Score and analyzing participant satisfaction data regarding the training experience.

The effectiveness evaluation involved comparing pre-test and post-test results of the principals' managerial competencies. Calculations using the N-Gain Score formula in Table 8 indicated a significant improvement in participants' competencies following the training, with an average N-Gain Score of 0.73, categorizing it as high. This finding underscores the training model's effectiveness in enhancing the managerial skills of school principals.

Table 8. N-Gain Score Results Table and Statistical Test

Implementation Stage	Pre-Test (Mean)	Post-Test (Mean)	N-Gain Score	Normality Test (p)	t-Test (p)
Limited Trial	48.67	87.11	0.74	0.346	0.001
Field Testing	49.20	85.33	0.71	0.083	0.001

To validate the data, normality tests and t-tests were conducted on the pre-test and post-test results. The normality test confirmed a normal distribution of the data, allowing for the t-test to assess significant differences pre- and post-training. The t-test results yielded a significance value (p-value) of 0.001 ($p < 0.05$), indicating a statistically significant difference in the managerial competencies of principals before and after the training.

Participant satisfaction with the training was assessed through a questionnaire covering aspects such as material relevance, method effectiveness, participant engagement, and the training's impact on leadership practices in schools. Table 9 displays the analysis of the satisfaction data which revealed that 85% of participants reported being very satisfied with the training, while 15% expressed satisfaction. Notably, no participants indicated dissatisfaction. The highest satisfaction scores were attributed to the interactive, real-life experience-based training methods and materials tailored to the needs of school principals facing leadership challenges.

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Table 9. Participant Satisfaction Results for Training

Satisfaction Aspect	Very satisfied (%)	Satisfied (%)	Dissatisfied (%)
Material Relevance	88	12	0
Method Effectiveness	85	15	0
Participant Engagement	86	14	0
Impact on Leadership Practice	83	17	0
Average	85.5	14.5	0

Despite the positive feedback, participants provided suggestions for further improvement. Some recommended adding mentoring sessions post-training to optimize material application, while others requested more flexible training schedules to accommodate the busy lives of school principals.

The evaluation stage confirms that the ADDIE training model based on Appreciative Inquiry and Grit is highly effective in enhancing the managerial competencies of school principals. The high N-Gain Score and excellent participant satisfaction levels indicate the model's viability for broader application. Future development recommendations include adjusting training schedules, incorporating mentoring sessions, and conducting long-term evaluations to assess the model's impact on principal performance over time.

DISCUSSION

This research presents the development of the ADDIE Training Management Model, which integrates the principles of Appreciative Inquiry (AI) and Grit to enhance the managerial competencies of physical education school principals. The findings of this study underscore the model's effectiveness in fostering leadership skills among school principals, as evidenced by an impressive average N-Gain Score of 0.73, categorizing the improvement within the high range.

The incorporation of Appreciative Inquiry into the training model emphasizes a strengths-based approach, encouraging school leaders to identify and build upon their existing capabilities [30], [31]. This positive framework not only enhances engagement but also fosters a collaborative environment where principals can share experiences and learn from one another [32]. By focusing on what works well within their leadership practices, participants are empowered to cultivate a more resilient and adaptive leadership style [33], [34], [35].

Moreover, the integration of Grit into the training framework plays a crucial role in developing perseverance and passion for long-term goals [36]. This characteristic is particularly vital for school principals, who often face complex challenges in their roles (Kaya & Yüksel, 2022; Malureanu et al., 2021). The training model equips them with the tools to navigate these challenges effectively, fostering a mindset that values resilience and continuous improvement.

The high N-Gain Score indicates that participants not only acquired new knowledge and skills but also demonstrated a significant transformation in their leadership practices. This outcome suggests that the ADDIE Training Management Model is not merely a theoretical construct but a practical framework that can be effectively implemented in real-world educational settings. The model's design, which includes interactive learning experiences, case studies, and reflective exercises, contributes to a deeper understanding of leadership concepts and their application in practice.

Furthermore, the positive feedback from participants regarding the training's relevance and effectiveness highlights the model's alignment with the actual needs of school principals [39], [40]. This alignment is critical for ensuring that professional development initiatives are impactful and sustainable [40], [41], [42]. The study's findings advocate for the broader adoption of the ADDIE Training Management Model, as it offers a structured yet flexible approach to enhancing the managerial competencies of school leaders.

In short, the development and validation of the ADDIE Training Management Model based on Appreciative Inquiry and Grit represent a significant advancement in the field of physical education management [43]. The model's

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demonstrated effectiveness in improving the leadership skills of school principals provides a compelling case for its implementation in various educational contexts. Future research should explore the long-term impacts of this model on school performance and student outcomes, as well as its adaptability to different educational environments and leadership challenges.

CONCLUSION

This research has successfully developed a comprehensive Training Management Model that synergizes the ADDIE approach with the principles of Appreciative Inquiry (AI) and Grit to enhance the managerial competencies of physical education school principals. The empirical evidence gathered from the study demonstrates that this model is effective in significantly improving the leadership skills of school principals, as indicated by a substantial average N-Gain Score of 0.73. This finding highlights the model's potential to foster resilience and a strengths-based approach in educational leadership.

The implications of this research are profound for physical education management and leadership development. By integrating AI and Grit into the ADDIE framework, the model not only addresses the immediate training needs of school principals but also cultivates a mindset geared towards continuous improvement and adaptability. This approach encourages school leaders to leverage their strengths and maintain perseverance in the face of challenges, ultimately contributing to more effective school management and improved educational outcomes. Furthermore, the model serves as a valuable resource for educational institutions seeking to implement structured training programs that are both practical and impactful.

A number of directions for further study and practice can be noted, including the necessity of conducting longitudinal studies to evaluate the Training Management Model's long-term effects on physical education school principals' managerial skills and the general performance of their institutions. Additionally, future research could explore the adaptability of this model across diverse educational contexts and cultural settings to determine its universal applicability. Finally, incorporating feedback mechanisms and mentoring components into the training process could further enhance the model's effectiveness, ensuring that school principals receive ongoing support as they implement the strategies learned during training. By pursuing these suggestions, the educational community can continue to refine and expand upon the foundational work established in this study.

ACKNOWLEDGEMENTS

FINANCING

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