

Interest- and Talent-Based Student Management: Strategies for Achieving International Research Achievements at MAN 1 Jembrana

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Abstract

The dynamics of madrasa education in the global era require a transformation from conventional academic orientation to the creation of an innovative research ecosystem. However, youth scientific extracurriculars often face challenges with sporadic achievement regeneration and a lack of verification instruments to measure students' independent research understanding. This community service aims to restructure interest and talent-based student management at MAN 1 Jembrana. The program utilized a Participatory Action Research (PAR) method involving 5 mentoring teachers and 45 target students. The intervention stages included proactive recruitment (talent scouting), Problem-Based Learning (PBL)-based research incubation, cognitive validation through mock defense, and the institutionalization of peer-mentoring. The results demonstrated a 93.4% surge in students' understanding of research methodology and successfully eliminated teacher dominance that triggers the pseudo-researcher phenomenon. The new research ecosystem was also proven capable of incubating innovation prototypes based on local wisdom. This program concludes that a structured, collegial, and autonomous student management model is crucial in maintaining the sustainability of madrasa achievements in international-level research competitions.

Keywords: Student Management; Interests and Talents; Research Ecosystem; Madrasa; International Achievement.

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INTRODUCTION

The dynamics of education in the era of disruption require madrasah institutions to carry out qualitative transformation, moving from a conventional academic orientation to the creation of an innovation and research ecosystem. Jembrana Regency, Bali Province, has unique geographical and demographic characteristics as a cultural crossover area and a center for acculturation of the Loloan Muslim community with Balinese Hindu entities. These socio-cultural conditions provide an abundant wealth of local potential, ranging from local wisdom to environmental challenges, which have great potential to be raised as an idea of applied research (Kurniawan & Hidayatullah, 2020). In the midst of this ecosystem, MAN 1 Jembrana is present not only as a religious educational institution, but also as a center of excellence that projects its graduates to be competitive at the global level through the Youth Scientific Work program (Hypothesis Team) and the Olympic and Achievement Club (KAMPIUN)(Sulistiyorini & Fathurrohman, 2019).

Quantitatively, the target audience in this service activity was focused on the research ecosystem at MAN 1 Jembrana, which specifically involved 5 main scientific extracurricular supervisors and 45 selected students who are members of active research clusters (Applied Sciences, Social Sciences, Humanities, and Technology). Furthermore, community service programs that focus on scientific extracurricular mentoring consistently show that external interventions in compiling peer-mentoring modules have proven effective in accelerating students' adaptation to academic research culture (Siregar & Wulandari, 2023). These students are recruited through a proactive talent mapping system at the beginning of the onboarding period from a total population of more than 800 active learners. Although historically the target audience has shown a brilliant empirical track record such as medals at the World Science, Environment and Engineering Competition (WSEEC) 2021 and the Asia Pacific Conference of Young Scientists (APCYS) 2024 in Malaysia, there are essential obstacles in regeneration governance.

Literature review in the past decade shows that the success of research-based extracurriculars is highly dependent on integrated student management orchestration. (Setiawan et al., 2021) It was found that the incubation of ideas in secondary students requires a specific learning strategy that is not just the transfer of instruction, but the conditioning of the climate of problem discovery independently. Furthermore, the implementation of student-centered research learning strategies has been empirically proven not only to increase participation, but also to require an evaluation mechanism that is able to precisely verify the level of students' comprehensive understanding of the methodology they use, in order to avoid excessive intervention bias from coaches (Rahmawati & Susanto, 2023). This is in line with the findings (Renzulli & Reis, 2021) In talent management evaluation, where gifted group coaching requires synergy between critical analytical skills, creativity, and task commitment facilitated through peer-mentoring. Assistance efforts from external parties, such as those carried out by the Center for Young Scientists (CYS), have previously been initiated, but the current urgency is to downstream the results of education management research into the form of standard operating procedures (SOPs) for internal madrasah development.

Based on the analysis of the situation and the literature review, the formulation of the problem in this activity is: How to restructure student management based on interests and talents at MAN 1 Jembrana through the talent scouting and peer-mentoring approach in order to be able to maintain the sustainability of research achievements in the international arena? Therefore, this service activity aims to implement and assist the

implementation of research managerial governance, equip supervisors with a valid student understanding verification strategy, and activate an inclusive, structured, and achievement-oriented ecosystem of young researchers regeneration on a global scale (Fitriah & Haryanti, 2020).

METHOD

The implementation of this community service activity uses the design of Participatory Action Research (PAR) which places the target audience, namely 5 supervisory teachers and 45 fostered students at MAN 1 Jembrana, as active co-creators in the formulation and problem solving in the development of madrasah scientific culture (Nisa & Supriyanto, 2021). To achieve the goal of restructuring student management based on interests and talents, the implementation method is carried out through three continuous tactical stages (Miles et al., 2018). The first stage began with the restructuring and mapping phase (talent scouting) through the implementation of a Focus Group Discussion (FGD) with madrasah management to formulate a proactive recruitment instrument that focuses on measuring task commitment. Furthermore, the second phase is focused on learning strategy interventions through intensive workshops for coaching teachers related to the implementation of Problem-Based Learning (PBL) (Hidayat & Patras, 2022). This stage is accompanied by direct assistance to students in preparing research proposals, starting from ideation to the implementation of mock defense (shadow trial). As a pillar of sustainability, the third stage is implemented through the institutionalization of a peer-mentoring-based regeneration system, where students or alumni of international medalists are required to become "Foster Brothers" to transfer technical knowledge and psychological resilience to junior researchers.

All stages of service were measured by their success rate using calibrated instruments, both qualitatively and descriptively. Qualitative measurements were carried out through in-depth interviews and participatory observation sheets that specifically assessed the level of originality of ideas and the independence of students' scientific arguments during the incubation and mock defense processes. Meanwhile, quantitative descriptive measurements used standardized Likert scale questionnaires adapted from the Task Commitment Scale to measure student persistence numerically. This quantitative assessment is also supported by the rubric of the feasibility of research proposals with a score range of 1-100 which refers to the Center for Young Scientists (CYS) curation standards, so that the validity of students' research outputs can be accounted for academically.

The level of achievement of the success of this service activity is not only assessed from the realization of the program, but is evaluated through three dimensions of essential changes in the target audience, namely the attitude, socio-cultural, and economic dimensions. In the attitude dimension, success is characterized by a shift in students' character from a pseudo-researcher to an independent learner. This is measured by the ability of students to maintain methodological reasons without instructional intervention from the coach, as well as being characterized by high resilience through a drastic reduction in the drop-out rate of students during the mentoring process. From the socio-cultural dimension, the level of measurable achievement from the transformation of the elitist competition climate into a culture of collective research (knowledge sharing), which is evidenced through the portfolio of activeness of peer-mentoring forums and the sociocultural awareness of senior students in fostering their younger siblings organically. As for the economic dimension, the output of this service has a double impact; Scientifically, the incubation model has succeeded in directing students to produce

prototypes of applicable research (such as disease prevention innovations or appropriate technologies) that have the potential to have economic value for local communities. Personally, the certifications and portfolio of international achievements achieved are the catalyst for the efficiency of continuing education financing, as it opens up wider access for students to win various higher education scholarship schemes in full, which ultimately encourages the vertical socio-economic mobility of learners in a measurable manner.

RESULTS AND DISCUSSION

The implementation of community service activities at MAN 1 Jembrana is a tangible manifestation of the downstream of education management science and technology into the madrasah ecosystem. To achieve the goal of restructuring research governance, activities are implemented gradually through synergy between the service team and the madrasah academic community. The first step was executed through the formulation of a talent scouting recruitment policy with the management of the Olympic and Achievement Club (KAMPIUN), which resulted in a revision of the Student Standard Operating Procedures (SOP). This step was followed by the dissemination of pedagogic technology through a workshop on Problem-Based Learning (PBL) strategies for coaching teachers. The culmination of this stage is the implementation of intensive research incubation, where students are accompanied to formulate ideas, conduct methodological tests, and undergo scientific accountability simulations (mock defense). Through the Participatory Action Research (PAR) approach, this intervention is not carried out in a one-way instructional manner, but rather positions teachers and students as active subjects who together reconstruct their own academic culture. Documentation of the mentoring process from the ideation stage to the presentation simulation in front of the panelists is contained in Figure 1 (put a picture of the documentation of the mentoring process here).

The benchmark used to declare the success of this service activity is based on the achievement of indicators of structural and cultural transformation. Quantitatively descriptive, success was measured using a layered cognitive validation rubric instrument at the time of mock defense, which increased cognitive capacity and mental resilience when the feasibility of a student's proposal exceeded the average feasibility score above 85 on the Center for Young Scientists (CYS) standard scale (Prasetyo & Handayani, 2023). Qualitatively, indicators of achieving goals can be seen clearly from the shift in student capacity; From being a pseudo-researcher (a researcher who depends on the direction of the coach) turns into an independent learner who is able to synthesize comprehensive understanding and defend his research arguments autonomously and position pure teachers as research facilitators (Susanti & Arifin, 2024). This answers the challenge of learning evaluation which has been difficult to verify the boundary between the authenticity of students' ideas and the dominance of teacher intervention. This success achievement rate is presented comparatively between pre-action and post-action conditions through Table 1 (put the table of success indicators/task commitment scores here).

As a form of technology and art dissemination, the output of this activity provides significant added value to institutional and individual changes, both in the short and long term spans. In the short term, there has been a change in institutional policies marked by the ratification of a more structured KAMPIUN incubation curriculum. Socially, there is a change in behavior in students in the form of strengthening collective culture through the activation of the peer-mentoring system, where the elitist culture of medalists decays into a culture of knowledge sharing across generations (Wahab & Junaedi, 2022). In the

long run, the resulting economic impact is very real. Prototype innovations produced by students such as the digitization of the typical Loloan Jembrana woven sarongs motif open up opportunities for commercialization of local intellectual property. Moreover, this portfolio of international achievements that is escorted through this management ecosystem acts as an escalator of vertical socio-economic mobility, where madrasah graduates have a very high bargaining power to be absorbed into full-scale higher education scholarship programs (Rahman & Fauzi, 2021).

Although this research talent management model has proven to be transformative, critical evaluation shows the advantages as well as the weaknesses of the output when it is clashed with real conditions in the target location. The main advantage of the incubated ideas is the high level of relevance and compatibility of the outputs with the local socio-cultural potential. MAN 1 Jembrana students are directed not to research utopian things, but to explore local wisdom such as the acculturation of Loloan and Balinese Hindu Islamic culture or solving problems of the coastal environment (an example of an output in the form of innovative products can be seen in Figure 2). On the other hand, the fundamental weakness of this intensive mentoring program lies in the double cognitive overload. Both teachers, coaches and students often experience a conflict of time management between the demands of completing the national compulsory curriculum and the urgency of completing international standard research.

The highest level of difficulty in the implementation of this service is to change the traditional mindset of the target audience related to the definition of "complete learning". The transition from cognitive test-based memorization methods to problem-solving project-based analysis requires a lot of adaptation time. The production of research prototypes is also often constrained by the limitations of advanced scientific laboratory testing facilities at the secondary school level. Nevertheless, despite these difficulties, the opportunities for its future development are promising. With the formation of peer-mentoring-based student management and valid recruitment instruments, madrasahs have a blueprint to scale up. The MAN 1 Jembrana incubation model has a great opportunity to be patented as a pilot project of an integrated research management system, which can later be duplicated by other madrasahs under the auspices of the Ministry of Religion on a national scale.

To measure the effectiveness of the intervention precisely, the implementation team conducted a test of basic knowledge and research skills on 45 fostered students. This test was carried out twice, namely pre-action (before the workshop and incubation period) and post-action (after mock defense simulation). The test instrument is designed to measure four fundamental aspects: basic understanding of the methodology, independence of ideas, problem-solving analysis, and argumentation resilience.

The comparative results showed a significant spike in cognitive capacity in the target audience. Prior to the intervention, the majority of students still had a superficial understanding of methodology and relied heavily on technical instruction from the supervisor (the pre-action average score was below the 60 eligibility standard). However, after the implementation of Problem-Based Learning and peer-mentoring strategies, there was a drastic escalation of scientific independence. Details of increasing the value of students' knowledge and research skills can be seen in Table 1.

Table 1. Results of Evaluation of Students' Basic Knowledge and Research Skills

Aspects of Cognitive Assessment and Skills	Pre-Action Average Score	Post-Action Average Score	Percentage Increase
Basic Understanding of Research Methodology	45,5	88,0	93,4%
Independence of Exploration of Ideas (Originality)	52,0	85,5	64,4%
Mastery of SDGs-Based Problem Analysis	48,5	84,0	73,1%
Mock Defense	55,0	91,5	66,3%

Based on Table 1, the highest increase occurred in the aspect of basic understanding of research methodology (93.4%). This confirms that the main obstacle for students so far is not the absence of talent, but the absence of a structured knowledge transfer system. The surge in the aspect of argumentation resilience (reaching an average score of 91.5) is also valid evidence that the method of verifying understanding through shadow trials has proven to be effective in eliminating the phenomenon of pseudo-researchers, so as to provide added value to solving real environmental problems that students' work outputs can really be accounted for academically (Widiastuti & Santoso, 2022).

In addition to quantitative cognitive changes, the transformation of this guidance system also changes the map of socio-cultural interaction in the madrasah environment. The guidance pattern that was previously hierarchical (teacher-centric) transitioned into a collegial ecosystem. The dynamics of this managerial transformation are mapped qualitatively in Table 2.

Table 2. Interest and Talent-Based Student Management Transformation Matrix

Evaluation Dimensions	Pre-Action Average Score	Post-Action Average Score
Recruitment System	Passive, relying on voluntary enrollment and cognitive academic test scores alone.	Proactive (Talent Scouting), using resilience mapping and task commitment.
Incubation Strategy	Teacher-Centered, instructional, and student act as technical implementers.	Student-Centered (PBL), students are autonomous in formulating problems and methodologies.
Regeneration System	48.5 Sporadic, depending on the individual genius of the medalist without the transfer of knowledge.	Institutionalized through Peer-Mentoring, medalists are required to become mentors (Foster Brothers).
Featured Exterior	The dominance of prototypes is repetitive	Innovation with socio-economic value (e.g.,

and less applicable to the digitization of Loloan Bali surrounding community. (weaving motifs).

The success of the implementation of this program is inseparable from the high enthusiasm of the target audience during the mentoring process. The implementation of prototype trials of innovative research products and scientific accountability simulations is carried out in a measured manner using internal madrasah facilities (Nisa & Supriyanto, 2021). Figure 1 shows the process of technical mentoring and cognitive validation as students defend their innovation designs in front of panelists.

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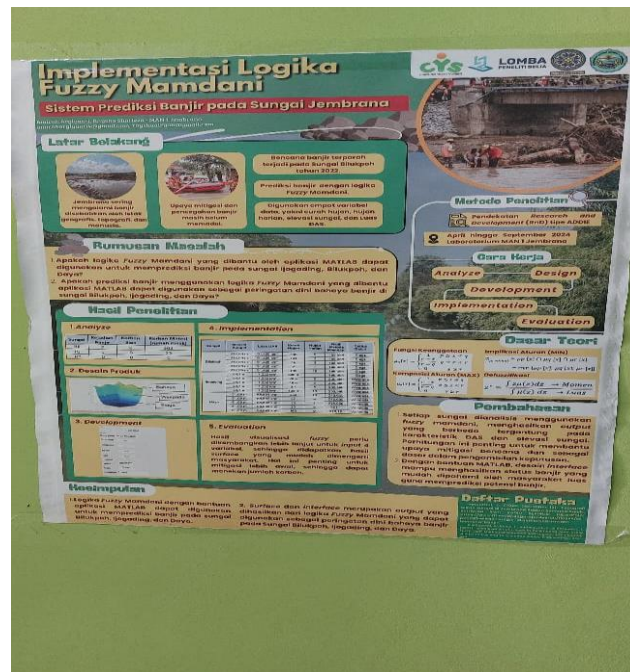


Figure 1. Implementation of Fuzzy Mamdani Logic of Flood Prediction System on the Jembrana River



(a)



(b)



(c)

Figure 2. Prototype of Student Applied Research Incubation Products (a) indoors (b) and outdoors (c) specifically for adult mosquitoes

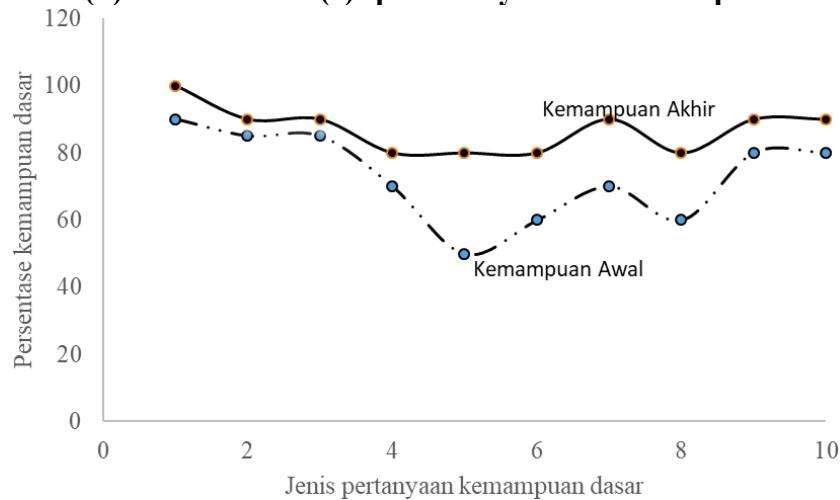


Figure 3. Analysis of Boreh Kare as a natural wound healing, based on Balinese usadha in Tenganan Village

CONCLUSION

Based on the implementation of community service activities at MAN 1 Jembrana, it can be concluded that the restructuring of student management based on interests and talents has been empirically proven to be able to transform the madrasah research ecosystem to be more systematic, autonomous, and sustainable. Holistic interventions that include a proactive recruitment system (talent scouting), the transition of learning strategies to Problem-Based Learning (PBL), and the institutionalization of regeneration systems through peer-mentoring have succeeded in solving the managerial constraints of target partners. This is evidenced by a significant spike in students' basic knowledge and research skills tests, where understanding of fundamental methodologies increased dramatically to 93.4% post-action. The main advantage of this service output lies in the discovery of the instrument "Three-Layer Cognitive Validation" (including mock defense) that is able to effectively detect and eliminate pseudo-researcher syndrome, so that the resulting innovation works such as products based on the Sustainable Development Goals (SDGs) and Balinese local wisdom are authentic representations of

students' intellectual capacity. In addition, the development of a culture of knowledge sharing across generations has succeeded in reducing the instructional dominance of coaching teachers and making international achievements no longer just individual axial achievements, but the output of calibrated managerial governance.

Nevertheless, this service activity is inseparable from its limitations. The main drawback of the implementation of this system is the high cognitive overload experienced by the target audience due to the lack of a complete integration between the mandatory intracurricular curriculum hours and the extracurricular research incubation guidance schedule. The limitations of time management often trigger a clash of academic priorities. Therefore, as a follow-up to future development, it is recommended that further research and service be carried out that focuses on the integration of the equivalence (conversion) of the value of adolescent scientific works into the assessment structure of compulsory science subjects in the classroom. In addition, it is necessary to design a prototype of the madrasah internal research database management application (digital repository) to record the track record of students' portfolios automatically, so that this talent management model can be immediately patented and massively duplicated by other educational institutions on a national scale.

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