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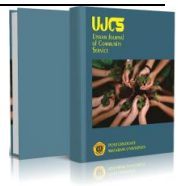

It Capacity Improvement for Swimming Coaches and Assistant Coaches for Swimming Performance Coaching at the Indonesian Aquatic Federation in Magelang City

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Abstract: Swimming is a water sport that is quite popular with the public to maintain and improve health and is also a branch of achievement sports that are competed in national, regional and international events. The main key to helping athletes achieve success is a competent coach. Coaches who are experts in their fields will find it easier to create and implement training programs to help athletes achieve success. This community service activity is carried out using training and mentoring methods with stages of socialization, training, technology application, mentoring and evaluation and program sustainability. Based on the success indicators obtained from the monitoring and evaluation stages, the results showed that 90% of swimming coaches and assistant coaches already understood the importance of using information technology. 75% of coaches and assistant coaches are skilled in using information technology even though they encounter obstacles. 75% of coaches are able to practice using the Computational Fluid Dynamics Methodology and 80% of coaches are willing to socialize the application of information technology in swimming to colleagues.

Keywords: Swimming; Competent coach; Computational Fluid Dynamics Methodology; Community service; Athletes

Introduction

Swimming is a water sport that is quite popular with the public to maintain and improve health. In addition, swimming is also a branch of achievement sports that are competed in national, regional and international events. Swimming achievements have also received quite a lot of attention from the public and the government. This will be quite a tough challenge for coaches, trainers and related parties to get talented athletes who can excel in the future.

An athlete's maximum achievement can be realized if there are supporting factors, namely internal and external factors. Internal factors consist of good physical and mental health, perfect mastery of techniques, correct tactical problems, psychological aspects, and good personality and the existence of a champion's mental maturity. External factors include coaches, finances, tools, places, equipment, organizations, the environment, and government participation.

The Indonesian Aquatics Federation is an organization that regulates swimming sports in Indonesia. The vision of the Indonesian Aquatics Federation is to Build Character and Make the Nation's Name Proud through Aquatics Sports. Meanwhile, the Mission of the Indonesian Aquatic Federation is to popularize swimming as a basic life necessity, Make swimming a healthy lifestyle, encourage the birth of high-achieving aquatic athletes, Embrace all parties in developing aquatic sports and ensure improvements in the quality of human resources that are evenly distributed in all regions.

The Indonesian Aquatic Federation of Magelang City as the parent of swimming sports in Magelang City is responsible for local swimming championships such as Popda Magelang City, O2SN Magelang City and

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KRAPDA Magelang City. In addition, the Indonesian Aquatic Federation of Magelang City also plays a role in developing the talents of athletes and the skills of coaches and referees involved in swimming. The main challenge for coaching for coaches and swimming athletes now and in the future is public demand for sports achievements, so that they advance beyond the achievements of other regions.

The Indonesian Aquatic Federation of Magelang City has adequate facilities for swimming sports coaching, there are 8 swimming pools, with 3 standard achievement swimming pools with a length of 50 meters and the rest are recreational swimming pools. The Indonesian Aquatic Federation of Magelang City also oversees 2 official swimming clubs and 4 unofficial clubs (waiting for permission from the Indonesian Aquatic Federation of Central Java) which of course have athletes and coaches. The number of registered swimmers in all clubs in Magelang City is 234 with 5 coaches and 10 assistant coaches.

Historically, Magelang City has produced many talented swimmers who are able to compete in national and international swimming championships. In 2023, the Indonesian Aquatic Federation of Magelang City trained 4 priority athletes who were prepared to compete in the Central Java Provincial Sports Week (PORPROV) and won 3 bronze medals.

Magelang City is a small city that already has many universities, both state and private, but there are no universities that have sports study programs, so that swimmers and assistant coaches in Magelang City do not have companions to learn about the application of technology in the field of sports.

Swimmers and assistant coaches in various clubs in Magelang City still use manual recording in training. In fact, they already have coaching certificates from beginner to expert level, but their literacy about technology is still lacking, especially applications in the field of information technology and sports science. Recording training data still uses conventional methods using stationery so that it is prone to data loss due to the lack of knowledge and skills of coaches and assistant coaches regarding the use of information technology for coaching. In addition, assistant coaches have not been able to analyze using computer-based sports science. Therefore, training and assistance funds are needed in order to increase the information technology capacity of swimming coaches and assistant coaches to develop the achievements of swimming athletes in Magelang City. This Community Service Activity is a new activity and there has never been a Community Service activity that is similar or similar to this activity. However, the author refers to several Community Service journals such as Socialization of the Application of Sport Science in Improving Athlete Achievement (Binqalbi Ruzain et al., 2022). The results of this Community Service activity obtained an increase in participants' understanding related to the application of the concept of sport science in improving athlete achievement.

Method

This community service activity is carried out using training and mentoring methods. The participation of partners in this community service activity includes participating in socialization activities, training, technology introduction and mentoring that has been scheduled. The following are the stages of the method carried out:

a. Socialization

Socialization activities are carried out through several activities, namely the Observation and Interview Methods. After that, Prepare an Operational Activity Plan, namely preparing a plan starting from a team coordination meeting plan, correspondence, identifying criteria, number of trainers, mentors, preparing presentations, activity schedules, implementing training programs, implementing monitoring and evaluation, and plans for compiling activity reports and writing scientific articles in National Journals/Mass Media.

b. Training

Training activities are carried out by holding Technical Guidance or Technical Guidance, then applying it to partner problems so that they can provide solutions according to the target. The resource person provides training to participants using the lecture method, then after the explanation, participants practice directly with mentoring by several training resource persons.

c. Implementation of technology

The implementation of technology activities is carried out by assisting partners in overcoming problems that occur and establishing direct communication with the implementation of technology that has been prepared. Technical Supervisors in this program involve experts or specialists in their fields and are supported by students with direct real action in the field, and scientific support from the university.

d. Assistance and Evaluation

The activities to be implemented are planned to be evaluated which include the implementation process, partner involvement, and the achievement of each activity. If the evaluation results are not optimal, then the implementation of the following activities is attempted to be optimal. The results of the evaluation are documented in writing in the logbook. The

implementation of monitoring is an activity carried out by the activity implementation team in observing and monitoring the implementation of both Training, Technical Guidance (Bimtek), and Assistance that are carried out or implemented.

In the evaluation activity, indicators for the success of this training are compiled, namely if: 1) more than 90% of participants/trainers understand the implementation of information technology training activities; 2) more than 75% are able to practice, namely the use of information technology; 3) more than 50% of trainers are willing to socialize the ability to use information technology.

e. Sustainability of the program

The results of the mentoring evaluation activities are then used as material for compiling reports and recommendations for activities and as material for the Sustainability Action Plan for the STMIK Bina Patria Magelang Mentored Group in the field of sport science.

Result and Discussion

This community service activity was carried out technically involving collaboration between the research and community service unit (LPPM) of STMIK Bina Patria Magelang with Sebelas Maret University Surakarta, Physical Education and Health Study Program, with swimming coaches under the guidance of the Indonesian National Sports Committee (KONI) of Magelang City. The training participants were swimming coaches under the guidance of Magelang City, with a total of 15 participants, consisting of swimming coaches and sports teachers. The following are the results of the activities according to the stages of the method carried out:

a. Socialization

Socialization activities were carried out by observing the partner's location, then observing the partner's problems that occurred in the swimming training process. In addition, interviews were conducted with the management of the Indonesian Aquatic Federation and coaches and assistant coaches involved in implementing the training. At this stage, the team held a team task division meeting, scheduled a coordination meeting, which was intended so that the implementation of activities starting from preparation, implementation, monitoring and evaluation, to the preparation of reports could run according to the predetermined plan. For this socialization stage, students helped create documentation that would be uploaded to the daily activity report, made banners and socialization videos. The credit recognition plan is for the courses Computer and Society, Visual Communication Design, Multimedia, Graphic Design.

b. Training

The first activity in the Joint Community Service Program in collaboration between STMIK Bina Patria and Sebelas Maret University was to conduct Bimtek or Technical Guidance which was held on Saturday, September 7 with the activity location at the Kyai Langgeng Park Swimming Pool.

Dr. H. Rony Syaifullah from Sebelas Maret University gave a presentation on Motivation in Improving Sports Achievement. As a former international athlete, Dr. H. Rony Syaifullah explained that great achievements do not come overnight, they require strong determination and motivation. TimNotke said "Hard work beats talent when talent doesn't work hard". Sports are not only about physical strength, but also mental strength.

Then it was also explained why sports achievements are important? Because to maintain Physical Health (Stronger body, increased endurance), Mental Development (Building discipline, self-confidence, and focus), Pride and Recognition (Achievements provide a sense of personal pride and recognition from others), Career Opportunities (Sports achievements can pave the way to a professional career).

In addition, it is explained how to increase motivation in sports, namely by Setting Clear Goals (specific, measurable, and realistic targets), visualizing success (Imagine yourself achieving achievements, this builds self-confidence), enjoying the Training Process (Focus on progress, not just the end result), and Get Inspiration from Others (Learn from successful athletes who have achieved big goals).

In addition, it is explained how to overcome obstacles in increasing achievement such as Boredom and Fatigue are overcome by resting and maintaining a balance between training and recovery. Failure as Learning: Every failure is a step towards success. Don't be afraid to fail, but make it a lesson. Stress and Pressure: Use stress management techniques such as meditation, relaxation, and maintaining focus on goals. Motivation to keep fighting: Understand Your Reasons for Training: What makes you want to achieve? Is it for yourself, family, or career ambitions? Social Support: Ask for support from those closest to you to stay motivated. Celebrate Small Victories: Every progress, no matter how small, is a sign that you are on the right track. “every journey begins with one small step” Meanwhile, M Lutfi MA, ST, M.Kom from STMIK Bina Patria gave a presentation on the role of information technology in improving athlete achievement by explaining applications that can be used in swimming sports such as: Swimplan, Swim IO, Swim4Gold, GoSwim,

MySwimPro, MySwimfit, SWUM (Swimming Human Simulation Model).

Figure 1. Technical Guidance Activities

This activity is a preliminary activity that will be continued with simulation practice and mentoring for 2 months, especially for the SWUM application, which is software used to implement a human swimming simulation model. This application provides swimming simulation with input data in the form of body geometry, joint movement, and fluid force. The input data is then analyzed to produce the output of a human swimming simulation model with output data in the form of swimming speed, propulsion efficiency, thrust, joint torque, and so on.

c. Application of technology

In the digital era, becoming a coach also requires computer-based sports science expertise to develop athlete performance, especially physical, technical, tactical and psychological (Sun & Wang, 2024a). Technology application activities are carried out through basic IT training for swimming coaches, such as MS Office so that coaches can copy athlete personal data, athlete physical data, athlete daily training data, athlete attendance data which can then use table facilities, graphs and calculations for analysis.

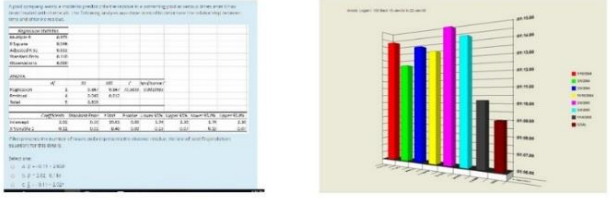

Figure 2. Basic MS Office training materials

Another technology implementation activity is the training of the Swumsuit Swimming Simulation software (SWimming hUman Model with Synthetic User Interface Tools) where the human swimming simulation model and Computational Fluid Dynamics Methodology are implemented. This software is open source software so there is no need to pay to use it. SWUM was created by a development team led by Prof. Motomu Nakashima, Tokyo Institute of Technology, Japan. SWUM (SWimming hUman Model) is a Human Swimming Simulation Model, developed with the aim of being a powerful analysis tool for various dynamic problems in swimming sports. In the SWUM software, the absolute motion of the entire human body is solved from the mathematical equations of body motion, fluid force and body inertia, by providing relative body motion (joint angle). SWUM software makes it possible to analyze various dynamic problems in swimming sports, such as the effect of different swimming styles on swimming speed and absolute body motion.

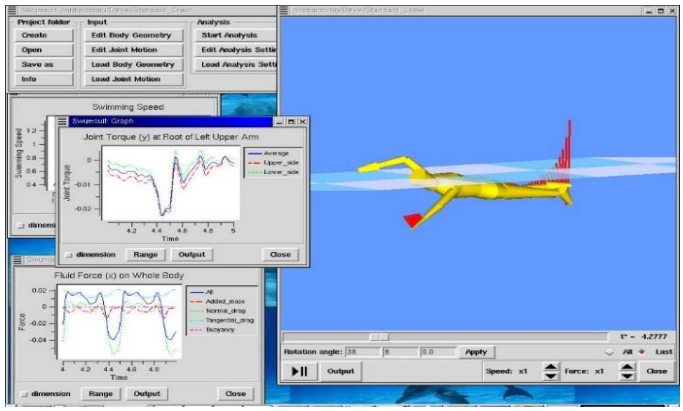

Figure 3. Swum software analysis display

SWUM (Swimming hUman Model with Synthetic User Interface Tools) is a software used to implement a human swimming simulation model. Data for body geometry, joint motion, and analysis settings are provided to the "analysis engine" section as input. The analysis engine estimates the fluid forces acting on the human body from the given input data, solves the equations of motion of the human body as a rigid body, and calculates the absolute motion of the human body. The analysis engine also outputs a lot of data, such as swimming speed, propulsion efficiency, thrust, joint torque, and so on, obtained from the analysis (Husein Allsabah et al., 2024).

By using the Swumsuit and AnyBody Modeling System software, Trainers can perform a full-body musculoskeletal simulation used for swimming. Musculoskeletal is a general term that refers to the human body system consisting of bones, joints, muscles, nerves, and connective tissues. This system allows the

body to move and perform activities, such as walking, running, and picking up objects.

The musculoskeletal system is also called the skeletal system because this supporting structure gives shape to the body, makes blood cells, protects organs, and stores minerals. The musculoskeletal system is an important component of human health. In addition to providing the body with structure and a means of movement, the musculoskeletal system functions as an endocrine system, which is stimulated by exercise, and interacts through biochemical signals with other organs in the body (Ellis-Brush, 2020).

d. Mentoring and Evaluation

Mentoring the application of computer simulation technology in swimming pools with Computational Fluid Dynamics Methodology is carried out to observe and understand the movement of water around the human body and to improve effective and efficient swimming techniques. There are many fluid dynamic problems in swimming sports so an analytical approach is needed.

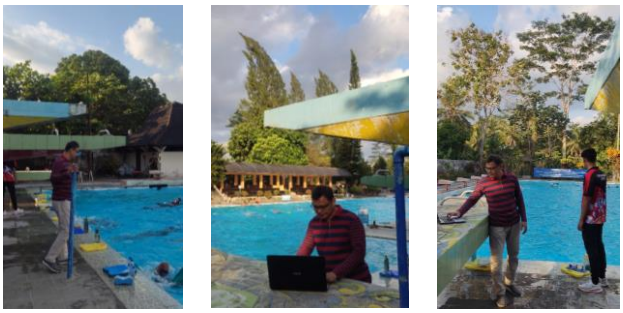

Figure 4. Computational Fluid Dynamics Methodology Assistance in Mendut Swimming Pool

This simulation model outlines the simulation model, joint motions for one stroke cycle, and calculation specifications. Furthermore, this simulation model outlines the contribution of each fluid force component and each body part to the thrust, the effect of the flutter kick, the estimation of active drag, rolling motion, and propulsive efficiency (Cossor, n.d.).

Figure 4. Computational Fluid Dynamics Methodology Assistance for Backstroke and Breaststroke in the Military Academy Swimming Pool

In order to improve the quantitative level of swimming sports teaching, it is necessary to conduct a quantitative analysis of swimming sports mechanics. The method of swimming mechanics analysis based on computer simulation technology is used to analyze the mechanics of swimming athletes' limb movements. The simulation results can estimate the mechanical parameters of swimming movements, and can guide swimming training effectively, efficiently and accurately (Sun & Wang, 2024b).

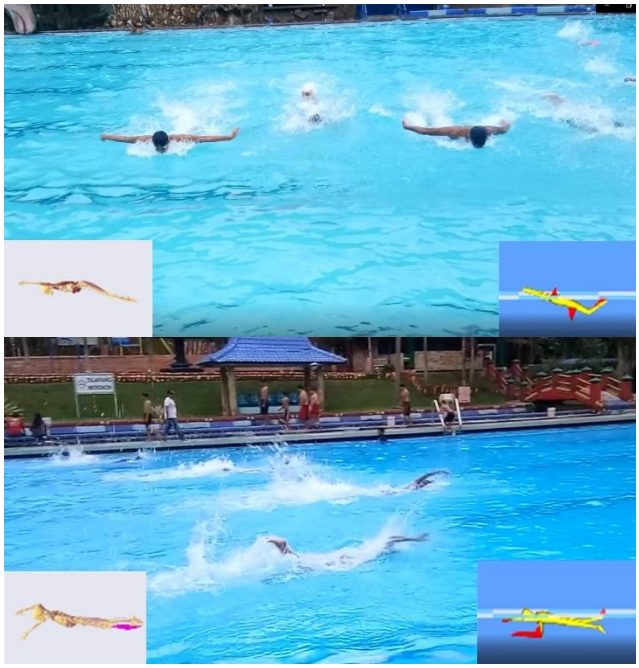

Figure 5. Computational Fluid Dynamics Methodology Assistance for Butterfly and Freestyle in Sukoco Swimming Pool

The video image above is an example of SWUM analysis for butterfly and freestyle, which shows the movement for one cycle in a steady state. The red line shows the fluid force acting on each part of the body. The surface of the water is in a checkerboard shape. The total width of the dark blue and pale blue areas corresponds to the length of the swimming stroke (the distance swam during one cycle).

e. Sustainability of the program

The results of the mentoring and evaluation activities are then used as material for compiling reports and recommendations for activities and as material for the Action Plan for the sustainability of the STMIK Bina Patria Magelang Fostered Group in the field of sport science.

The sustainability of the program activities will be marked by a Memorandum of Understanding (MoU) between STMIK Bina Patria and the Indonesian Aquatic Federation of Magelang City to collaborate in the field of sport science. In addition, a Memorandum of

Understanding (MoU) will also be carried out between STMIK Bina Patria and the Sebelas Maret University of Surakarta, Faculty of Sports.

Discussion

The main key to helping athletes achieve success is a competent coach. Coaches who are experts in their fields will find it easier to create and implement training programs to help athletes achieve success through learning development (Malik et al., 2015). Competent coaches require high training hours and are able to act as teachers, coaches, instructors, motivators, disciplinarians, managers, administrators, social workers, friends and scientists.

Sport science is a discipline that studies the application of scientific principles and techniques that aim to improve sports achievement. Sport Science has directions, among others, to predict and compare the results of tests that have been carried out and monitor the results of training that has been carried out. Sport Science can also be used as a decision-making tool and set goals in training programs.

Several large countries such as Germany, China, South Korea, and Australia are some of the countries that have very intensively implemented sophisticated Sport Science. As a result, athlete achievements have been boosted in various sports. Without utilizing sport science, the sports achievements of Indonesian athletes will continue to lag behind other countries. Until now, there are still coaches who consider science and technology only as a spice for sports. In fact, technological innovation in sports today has become a necessity and must be used as raw material for achieving sports achievements.

Based on the success indicators obtained from the monitoring and evaluation stages, the results showed that 90% of swimming coaches and assistant coaches already understand the importance of using information technology. 75% of coaches and assistant coaches are skilled in using information technology even though they encounter obstacles. 75% of coaches are able to practice using the Computational Fluid Dynamics Methodology and 80% of coaches are willing to socialize the application of swimming information technology to colleagues.

Swimming coaches and assistant coaches are enthusiastic and motivated to use the application. This can be seen during the question and answer session, the coach asked about the material on use. During the practice of implementing technology, swimming coaches and assistant coaches can understand and apply it and are able to identify difficulties to conclusions. Judging from their profession and experience, swimming coaches and assistant coaches in the city of Magelang have the potential, knowledge and ability to implement sports science. Based on the potential of each party involved in this training activity, the form of mentoring and cooperation presents a very strategic and positive synergy between higher education institutions and those who will receive training from professionally trained educational staff from higher education institutions to improve their competence in the use of physical test applications and strategic vehicles to disseminate educational knowledge with wider targets and reach, namely Swimming Coaches and Assistant Swimming Coaches in Magelang City. Lecturers and students of the community service team play a strategic role in every activity, both in counseling or coaching activities and in training activities. Each team member carries out tasks and functions that are relevant to the training materials and lecturers are always side by side in providing assistance on how to use the application. In training activities on the use of the application, each member acts as a speaker, mentor, and assistant or director in technical assistance on the use of the application.

Conclusion

Based on the results and discussion, it is concluded that the training activities for the use of Information Technology in swimming are very suitable to be implemented. Coaches are able to use the application and are willing to socialize the application to colleagues. Based on the conclusions above, the following are suggested; IT capacity building training activities for Swimming Coaches and Assistant Swimming Coaches in Magelang City are continued in the following year, Training activities involve more Swimming Coaches and Assistant Swimming Coaches in Magelang City, and more Physical Education and Health Lecturers are involved in training activities.

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References

Binqalbi Ruzain, R., Henjilito, R., & Islam Riau, U. (2022). Sosialisasi Penerapan Sport Science Dalam Meningkatkan Pretasi Atlet. *Communnity Development Journal*, *3*(3), 1659–1662.

Cossor, J. (n.d.). *The Use of Technology to Improve Swimming Performance Skill focus*.

Ellis-Brush, K. (2020). *Coaching In A Digital Age: Can A Working Alliance Form Between Coachee And Coaching App?*

Husein Allsabah, M. A., Putra, R. P., Weda, Sugito, Puspodari, & Junaidi, S. (2024). Physical Monitoring in Swimming Athletes: Leveraging Dominant Physique as a Benchmark. *Gandrung: Jurnal Pengabdian Kepada Masyarakat*, *5*(1), 1494–1508. https://doi.org/10.36526/gandrung.v5i1.3369

Sun, J., & Wang, S. (2024a). Diversified Teaching Strategies for College Swimming Courses in the Context of Artificial Intelligence. *Applied Mathematics and Nonlinear Sciences*, *9*(1). https://doi.org/10.2478/amns.2023.2.01649

Sun, J., & Wang, S. (2024b). Diversified Teaching Strategies for College Swimming Courses in the Context of Artificial Intelligence. *Applied Mathematics and Nonlinear Sciences*, *9*(1). https://doi.org/10.2478/amns.2023.2.01649