

The Coaching Model for Prospective Science and Mathematics Teachers from the Achievement and KIPK Paths

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ABSTRAK

Analisis capaian prestasi mahasiswa angkatan tahun 2019 menemukan fakta baru bahwa ada kecenderungan penurunan prestasi yang diraih mahasiswa yang masuk melalui jalur prestasi dan jalur Kartu Indonesia Pintar Kuliah. Persentase prestasi mahasiswa kedua jalur kurang dari 5%. Penelitian ini bertujuan mengembangkan model pembinaan prestasi mahasiswa calon guru sains dan matematika dari jalur prestasi dan KIPK. Penelitian menggunakan metode penelitian dan pengembangan untuk mengembangkan model pembinaan mahasiswa yang melibatkan pakar manajemen pendidikan untuk memvalidasi model yang dikembangkan. Penelitian memperoleh hasil dimana model pembinaan prestasi mahasiswa dinyatakan layak digunakan oleh pakar. Hasil uji coba keterterapan model dalam skala luas melibatkan 240 calon guru sains dan matematika. Persentase mahasiswa yang meraih prestasi selama satu semester dari jalur prestasi 16% dan dari jalur KIPK 25% Model pembinaan telah menaikkan prestasi mahasiswa yang sebelumnya kurang dari 5% untuk kedua jalur. Kesimpulannya, model pembinaan prestasi mahasiswa dari penelitian ini dapat menjadi cara baru dalam melanjutkan budaya untuk berprestasi semasa di sekolah dan perguruan tinggi.

ABSTRACT

Analysis of students' achievement in 2019 found new facts that there was a tendency to decrease in achievement from the achievement path and the Indonesian Smart College Card students. The percentage of students' achievement from both paths is less than 5%. This study aims to develop a student achievement coaching model for prospective science and mathematics teachers from the achievement and KIPK paths. The research uses research and development methods to develop a student coaching model involving education management experts to validate the model. The study obtained results where the student achievement coaching model was declared suitable for use by experts. The results of a large-scale model applicability test involve 240 prospective science and mathematics teachers. The percentage of students who made achievement for one semester from the achievement path was 16%, and from the KIPK path was 25%. The coaching model increased students' achievements, which was less than 5% for both paths. In conclusion, the student achievement coaching model from this research can be a new way to continue the culture to make achievements during school and college.

1. INTRODUCTION

Students admitted to the university through the achievement path are based on achievement during school, such as academic and extracurricular achievements. Extracurricular achievements include district, provincial, national, and international championships. Achievement path students are expected to make achievements like in school. Students with achievements have trained talents because achievements are obtained from programmed efforts (Kim et al., 2020; Qurbani et al., 2020; Retnowati et al., 2016). Students with achievements are important skills for prospective teachers because they can inspire and motivate students. Science education students are prepared to become prospective teachers with high

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achievement and character (Khusniati, 2012; Mensah, 2022; Naidoo, 2017). Prospective mathematics teachers are prepared to have the skill to solve mathematical problems (Lee, 2016; Swars Auslander et al., 2020). Analysis of students' achievement in 2019 found new facts that there was a tendency to decrease in achievement from the achievement path and the Indonesian Smart College Card students. The percentage of students' achievement from both paths is less than 5%. KIPK path students have academic and extracurricular achievements and poor economic situations. The two new admissions paths filter prospective students in educational programs. Prospective teachers are prepared to have various skills to educate students to make achievements according to their interests and talents (Gist, 2018; Gotwals & Birmingham, 2016). Achievement path admission of education students is carried out at Universitas Negeri Semarang to capture and provide opportunities for prospective students with achievements during school.

However, from the student achievement data at the Faculty of Mathematics and Natural Sciences in 2021, achievement path students' achievements are minimal. Only a few KIPK students made achievements. The achievement in question is the championship per the achievements at school. Based on the analysis of achievement from the achievement path and the KIPK path students, a coaching model is needed to produce various championships from competitions at national and international levels (Chen et al., 2011; Coté et al., 1995; Klusemann et al., 2013). Achievement students are accepted with relatively small tuition fees. The government bears tuition fees for KIPK students, and they even get monthly living expenses. From the condition of these two student groups, they should be targeted to make various achievements during their studies. Profiles of graduates with various achievements are preferred by graduate users when entering the world of work (Habibi, 2018; Muhson et al., 2012). Students' achievements are obtained in a planned manner with a continuous coaching program. Prospective science teachers have potential since they were in school, so a coaching strategy is needed so that their achievements will continue when they are in universities. The opportunity to participate in various competitions is a space for channeling students' interests and talents (Csikszentmihalyi et al., 1997). The spirit to achieve achievement is built through students' self-awareness to channel their interests and talents. Interests and talents are owned since students are still in school. Students awaken achievement awareness to have competitiveness (Nayantaka, 2017; Sulistiyono et al., 2021). Prospective science and mathematics teachers are known as students with scientific traditions as a support for obtaining various championships. Based on the analysis of various scientific journals, prospective science and mathematics teachers are students prepared through theoretical and practical education in the laboratory to have scientific work skills. Prospective science teachers are prepared through scientific familiarization from theory exploration and practicums in the laboratory (García-Carmona et al., 2018; Superfine & Pitvorec, 2021). The skills of prospective science and mathematics teachers from scientific activities provide real experience for conducting research. Various student research results become material for participating in various competitions. The characteristic of prospective science and mathematics teachers is that they like to write scientific papers (Loucks-Horsley et al., 2009). The potential at school with various educational preparation strategies becomes the strength of prospective science and mathematics teachers to make achievements. This study aims to develop a student achievement coaching model for prospective science and mathematics teachers from the achievement and KIPK paths. The developed coaching model will familiarize prospective science and mathematics teachers with achievement (Asghar et al., 2012; Huang et al., 2010). Achievements in this study are limited to championships or competition achievements. This study does not analyze students' academic achievement. The developed model is applied to students for one semester, then data on students' achievement is collected.

2. METHOD

The research uses research and development methods that refer to Borg and Gall (2005). This method is used to develop a student coaching model that involves education management experts. This research procedure includes model development, model validation and testing, model implementation, and model effectiveness measurement. Experts validate the developed model. This research is expected to be used in various educational institutions for prospective science and mathematics teachers. The research targets are prospective science and mathematics teachers from four study programs at Universitas Negeri Semarang: science education, biology education, chemistry education, physics education, and mathematics education. This research is limited to prospective science and mathematics teachers for the 2019-2021 class who are accepted through the achievement and KIPK paths. The small-scale model test was applied to prospective teachers from science education, while the large-scale test was applied to prospective teachers from biology, chemistry, physics, and mathematics education. The data collected in this study were model validation, expert input, model applicability, and students'

achievements in one semester after being the research target. The instrument outline for model validation includes readability, model objectives, model stages, and ease of application with a score of 1-5. Students' achievements are calculated from championships they obtained at least third place nationally. The validation of the model in this study is content validation which is analyzed descriptively and qualitatively. Expert input will be analyzed substantially to improve product design. The model's applicability was analyzed by measuring the level of applicability to the research objectives. Students' achievements will be analyzed qualitatively to determine the impact of the model.

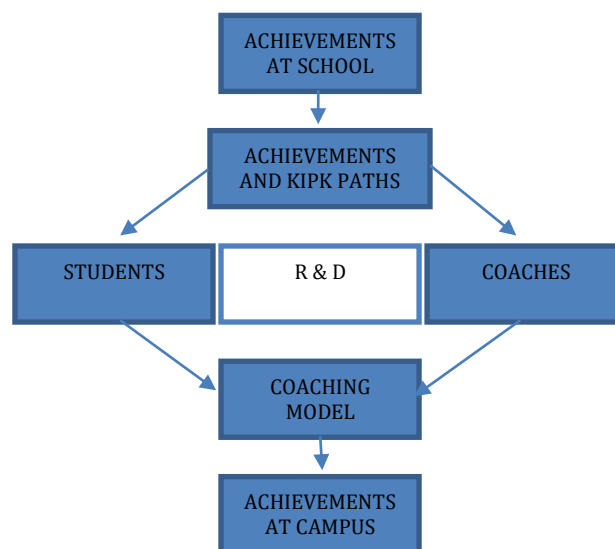


Figure 1. Coaching Model for Prospective Science and Mathematics Teachers

Coaching model for prospective science and mathematics teachers is presented in Figure 1. The development of a coaching model with research and development methods begins with an analysis of the potential strengths of students at school. Their achievements at school become a reference in developing models because the target is to maintain and improve achievement at school. Coaching involves a lecturer systematically becoming a coach in implementing the resulting model. The model as a research product has a coaching stage so that all prospective science and mathematics teachers from both paths make achievements.

3. RESULT AND DISCUSSION

Result

The developed model was named *Model Pembinaan Prestasi Mahasiswa (MP2M)*. The name is determined so that it is easy to pronounce, following the program, and the model can be disseminated more widely. Problems in the achievement of prospective science and mathematics teachers from both paths allegedly occurred in other universities. The stages in the MP2M include identification of interests and talents, achievements during school, achievement field groups, lecturer coaching, training according to fields, delegation, competition, and reflection. The validation results of the coaching model with a score range of 1-5 from experts are presented in Table 1.

Table 1. Validation and Input from Education Management Expert

Validation Aspect	Score	Expert Input
Readability	4	The model academic manuscript is easy to understand because it uses common operational words and follows linguistic rules.
Purpose of Model	5	The purpose is clear by mentioning that the model is developed to coach students to make achievements according to their interests and talents.
Clarity of Model Stages	4	The eight stages of the model are clearly stated.

Validation Aspect	Score	Expert Input
Measurement of Each Stage	4	Each stage can be measured quantitatively and qualitatively so that each stage's achievement is rational.
Ease of Application	4	Supervising lecturers can easily apply the developed model.

After the development model for prospective science and mathematics teachers was declared feasible to use. The results of a large-scale model applicability test involving 240 prospective science and mathematics teachers with a score range of 1-5 are presented in Figure 2.

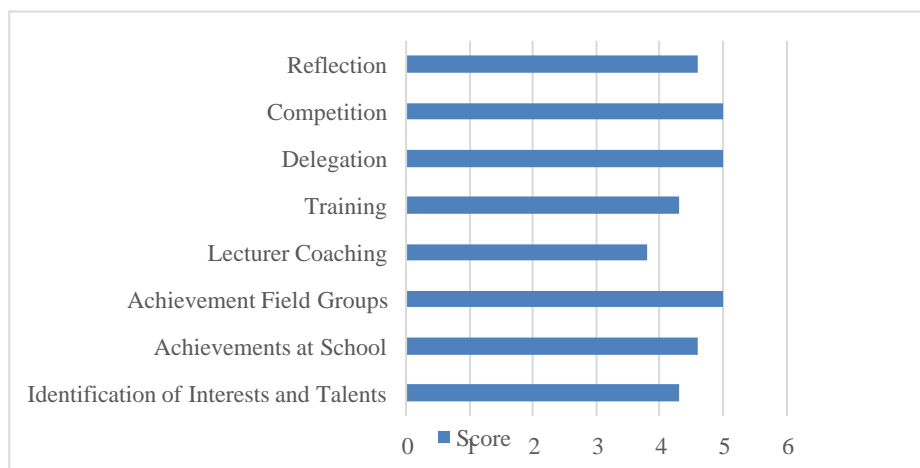


Figure 2. The Results of Large-scale Model Applicability Test

The average score of the eight stages is 4.6, implementing that the model is easy to apply. The model is used for student coaching for one semester, as shown in Figure 3.

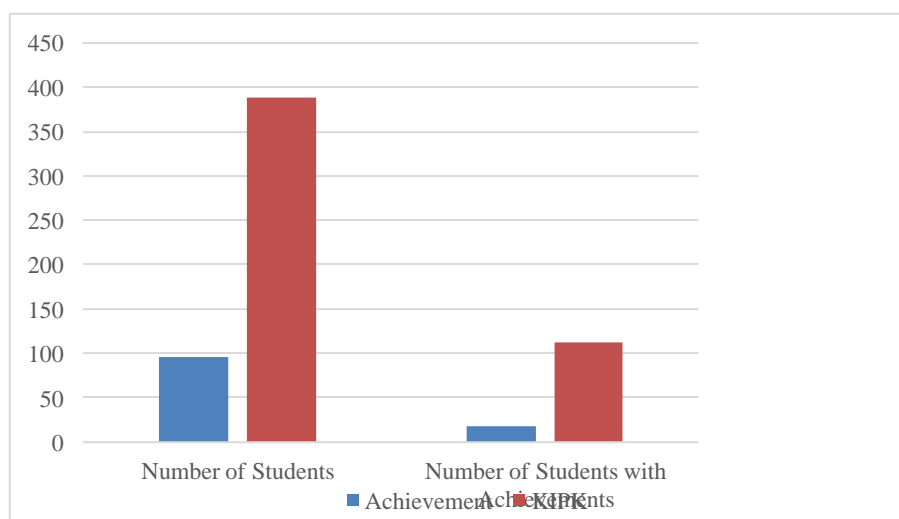


Figure 3. Achievements of Achievement and KIPK Path Students Class of 2020-2021

The percentage of achievement path students who made achievements for one semester is 16%, and the KIPK path is 25%. The coaching model increased student achievement, which was less than 5% for both paths. After applying the model for one semester, the data were explored through a random open interview with 20 prospective science and mathematics teachers with school achievements. In summary, the interviews with 20 prospective science and mathematics teachers are presented in Table 2.

Table 2. Interview Results

Pertanyaan	Jawaban Responden
Did you have any achievements from championships (district/province/national/international) when you were in school?	Yes, I had.
Do you have the desire to continue making achievements according to your talents?	Yes, I do. I want to go back to participating in competitions like when I was at school
Do you participate in the coaching from the supervising lecturer according to your field of achievement?	Yes, I participate according to the group of achievement field.
What is your opinion about the coaching?	In my opinion, the coaching is good enough. However, the frequency of delegation still needs to be increased so that there are more opportunities for achievement.

Discussion

The achievement coaching model for prospective science and mathematics teachers has three main specifications: having eight stages of activity, involving a supervising lecturer, and using achievement to measure the success of implementing the model. The identification stage of interests and talents is the initial stage of sorting out the types of achievements in schools that best suit interests and talents. Not all achievements are based on interests and talents because there are achievements from school assignments. Students whose talents are identified and their school achievements are grouped into various small achievement field groups. The results of this study classify students into seven fields: scientific writing, science, sports, art, speeches or debates, scouting, and nature lovers. The seven fields support strengthening the skills and competencies of prospective science and mathematics teachers. Prospective mathematics teachers have various potentials that can be developed, including competencies outside the scientific field (Nasution, 2018; Sumartini, 2020). Coaching from supervising lecturers is the key to success in facilitating the sustainability of achievements according to students' interests and talents. Sustainability of achievement is an important part that requires lecturer coaching. Coaching in the developed model is carried out by providing motivation, making them aware of their potential, and preparing competition materials. Supervising lecturers are essential in facilitating students' achievements (Beaudoin, 1990; Komarraju & Nadler, 2013). Coaching is carried out programmatically through online and face-to-face meetings. Coaching intensity increases when there are competitions by various institutions. The materials for the competition become the focus of coaching so that students feel they get strengthened and motivated to take part in the competition. Lecturers guide students through training that brings experts in the field of competition. The results of the coaching are followed up in the delegation program. Students who take part in coaching are funded to compete through a delegation fund scheme. Participants who attended coaching that presenting experts have the opportunity to make higher achievements than those who have not attended coaching (Alinier et al., 2006; Hahn et al., 2011; Zakiyatunufus, 2019). The developed model provides space for lecturers through an umbrella pattern for lecturers' work to students. Lecturers adopt various coaching strategies because the competition to win various science and mathematics competitions in Indonesia is relatively high. The coaching model allows supervising lecturers to choose strategies to make coaching activities more adaptive. The level of applicability of the achievement coaching model for prospective science and mathematics teachers is inseparable from the characteristics of the two fields. Groups of prospective teachers in both fields dominate in participating in science-related competitions. Scientific writings are the most participated because students have a linear scientific background. The suitability of the scientific field is the most crucial factor in developing students' competencies. The model is easy to apply, so it has the potential to be implemented in other universities. This research product has the opportunity to be applied and developed for students in fields other than science education and mathematics education. The implications of the resulting model can be followed up as a coaching form for prospective science and mathematics teachers from the achievement path. The problem of students' achievement, which does not continue from school to college, can be resolved by applying this research product. This study has limitations on the length of time for coaching, which is only one semester. Universities can provide long-term coaching because extracurricular achievements take a long time. The model can be widely applied by modifying the form of coaching by adapting it to the type of achievement targeted.

4. CONCLUSION

The characteristics of science in science and mathematics education are integrated into educating competitive prospective teachers. The culture to make achievement makes the competition for graduates more competitive. Students' achievement in science and mathematics education is difficult to continue from school to college if special treatment is not carried out. The student achievement coaching model from this research can be a new way to continue the culture to make achievements during school and college.

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