

Parallel curriculum model: An evaluation on students' academic achievement and motivation in profession of education course

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Article Information	Abstract
Keyword: Parallel curriculum model; Academic performance; Motivation; Profession of education; Course Kata Kunci: Model kurikulum paralel; Performa akademik; Motivasi; Profesi pendidikan; Mata kuliah History: Received : 14/11/2024 Revised : 21/01/2025 Accepted : 10/02/2025 Published : 11/02/2025	A suitable teaching model and strategy are essential to enhance student motivation and learning in the classroom, following the semester program evaluation meeting results in the biology education department for the 2023/2024 academic year. The Parallel Curriculum Model (PCM) is a curriculum framework designed to provide appropriately challenging and differentiated learning experiences that increase intellectual engagement. This experimental design study explores PCM's impact on student learning outcomes, identifies the PCM parallel group with the highest achievement, and assesses its effect on student motivation. The participants included 78 students enrolled in the Profession of Education course. Academic achievement was evaluated through case analysis-based pre- and post-test essays, analyzed using t-tests, while motivation was measured with the ARCS motivation model, then categorized by levels. Findings reveal that PCM positively influenced student performance, and motivation levels were high. This suggests that using PCM as a teaching strategy can be an effective alternative to enhance students' academic success. Moreover, incorporating ARCS motivation principles into curriculum design can contribute to more dynamic learning environments and improved academic results. Abstrak. Model dan strategi pengajaran yang tepat sangat penting untuk meningkatkan motivasi dan pembelajaran siswa di kelas, sebagai tindak lanjut dari hasil evaluasi program semester di departemen pendidikan biologi tahun akademik 2023/2024. Parallel Curriculum Model (PCM) adalah kerangka kurikulum yang dirancang untuk memberikan pengalaman belajar yang menantang dan terdiferensiasi secara tepat, yang dapat meningkatkan keterlibatan intelektual siswa. Penelitian dengan desain eksperimen ini bertujuan untuk mengeksplorasi dampak PCM terhadap hasil belajar siswa, mengidentifikasi kelompok paralel PCM dengan pencapaian tertinggi, serta menilai pengaruhnya terhadap motivasi siswa. Partisipan dalam penelitian ini adalah 78 mahasiswa yang terdaftar dalam mata kuliah Profesi Pendidikan. Pencapaian akademik dievaluasi melalui esai pre-test dan post-test berbasis analisis kasus, yang kemudian dianalisis dengan uji t, sementara motivasi diukur dengan model motivasi ARCS dan dikategorikan berdasarkan tingkatannya. Hasil penelitian menunjukkan bahwa PCM memiliki pengaruh positif terhadap kinerja akademik siswa, dan tingkat motivasi siswa berada pada kategori tinggi. Hasil ini menunjukkan bahwa penggunaan PCM sebagai strategi pengajaran dapat menjadi alternatif efektif untuk meningkatkan prestasi akademik siswa. Selain itu, penerapan prinsip-prinsip motivasi ARCS dalam desain kurikulum dapat menciptakan lingkungan belajar yang lebih dinamis dan meningkatkan hasil akademik.

A. Introduction

Based on the results of the 2023/2024 odd learning evaluation meeting in the Biology Education Study Program, it was found that there was a decline in student learning outcomes (academic achievement) in the Biology Education Study Program (PS) and this was conveyed by almost all lecturers who taught the course (PS Evaluation Notes, January 2024). Apart from that, it was found that students' attitudes and performance towards lectures were also problems that needed to be addressed in the right way. Previous research has found that there are several factors that can influence the achievement of learning outcomes, including learning motivation, learning style (Suciani et al., 2022) and learning strategies or methods on achieving learning outcomes (Hafeez, 2021).

Academic achievement is a pivotal aspect of students' educational progress, serving as a key indicator of their success in completing academic programs. It often acts as a gateway to scholarships, career prospects, and further educational advancement. Beyond demonstrating knowledge, academic achievement also reflects the development of essential skills that contribute to success both during studies and in professional life after graduation (Manurung, 2017).

Like the concept of diversity, each group of students taking courses has diverse characteristics, which can arise from interactions with the environment or inherited genetic factors. The interactions between individuals and their environments contribute to everyone's learning profile, which is a combination of strengths, vulnerabilities, and preferences that determine how a person operates most efficiently as a learner (Renzulli et al., 2010). Due to the diverse characteristics of students, both in terms of learning styles and learning needs, differentiation in learning needs to be carried out. Previous research has shown that differentiated learning has a positive impact on education (Deunk et al., 2018) and students' academic achievement (Aguanda et al., 2023; Lim et al., 2022; Little et al., 2014). However, the differentiation process in learning will be successful if it pays attention to a valid differentiation operational approach and the teacher's skills in designing the learning process (Deunk et al., 2015). Based on problems regarding student academic achievement and interest in learning which shows a decline, there is a need to design a learning model based on differentiated learning that involves active participation of students in the learning process according to individual interests and learning styles.

The PCM or parallel curriculum is a curriculum design that can provide appropriate challenges and learning activities based on ascending intellectual demand that can improve analytical, critical and creative thinking (Tomlinson & Jarvis, 2023). PCM is structured around four parallel components: Core, Connections, Practice, and Identity. The "Core"

represents the essential knowledge of the discipline, while "Connections" integrate the discipline with other fields across different time periods and contexts. "Practice" centers students in the curriculum, fostering their ability to apply disciplinary concepts and skills for investigation. Finally, "Identity" encourages students to reflect on their strengths, interests, and passions, guiding their personal and academic growth (Lim et al., 2022; Tomlinson & Jarvis, 2023).

The PCM helps to maximize the development of talents in each student (Lim et al., 2022). The learning process through PCM is also focused on developing problem solving to support the needs of key performance indicators (IKU) for higher education in supporting case method/team-based project-based learning. PCM is expected to support sustainable development for the purpose of achieving quality education that considers gender equality. Apart from that, there is a need for quality teaching materials with the integration of appropriate technology to be able to contribute to the implementation of Outcome Based Education (OBE) curriculum-based learning.

Learning motivation is encouragement from within students and from outside to achieve learning goals. There are four aspects of student learning motivation, including attention, relevance, confidence, and satisfaction (abbreviated as ASCR). These four aspects can be broadly understood as: 1) Attention is students' attention that arises from curiosity. Characterized by strong concentration on subject matter. 2) Relevance, meaning that there is a connection between the learning material and the students' needs and situations, thereby helping students stay motivated. 3) Confidence is a state of student motivation which is related to personal belief in their ability to carry out a task and is a prerequisite for success. 4) Satisfaction (satisfaction) is the impact of a student's success in achieving learning goals (Asiani et al., 2017; Jamil, 2019; Setyowati et al., 2022). Student learning motivation can be determined through direct and indirect observation. Student learning motivation is one of the things that supports students' success in understanding a lesson. Without learning motivation, learning activities and learning achievement will decrease rapidly.

The PCM has been applied in schools with characteristics, such as those for gifted or talented students. However, there is insufficient research on its implementation at the university level, especially among regular students. Here, "regular" refers to students who demonstrate above-average abilities but are not classified as gifted or talented. The implementation of PCM in schools has focused on improving learning outcomes (Lim et al., 2022) and enhancing creative writing skills (Bozca et al., 2018). While some research addresses PCM at the university level, it primarily explores students' perceptions of

PCM in their lifestyle medicine programs (Pojednic & Frates, 2017).

Based on the analysis above, the application of the PCM at the university level and its impact on student learning outcomes and motivation remains limited. Therefore, this study aims to analyze the effect of implementing the PCM model on student learning outcomes, identify the PCM parallel group with the best learning outcomes, and examine the model's impact on student motivation. The findings of this research are expected to provide educators with insights into the use of curriculum models that align with student characteristics and their effects on learning outcomes and motivation.

B. Material and method

This research was carried out for six months starting from February 2023 to July 2023 at the Biology Education Undergraduate Study Program, Biology Education Department, Faculty of Teacher Training and Education (FKIP) USK, Darussalam, Banda Aceh. The population of this study were 4th semester students (Class of 2022) who were enrolled in the Education Professionals course (EDU301). The sample in this research is total sampling or the total population. The number of students registered for the EDU301 course is 78 students divided into 3 classes (class 01, class 02 and class 03). Subsequently, students were grouped based on their learning needs and compatibility into four parallel PCM groups, which were later confirmed by the researchers. The results of student grouping according to the PCM learning groups are shown in Table 1.

Table 1 Student grouping according to the PCM learning groups

PCM group	Number of students
Core	16
Connection	32
Practice	13
Identity	17

This research design used a quasi-experiment with pretest and posttest design. The independent variable in this research is the PCM (in the form of Learning Activity Plans and Student Assignment Plans/RTM). Meanwhile, the dependent variable includes student learning outcomes (final exam scores and percentage of learning motivation).

The instruments used in this research include a motivation questionnaire following the Attention, Relevance, Confidence, Satisfaction or ARCS indicators (Keller, 2000). Other instruments that will be designed are pretest and posttest learning outcomes in the form of case-based questions consisting of ten questions based on the learning topics studied (professional teachers, teacher code of ethics, teacher competency, certification and teacher performance). Each

questionnaire instrument will measure its validity and reliability (Creswell, 2012). This research has used face validity techniques. The validity test result is in good category.

The quantitative data measured, the learning motivation variable, will be analyzed using descriptive statistics. Data on students' learning motivation is taken from the results of students' answers to the questionnaire that has been prepared. Research subjects will choose one of the answer choices from all the alternative answers provided for each statement, then for each indicator the average score is found using the Formula 1.

$$\text{Mean Score} = \frac{\sum \text{Respondent Score}}{\sum \text{Total Item Score}} \dots \dots \dots \text{Formula 1}$$

The mean score was subsequently converted into a percentage by referencing the learner motivation criteria outlined by Rahma et al. (2024). This conversion aimed to facilitate the analysis of which ARCS components had the most significant impact on student motivation. The criteria for student learning motivation are shown in Table 2.

Table 2 Student motivation criteria

Mean score percentage	Criteria
81% - 100%	Very high
61% - 80%	High
41% - 60%	Average
21% - 40%	Low
0% - 20%	Very low

After obtaining the results from the average number of statement scores, they will then be adjusted to the category index for the level of learning motivation based on Keller (2000). This data analysis process is data transformation. The variable influence of PCM design on learning outcomes will be analyzed using the t-test. Furthermore, differences in learning outcomes for each PCM learning group will be analyzed using ANNOVA (analysis of variance).

C. Results and discussion

The t-test was carried out to determine whether there was a significant difference in test scores between the learning outcome tests carried out (Table 3).

Table 3 Paired t-test for academic achievement

Parameter	Pre-test		Post-test		t-value	Sig.
	Mean	SD	Mean	SD		
Academic achievement	5.72	3.98	80.0	10.08	65.6	.000

Table 3 show that there is a statistically significant difference between students' test scores after implementing learning strategies with PCM (t (78) = 65.60, p < .001). Therefore, learning with the

PCM model influences the ability of learning outcomes, which are measured through tests based on the ability to analyze cases. This influence on learning outcomes can be caused by the readiness of students' abilities towards the concepts or material being studied. Besides that, the learning experience obtained by each study group can be different depending on the learning activity plans that have been prepared

Furthermore, the test results are descriptive data (Table 4). Next, the Anova test (Table 5) was carried out to see whether there were significant differences in learning outcomes for each PCM study group (Core, Connection, Practice and Identity).

Table 4 Descriptive of post-test result

PCM Group	N	Mean	SD
Core	16	75.19	9.79
Connection	32	80.84	8.45
Practice	13	73.69	13.54
Identity	17	85.29	7.64

Based on the results of descriptive statistics, it can be seen that the highest average learning outcomes were obtained by the Identity study group ($M=85.29$, $SD=7.64$) and the lowest learning outcomes were in the Practice group ($M=73.69$, $SD=9.23$). This indicates that the Identity group effectively utilized the opportunity for self-exploration, enabling a strong understanding of the material's context (Tomlinson, 2023).

The Identity group, which emphasizes personal relevance and self-reflection, fosters a deeper connection to the material, enhancing students' engagement and motivation. Research indicates that curricula that integrate personal identity into learning experiences can significantly influence students' professional identity formation, particularly in fields such as pharmacy and nursing education (Matthews & Mercer-Mapstone, 2018). However, the effectiveness of this approach may be limited by the variability in students' backgrounds and experiences, which can lead to disparities in how individuals relate to the curriculum (Hawkins et al., 2015). In contrast, the Core group focuses on essential knowledge and skills, benefiting from structured learning objectives that align with educational standards. This structured approach can facilitate the development of foundational skills, but it may also restrict creativity and exploration if overly prescriptive (Matthews et al., 2016). The Connection group, which emphasizes interdisciplinary learning and real-world applications, can enhance student engagement by making learning relevant to their lives. Studies have shown that curricula that connect academic content to students' experiences can lead to improved motivation and understanding (Quileste, & Pagara, 2022). However, challenges arise when integrating diverse content areas, as cognitive overload can hinder effective synthesis of information (Liu et al., 2015). Lastly, the Practice group focuses on hands-on experiences, which

can significantly enhance student engagement and application of knowledge. While experiential learning is beneficial, it may be constrained by resource availability and the necessity of balancing practical skills with theoretical understanding (Jirasatitsin et al., 2023).

Table 5 The result of Anova test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1364.43	3	454.81	4.96	.003
Within Groups	6786.96	74	91.72		
Total	8151.39	77			

Based on the results of the Anova test (Table 5), there are significant differences in learning outcomes between PCM study groups ($\text{Sig.} < .005$). This identifies that learning activities through the PCM-Identity study group are more effective for learning the concept of the Education Profession compared to other PCM study groups.

Furthermore, to determine which groups have similar or different mean values, a post-Hoc test (Bonferroni) was conducted. The results of the Bonferroni statistical test are as follows.

Table 6 The result of Post-Hoc (Bonferroni) test

Group of PCM	Mean difference	Sig.
Core – identity	3.34	0.02
Practice – identity	3.53	0.09

Table 6 indicates that the PCM Identity learning group exhibits a significant difference in mean scores compared to the other groups. PCM Identity study groups refer to a curriculum approach that integrates multiple levels of learning and perspectives to create a more cohesive and engaging educational experience. This study group interacts directly with teachers in the field to gain concepts and experiences related to the teaching profession. The PCM-Identity study group explores concepts and real applications in the field related to professional teachers, teacher competency, teacher code of ethics, certification and teacher performance directly in the field so that contextual learning opportunities can be met. Through the integration of connected knowledge into real-world applications, and opportunities for practice, these study groups help students see the relevance and application of their learning in a more integrated way. This can increase engagement when students understand how various aspects of the teaching profession and the education system relate to each other. Students who experience connected and integrated learning are often better able to retain and transfer knowledge through a deep understanding of

concepts. In contrast to the experience of the Core, Connection, and Practice study groups, students in this identity study group can see the relevance of their learning in a sustainable context. This continued relevance can increase motivation and help students understand the practical implications of what they are learning.

Meanwhile, students' motivation data was taken using the ARCS (Attention, Relevance, Confident, Satisfaction) questionnaire. The percentage results can be seen in the Table 7.

Table 7 The results of ARCS measurement

Aspect	Percentage	Criteria
Attention	78,92	High
Relevance	80,89	High
Confident	76,20	High
Satisfaction	76,23	High

Based on the Table 7, it can be seen that student motivation in the Professional Education class using PCM is in the "High" criteria with a percentage range of 61% - 80%, meaning that the application of PCM is able to provide motivation for students and support the process. Learning in the Educational Professionals class was successful. The highest percentage is in the Relevance criteria, namely 80.89%. The application of what students learn is linked to daily life in the learning process so that the "Relevance" aspect is in the highest category. This is in line with Aziz & Shaleh (2019) The level of student learning motivation has a significant influence on their success in the educational process. Educators' efforts to increase student learning motivation are supported if the supporting factors are effective but can become an obstacle if the supporting factors are not effective. In addition, strong motivation allows students to achieve optimal learning outcomes (Athillah et al., 2024).

Besides media, a solution learning model is also needed. The application of PCM is one thing that can make students have a different mindset and be active. There are four study groups that have high levels of motivation in all aspects of motivation. ARCS Motivational is an effective solution, where all aspects will be measured with the aim of increasing interest, motivation, self-confidence, relevance and learning satisfaction. The presence of appropriate media with good motivational measurements can stimulate thoughts, feelings and will to create a learning process in students (Francescucci & Rohani, 2019).

The ARCS measurement posits that effective learning environments must engage students' attention, establish relevance to their lives, build confidence in their abilities, and ensure satisfaction with their learning experiences. Research has shown that students who exhibit high levels of motivation are more likely to engage deeply with the material, leading to improved academic performance (Rahmi et al., 2021; Bahri & Corebima, 2015). For instance,

motivated learners are not only more enthusiastic about completing assignments but also demonstrate enhanced metacognitive skills, which are crucial for effective learning (Bahri & Corebima, 2015). The PCM complements this by allowing educators to tailor curricula to meet diverse student needs, thereby increasing the relevance of the material and fostering a more engaging learning environment (El-Abd, 2019).

Moreover, the interplay between motivation and learning outcomes is further reinforced by the role of metacognitive skills and learning strategies. Studies indicate that learning motivation serves as a mediator between instructional stimuli and student responses, suggesting that when students are motivated, they are more likely to employ effective learning strategies that enhance their cognitive outcomes (Bahri & Corebima, 2015). Additionally, the PCM encourages the use of varied instructional strategies that can cater to different learning styles, thereby promoting both motivation and academic success (Lin et al., 2017). The emphasis on creating a supportive and challenging learning environment, as advocated by the ARCS model, ensures that students not only feel confident in their abilities but also experience satisfaction in their learning journey, ultimately leading to better educational outcomes (Liu & Huang, 2011). Thus, the integration of the ARCS model within the PCM framework provides a comprehensive approach to enhancing student motivation and improving learning outcomes

In research conducted by Rahman (2022) it is explained that motivation is one of the factors that influences student success. A person will get the desired results in learning if within him there is a desire to learn. Motivation can function as a driving force for achieving good results. A person will carry out an activity because there is motivation within him. Having high motivation in learning will achieve optimal results. Student learning motivation is also an important factor in the learning process. A student who is academically motivated is a child who "wants to learn", likes activities related to learning, and believes that school is important. During the learning process students will be divided into four study groups, each group has a different learning style, but all groups showed very good motivation in the learning process.

Motivation is the provision of certain conditions through a series of efforts that will cause someone to act because they like it or not. Judging from the influencing factors, motivation can be stimulated externally but it grows from within a person (Pangestu et al., 2022). Meanwhile, according to Emda (2018) motivation is a series of efforts to provide certain conditions, so that someone wants and wants to do something. something and if you don't like it, you will try to negate or avoid that feeling of dislike. Motivation can be stimulated by external factors, and motivation grows within a person. The environment is one of the external factors that can foster motivation in a person

to learn. Learning motivation is divided into two, namely intrinsic (from within) and extrinsic (from outside), both of which are interrelated in learning. According to Arianti (2019), Learning motivation is also important for a teacher to know.

Motivation is an urge that underlies someone's behavior. This drive is different for each individual, which moves them to do something, one of which is to learn, which is called learning motivation. Motivation to learn does not only come from the individual but can also be increased through the stimulus provided in the learning environment (Magdalena et al, 2021). This is in line with the results of this research where all students are divided into 4 groups consisting of Connection, Core, Identity, Practice. Each group will receive different treatment/stimulus according to the type of study group, each student will learn to solve their own problems and will make a reflection journal as a report and will be evaluated later for the next learning process.

D. Conclusion

Based on the results of the data analysis in this research, it can be concluded that there is an influence of PCM implementation on student academic achievement or there is an increase in learning outcomes based on pre-test and post-test results, and there are significant differences in learning outcomes between study groups, which is the PCM Identity group. In addition, level of student learning motivation in each aspect of Attention, Relevance, Confident and Satisfaction is high. The limitation on this study that need to be improved is the monitoring and observation detail for the process in each group of study. These results underscore the importance of integrating personalized, motivation-driven approaches in education while emphasizing the need for improved monitoring and observation to maximize the effectiveness of PCM implementation in diverse learning contexts.

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