Research On The Design Of Pedagogy Curriculum Teaching Plan Based On Nonlinear Analysis

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Abstract

The pedagogy curriculum is linked to the basic concerns that are currently attributed to modern education, its quality, and efficiency. Inadequate, extremely long, and non-adapted curriculum has an impact on the planning, programming, and implementation of education, as well as the value of the results. The basic prerequisites for providing quality modern teaching and the necessity of modern pedagogy are their continual changing, shaping, and adapting to modern life situations, the demands of present reality, and the needs and skills of students. This study presents a pedagogical curriculum teaching plan based on non-linear analysis. Non-linear pedagogy encourages the use of limitations management to enhance learning in order to foster the emergence and development of inventive and adaptable performance behaviors in education. The purpose of our study was to look at the impact of a Nonlinear Pedagogy-based education curriculum (NP) on student performance and score evaluation. The students are split into testing and training sets. The testing set is provided with normal teaching plan, whereas the training set is provided with pedagogical teaching plan. The scores are evaluated using the Gradient Boosted Support Vector Regression (GBSVR) model. The results show that this type of program is beneficial for teaching activities.

Keywords: Pedagogy curriculum, non-linear analysis, pedagogical teaching plan, Gradient Boosted Support Vector Regression (GBSVR)

1. INTRODUCTION

There is a widespread perception that great educational accomplishment is dependent on the teaching quality. In other words, the educational system's level is not greater than the teacher skills. The construction of a creative and competent individual who is ready to freely and courageously face any hurdles and challenges in his chosen career and employment, as well as one who has profound, regularly updated, and increasing knowledge, is what quality education entails. This is especially true for graduates from educational organizations who must compete in the labor market. The teaching and training actions of instructors have been criticized by Central Asian scholars. Throughout human history, the structure of education has been a critical issue. Many scholars, particularly in Central Asia,

have addressed this issue in their writings, expressing their perspectives on the raising of the younger generation and the traits of a teacher-educator (Usanov et al. 2020).

Educators are expected to give students with realistic learning experiences that include opportunity for learners to produce prospective performance solutions. In recent years, instructional methods aimed at increasing students' participation in meaningful and context-relevant learning have evolved. In educational systems, the problem of enhancing educational quality is a major issue (Smirnova et al. 2018).

The integration of pedagogical techniques is one of the promising strategies to enhance the quality of learning in academic systems. Most people think of pedagogy as a method of teaching. This broad definition encompasses a

variety of characteristics of teaching, such as teaching methodology, feedback, and evaluation. The word 'pedagogy' is also defined as the study of different teaching methods (Black et al. 2018).

Recent decades have witnessed the emergence of educational applications to enrich teaching and learning processes. For pedagogy, it is important for a developing individual to achieve individuality and maximum efficiency of correctional education on the basis of the optimal application of computerized and traditional approaches to dynamic and changing changes in society tomorrow, as well as the approach of the pedagogical system in determining the diversity of the elements studied in educational processes and their relations creative activity. Building a efficient pedagogical curriculum is vital to bring out happy, healthy, and productive students and societies in the nation.

In this article, we designed the pedagogy curriculum teaching plan based on nonlinear analysis and analyzed the plan. The further proceedings of the paper are organized as shown. Section II shows the related literature and the problem statement. Section III provides the materials and methods. Performance evaluation is given in section IV. Finally, section V gives the conclusion of the proposed paper**.**

2.   LITERATURE SURVEY

Nousiainen et al. (2018) investigated what kinds of skills teachers require while adopting game-based pedagogy (GBP). GBP involves four ways in their framework such as employing educational or entertaining games, learning by developing games, and gaming technology in learning. They used descriptive qualitative analysis to examine their data, which included documentation of teachers, theme interviews, and questionnaires. The study looked at four primary competence areas namely technological, instructional, creative, and collaborative. Bayram Jacobs et al. 2019 shed light on instructors' brief

professionalisation when it comes to teaching socio-scientific topics (SSI). By enacting newly prepared SSI curriculum materials, they hoped to capture the growth of science teachers' pedagogical content knowledge (PCK) for SSI instruction. The research also looks into signs of PCK development for SSI instruction that are stronger or weaker. Machado et al. 2019 wanted to examine the significance of street football on players' growth, as well as the function of a NP framework in the construction of a player-centered and game-based strategy that can help to improve learning of innovative and adaptable behaviours in football. Chow et al. 2021 gave a review of NLP's theoretical foundations and practical applications in Physical Education (PE). They discussed how NLP is being used as a conceptual approach for learning design in Singapore school PE program to demonstrate how important principles are being applied. Strongly influenced by the theoretical model of Ecological Dynamics, Roberts et al. 2019 proposed essential pedagogical concepts of a Constraints-Led Approach (CLA) in basic physical education (ED). We display our observations on a newly designed Education program for primary schools, Boing, which might facilitate the development of action capabilities in play-based curricula designed to support the Physical Literacy journey for individuals, motivated by the problem of designing affordance landscapes for learning. During the period of quarantine, Pakhomova et al. 2021 studied the possibilities in which the pedagogical procedure in higher education could be transformed. In higher education, a systematic approach for examining the modification of the educational process under quarantine and quarantine limits has been established. Brunzell et al. 2019 investigated how trauma-informed positive education (TIPE) training influenced primary as well as secondary level school teachers' practise pedagogy. TIPE combines teaching practices from two practice paradigms namely trauma-informed education and positive education, to help sensitive students who face the struggles in school due to abuse, violence,

or neglect. Teacher candidates (TCs) indicated some components of the curriculum and instruction helped them enhance their knowledge of science subject and pedagogy for illustrating science in the elementary school, according to Lewis. 2019. Kong et al. 2020 conducted successful professional training courses on computational thinking (CT) in connection to programming for K-12 teachers. One course concentrated on the fundamentals of programming for CT development as well as teaching. The other focused on advanced knowledge development while also giving opportunity to experience teaching in the classroom and reflect on it. Florian et al. 2018 employed inclusive pedagogy, which is a method of teaching and learning that takes into account individual variations among students while avoiding the marginalization that can arise when pedagogical solutions are tailored only to their requirements. This study was conducted to determine how teachers' professional knowledge improves as they understand to use what their students suggest about learning respective of whole class teaching, utilizing the observations of participants and video recordings from 3 classrooms that captured 'learning moments' recognized by teachers and students. Matsuda et al. 2019 looked at how the findings of the WE study may be used to inform, question, and enrich instructional methods. They focused on English language teaching (ELT), a sector that has seen an increase in attention paid to the diversity of English and its implications for

theory and practice despite being dominated by a monolithic conception of English. The study by Koh et al. 2019 demonstrates how multiple types of technological pedagogical content knowledge (TPACK) layout scaffolds, which is a meaningful learning framework, lesson design heuristics, and TPACK activity types, can be used to assist instructors' notions of pedagogical transformation.

Problem Statement

One of the most important difficulties faced by the educational system today is providing modern education quality while keeping its fundamental nature in conformity with current and future needs of individuals, societies, and states. The primary directions in the field of establishing education are management and education quality control. Teachers play a critical influence in improving students' learning and motivational abilities. Integration of nonlinear pedagogical technology is one of the promising strategies to increase the quality of training in academic institutions.

3. MATERIALS AND METHODS

Based on non-linear analysis, this study proposes a pedagogical curriculum teaching approach. The main aim of our study was to look at the impact of a Non-Linear Pedagogy-based teaching program on student performance and score assessment. Score assessment was carried out to evaluate the performance of NP. Figure 1 depicts the flow of the proposed work.
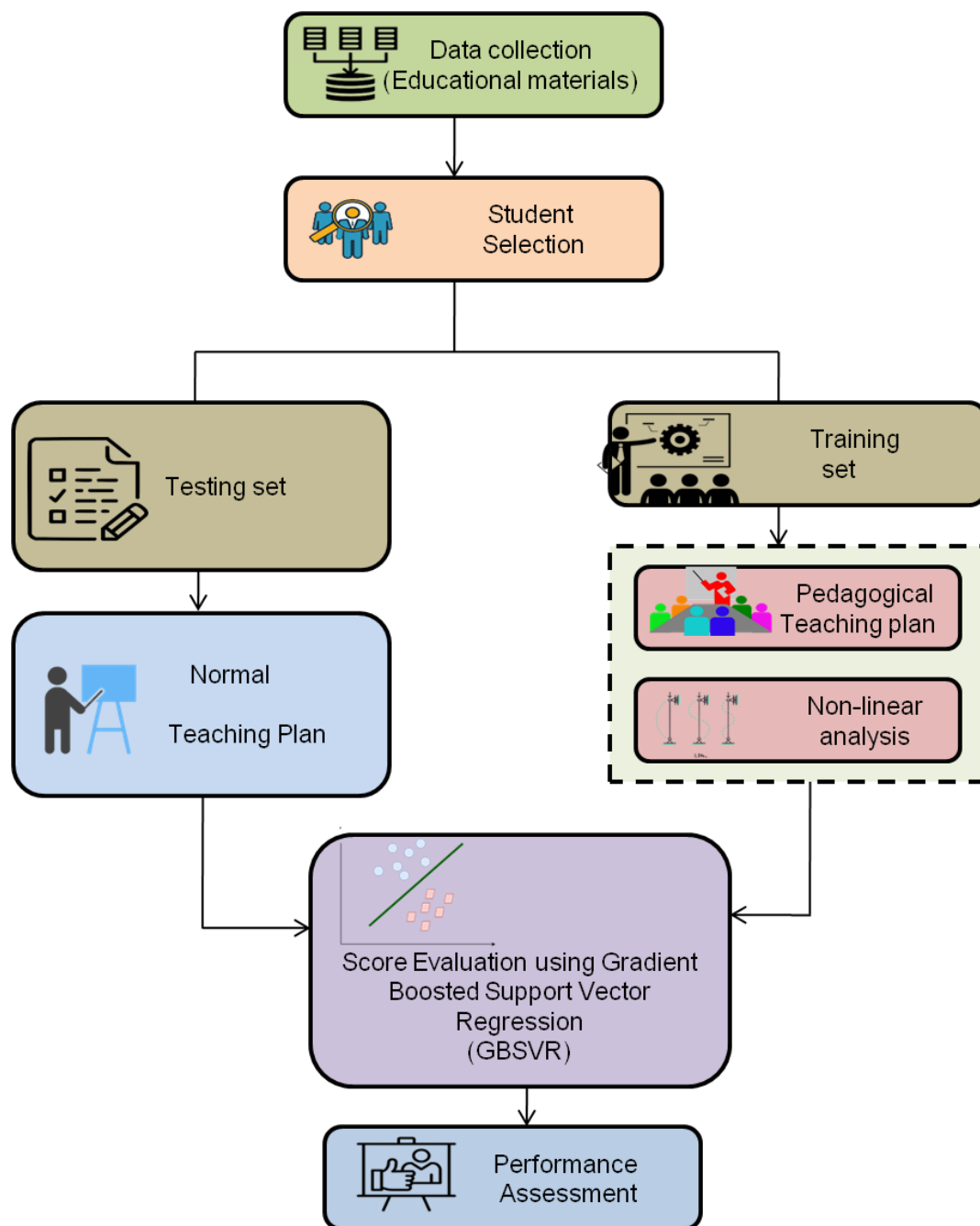
Figure 1 Detailed flow of the proposed work

a) Data Collection and student selection

The dataset for this study includes 56 students (16 females and 40 males) from 3 physical education classes from three distinct schools in three different Malaysian states: Selangor, Perak, and Penang (Nathan et al. 2017). The students for the study are selected based on certain criteria. The first important criterion is that their willingness in the participation of the study must be confirmed. Their age must be between 13 and 25. They must have good physical and mental health. The parental confirmation of allowing their children to participate in the study must be collected. The students must have interest in sports and emotional stability. They must be ready to acquire the skills. They must not have any formal training. The students were divided into two groups namely testing set and training set. The testing set consists of 28 students and it was

subjected to normal teaching plan. The training set consists of 28 students and it was subjected to nonlinear pedagogical plan (NP). These two sessions were conducted simultaneously.

b) Normal teaching plan

The students in testing set are trained according to the normal teaching plan. Educators have traditionally used monotonous and prescriptive methods to prepare the students to acquire skill by demonstrating technique and verbal instructions, believing that there is only one motor structure for performing a task and learning, which appears to be instructor-oriented in this regard. This technique is called the normal teaching or linear pedagogy (LP). In LP, all participants used one single pattern and one way to do the task. According to the focus of this pedagogy that is on form and the way of doing technique, they followed traditional and educational instructions of sports based on prescriptive instructions and repetition of consecutive practices under the supervision of the instructor, and by these repetitive practices learnt the skill.

c) Nonlinear pedagogical teaching plan

In sport, exercise, and physical education, nonlinear pedagogy (NP) is a dynamic paradigm for understanding the human movement and constructing efficient teaching, coaching, and training program. The teaching approach in NP is built around the concepts of 'what to do' and 'how to do' – game problem solving utilizing guided questioning tactics. According to the NP approach, instructors should build inventive drills for each individual so that the learner can become skilled in a dynamic environment. Task, environmental, and individual (player) restrictions are used to determine learning and performance. In effective learning design and pedagogy, the trainer must be able to detect and expertly exploit restrictions. The lead researcher will construct task or lesson activities with various limitations, such as specific regulations, the size of the playing spaces, the environment, changing equipment available to the learners,

and establishing goals and objectives in each session to improve players' performance. The perceived information from the trainer will enable the players to make tactical decision. They must train the students to handle a situation in different ways. An example is that trainers must suggest the different ways of catching a ball respect to different situations to the learners. In NP, game based problems are only described to the students and they are given some freedom to analyze the situation and design a solution or plan for handling the problem.

d) Score evaluation using Gradient Boosted Support Vector Regression (GBSVR)

The assessment of performance of LP and NP was carried out to evaluate the plans using GBSVR technique. For this evaluation, data were collected after the ending of sessions. Also, the testing and training set students are allowed to participate in the sport and the video was recorded and used for this evaluation. GBSVR is a type of support vector machine (SVM). GBSVR and SVM classification vary in that SVR only has one type of sample point. The GBSVR model has an advantage over neural networks since it uses the structural risk minimization (SRM) approach to recognize patterns between players and expected variables. The data collected were given as input data to this model. This technique helps in classifying the performance of different students based on the variables such as decision making score, skill execution score, and performance rate. The kernel function is used by GBSVR to map the nonlinear regression problem to the sample space, so that it can find the optimal score. The obtained score values are used to evaluate the performance of LP and NP.

4.   PERFORMANCE EVALUATION

The Pedagogical curriculum teaching plan based on nonlinear analysis was designed in this study. The students in the testing and training sets are subjected to normal teaching plan and NP respectively. These two methods

are evaluated and compared based on the metrics such as learning efficiency, decision making score, skill execution score, and performance rate. The simulation results were generated using MATLAB.

The learning efficiency of students in training set is higher compared to that in testing set. This is observed from figure 2. This shows that participants using NP can efficiently learn the concept and become skillful in the dynamic environment. The decision making skill refers to finding the solutions for game based problems that rise in the sports field. Skill execution is defined as the abilities required to perform a certain task or to complete the goals. The effect of teaching program based on NP and LP on decision-making and skill execution is analyzed in figure 3 and 4. Scores were determined based on a 5-point rating scale. The

mean score of decision making skill acquired by training set was significantly higher than that acquired by testing set. The mean score of skill execution obtained by training set was significantly greater than that acquired by testing set. These data suggest that the NP-based education programme was successful in enhancing the execution of scheduled lessons, resulting in better decision-making and action implementation. The sport performances of the participants were evaluated based on the video data collected. Figure 5 illustrates that the performance rate of students in the training set was greater when compared to that in the testing set. This in turn depicts that the students undergoing NP obtained efficient technical skills compared to that obtained in LP. This ensures that NP based teaching enhances the quality of education.
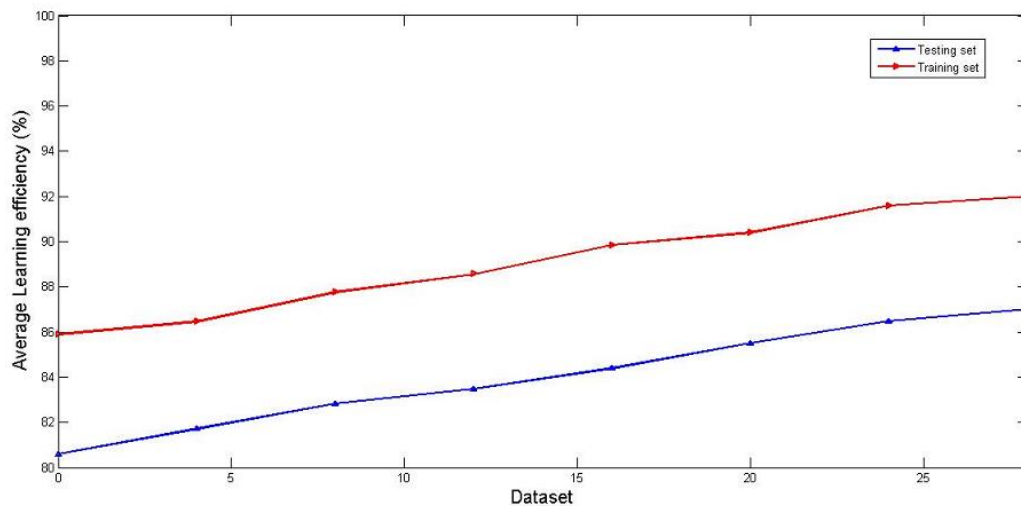

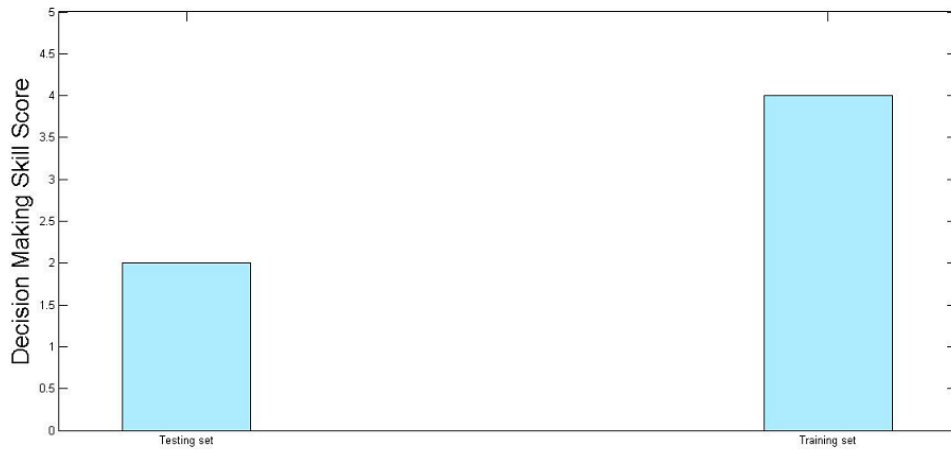**Figure 2 Comparative analysis based on learning efficiency**

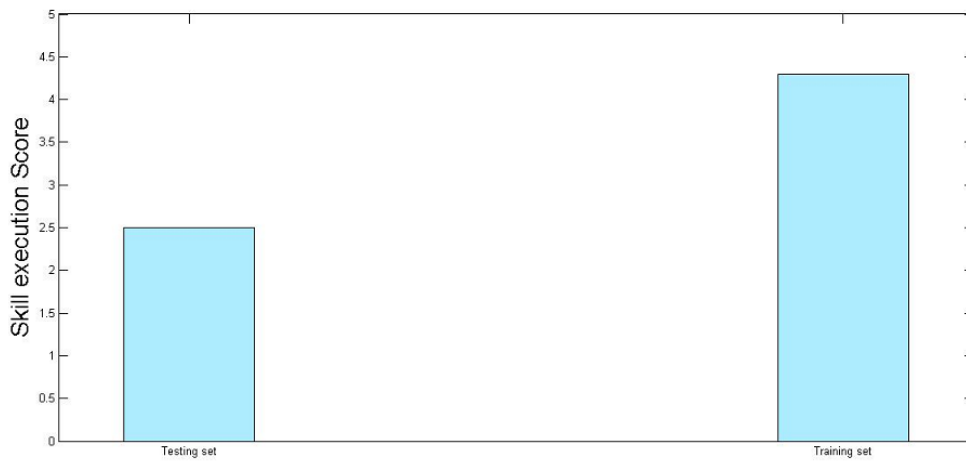**Figure 3 Analysis of acquired decision making skills**

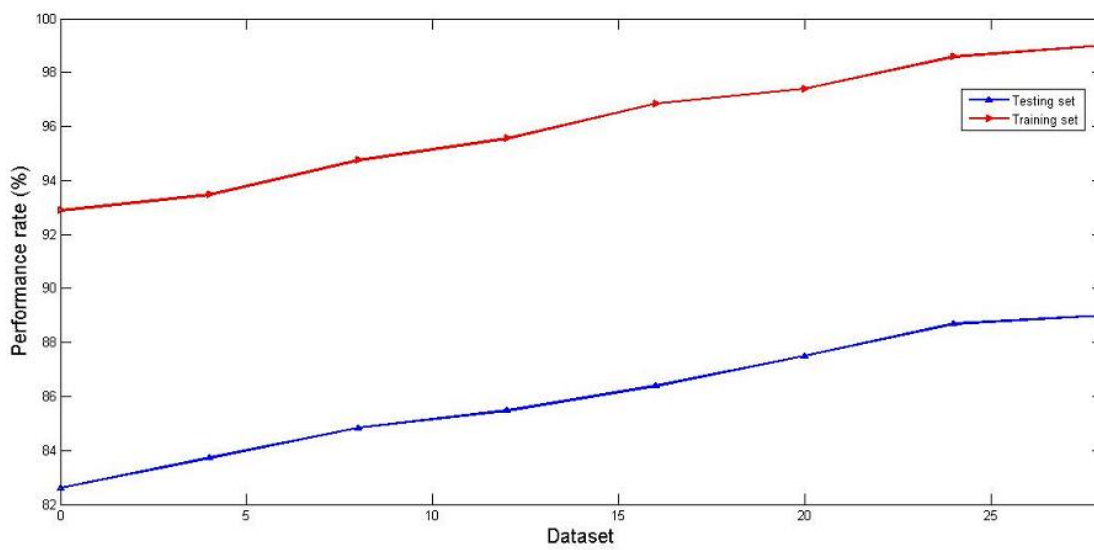**Figure 4 Analysis depending on skill execution**

Figure 5 Comparative analyses dependent on performance rate

5. CONCLUSION

The quality of the education system is based on the quality of teaching. Building an efficient curriculum plan is vital to bring out happy, healthy, and productive students and societies in the nation. In this paper, NP based education scheme was designed and the effectiveness of NP approach was investigated. The performance of NP strategy was compared to that of LP. The influence of the NP model was found to be more evident than that of other models such as the LP model in influencing the sports. The results of this study revealed that NP can help in improving the performance of students in sports based on the terms such as tactical decision making and skill execution. This confirms that NP based teaching strengthens the quality of education.

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