

The Cross-Cultural Teaching Model of Foreign Literature Under the Application of Machine Learning Technology

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Abstract—As globalization spreads, so does the world's ethnic makeup, leading to a surge in cultural diversity that has become a major issue for the educational systems of all countries. Many western countries advocate for cross-cultural education (CCE) as a means of dealing with cultural variety and promoting trust, tolerance, and interaction between individuals of different backgrounds. The way to achieve this goal is to work toward solving the issue while also fostering greater national unity. One of the newest developments in international education is the concept of CCE, which has also given rise to a whole new area of research within the subject of education. Too much time has passed since students were actively engaged in the learning process, and the new curriculum reform has seriously harmed the traditional approaches to teaching foreign literature. As a result, the proposed research has shown that around half of all education is dedicated to the FL cross-cultural teaching paradigm. Chinese students' data were first gathered for this study and divided into two groups: Control Class (CC) and Experimental Class (EC). The performance of the students in both groups is then forecasted using the extreme gradient boosting (XGBoost) technique, which is based on machine learning. Then, we use an optimization method known as the Flower Pollination Algorithm (FPA) to improve XGBoost's prediction performance. According to the descriptive findings, students who adhere to the suggested teaching strategy show more learning interest than those who adhere to existing strategies.

Keywords—Cross cultural education; foreign literature; extreme gradient boosting (XGBoost) algorithm; flower pollination algorithm (FPA); control class (CC)

I. INTRODUCTION

In order for Chinese students to achieve the English proficiency levels needed by their curriculum, a totally new piece of software known as the English displaying mode was developed [1]. It is possible that pupils' own levels of originality and academic success would rise if they were given extended periods of time on the computer to engage in speaking and listening activities [2]. It is possible that teachers might aid pupils in learning a language by introducing them to online reading, writing, and translation materials. Educators and students alike may anticipate an increase in opportunities to use multimedia in class as more and more resources become available for this purpose [3]. Multimedia courses in community nursing that make use of a digital library of teaching resources may improve students' interest in and recall

of course content. There is strong evidence that incorporating YouTube into the classroom enhances students' ability to jhioijjj/10000000ooklgLhk[poiuyt86867 6 565eeryyyyyyyyyyyr7fdhjrftttktt9tyeerse v sASZ z zjunderstand and remember what they read [4]. Students who saw the video on YouTube fared better than those who did not. The author learns why high school students study English online via a survey she administers to them. What makes an activity effective in meeting the requirements of the learner and fostering development is the "input and interaction" process. Here the author explores how music education might benefit from "smart classrooms" and other types of multimedia instruction. Today's multimedia productions rely significantly on the composition, editing, and synthesis capabilities of music software [5]. Since technology advancement has made it possible for students of any age and from any location to build their own learning plans, teachers need to rethink their responsibilities in the classroom. Additionally, students should be confident presenting and defending their views in class utilizing a number of methods [6]. Teachers may adapt their classes to their students' needs with the use of multimedia resources. As part of their education, students are expected to do their own study on topics that pique their curiosity or puzzle them, and to provide their own unique takes on the ideas they unearth. To some extent, computers may one day be used in lieu of human teachers because of the individualized attention they can provide to each student. Because not all pupils at a given school will have the same linguistic or cultural background, it is essential that schools have access to materials like this one [7]. A student like A may learn the same amount in three days whereas it could take the teacher a whole week. Student B may solve the issue or review it by clicking the mouse many times if necessary [8].

Internet of Things (IoT) advances has allowed educators to provide students with more engaging and valuable online learning opportunities, many of which include collaborative software and assignments. While it's true that learning English might be difficult, each individual should first take stock of their unique situation and objectives before making any broad assumptions. It is typical practice to survey educators prior to making major purchases like new textbooks or sets of worksheets [9]. To accommodate today's diverse student populations and make up for the time that might have been spent together in class if all students had the same previous knowledge and skills, new textbooks are being developed. The

most valuable function [10] is that users may set playback to begin at a time and location of their choosing. The high quality of the provided resources, the ease with which they may be communicated, and the possibility of presenting them all at once are just a few of the many benefits of this approach. As a means to better serve users with varying network speeds, service providers may provide customers granular control over which resources are duplicated, while researchers may look at normal resource flows simultaneously [11]. Multimedia lectures might be very helpful for college students engaged in a wide range of digital building projects. Students may watch and take part in the lectures from anywhere with an internet connections, and professors are freed up to focus on other aspects of the curriculum [12]. Since there are a lot of great learning resources available online, yet text-based materials might be monotonous, streaming media technologies may be useful in the self-study sector. Visitors from prestigious institutions in the academic or corporate sector often deliver talks on campus, and they are almost always streamed live online [13]. If there are too many people, it may become awkward. With the various multimedia education tools now accessible, professors may now reach students all over the globe in real time via online streaming of lectures. The school should explore recording extracurricular activities like sports and cultural presentations to make them available to students online [14]. In order to connect with people from all walks of life, a command of the English language is required. Speed is of the essence in today's globalized world [15]. Learning English might make people more educated, tolerant, and successful. Learners of English should make it a goal to improve their essay writing skills. A student's writing skills may be judged not just by their vocabulary and grammatical understanding, but also by their sentence structure, discourse, and ability to think coherently [16]. As a result, teachers need to pay close attention to their pupils' language abilities while crafting assessments of their progress. Perhaps this explains why today's pupils seem to be more attentive in class than ever before.

Educators' support of students' growth in written English proficiency is more important than ever [17]. Only a small number of the available short English works are appropriate for usage in a classroom where instructors physically check student work. This technique will be less effective and more prone to erroneous conclusions if stricter grading standards and longer essay lengths are used [18]. Manual grading is also very susceptible to prejudice since it's impossible to know how a reader from a different section of the globe or cultural background would interpret the same work. Due to technological developments, Automated Essay Scoring (AES) software is now often used in the classroom [19]. Though it has its constraints, this technology effectively probes and evaluates textual content. Computerized candidate evaluation is more efficient and cost-effective than human evaluation. Professors should focus more on actual teaching and cutting-edge research rather than spending time grading papers [20]. Machines excel at routine work. Students may either use the analysis results to methodically correct their own work (for things like spelling and grammar mistakes) or provide suggestions for further evaluation questions. Students may get inspiration for individual words, phrases, and even whole essays when

perusing the study findings. The research findings have already been implemented in the design and analysis of AES systems. In spite of its lack of depth and precision, this study does touch on a number of important topics [21-24].

Contributions of the Study is as follows:

- To improve the effectiveness of foreign literature learning by Chinese students, this study presented Cross-Cultural Teaching Model (CCTM).
- Using the XGBoost prediction model, the perceptions and performance of Chinese students, provided with CCTM -based foreign literature learning, were intelligently predicted.
- To enhance the student evaluation performance of XGBoost model, Flower Pollination Algorithm was employed for XGBoost model optimization.
- The effectiveness of CCTM in foreign literature learning was compared with existing foreign literature teaching models to emphasize the potency of CCTM in foreign literature learning.

II. RELATED WORKS

Saeid Ghalehbandi's (2022) research looked at how recasts and cues affected the vowel and consonant pronunciation accuracy of English as foreign language (EFL) students. Based on their scores on a pilot version of the KET, 89 primary school students were chosen to participate in the study and were randomly divided into three groups: the control group, the recast group, and the prompt group [25]. Before receiving treatment, each group took a custom-made pronunciation test developed by the researchers and tested with a sample group. The three groups were all given the same quantity of instruction time and content. People in the remake group were given recast, and those in the prompt group were given prompt. Participants in the control group, however, were not given any form of corrective input. Participants were given a post-treatment pronunciation test that was similar to the test they did before treatment. A multivariate analysis of covariance (ANCOVA) was performed. The outcomes showed that both recast and prompt greatly improved EFL students' consonant and vowel pronunciation accuracy. Furthermore, the findings revealed that the impact of recast and prompt on EFL students' consonant and vowel pronunciation accuracy was statistically indistinguishable.

The current research by Wei Zhang (2020) aimed to test how various types of corrective feedback (recasts and clarification requests) can differentially affect the suprasegmental development of English intonation [26]. A total of 102 EFL learners took part in the study. All participants, with the exception of the control group (n=34), got five treatment sessions intended to get them to focus on and practice the target feature in real-world discourse, and their untargeted like output was corrected through recasts or clarification requests. Seven intonation features, including words/IP, pause, anacrusis, lengthening, pitch reset, improper tonicity, and tone selection, were analyzed acoustically using pre- and post-test measures of learned and untrained occurrences. The findings indicated that 1) recasts are more

effective than clarification requests in helping EFL learners develop English intonation at a suprasegmental level, and that 2) recasts may lead learners to establish, reinforce, and generalize their new phonological knowledge of English intonation that they practiced during the treatments.

It is timely and prudent to provide a scholarly work that focuses on synthesizing and presenting the current state of affairs in the field of corrective feedback (CF) for the development of L2 pronunciation, as interest in this topic has been growing quickly in recent years. Existing descriptive studies show that both teachers and students value the provision of CF as an important part of L2 pronunciation development, particularly when the errors in question impede effective communication. In recent years, researchers in both classroom and laboratory contexts have begun to examine the pedagogical benefits of CF with a specific emphasis on pronunciation through the use of quasi-experimental studies employing a pretest-posttest design.

Even though the findings suggest that pronunciation-focused CF aids in the development of both segmental and suprasegmental accuracy, there appears to be a great deal of individual variability in how well such CF techniques work. [27] The potentials of CF for teaching pronunciation are greatest (a) when L2 learners have sufficient phonetic knowledge, conversational experience, and perceptual awareness of target sounds; (b) when CF provides model pronunciation forms (e.g., recasts rather than prompts); and (c) when the target of instruction concerns communicatively important and salient features.

Nearly half of the world's population uses a mobile phone regularly, a number that has grown by 20% in the past year compared to the last global population survey. Researchers performed a global survey to determine the average monthly data usage of mobile devices, and found that a single user generated 45 exabytes of data in just one month. Nowadays, e-commerce businesses are starting to see data consumption and analytics as one of their most essential requirements. Individuals' future signature or activity can be forecast with the help of such gathered data. The average calculation and quantity of data to be collected for five billion users looks to be much more challenging if 45 terabytes of data can be stored for a single user. It appears that a conventional computer system would have trouble processing this volume of input, even more so than the human working concept. For researchers in the fields of machine learning and artificial intelligence, accumulating enough data to make accurate predictions based on a user's behavior is a crucial first step. The expectations for academic assessment and the responsibilities of both teachers and students are laid out in this essay by Yang Q (2022). Most people were unaware of the online education paradigm even before the pandemic. Since it's difficult to hold traditional, in-person classes, internet education has been slow to catch on [28]. In an effort to increase student-teacher communication and provide more flexible learning options, nearly sixty percent of nations are attempting to transition their education systems to online models. Big data is one of the IT industry's technological revolutions that gained traction after the cloud computing disaster. In this paper, we suggest using a support vector machine (SVM) to analyze ESL pedagogy and then

compare it to the more conventional method of fuzzy analysis. According to the findings, the suggested model is 5% more accurate than the current algorithm, at 98%. Farhad Tabandeh's (2019) research compared the effectiveness of two methods for teaching English lax vowels to Persian EFL students: focus-on-form (FonF; explicit instruction followed by focused tasks) and focus-on-forms (FonFS; explicit instruction followed by controlled exercises). Forty-eight students voluntarily participated in a 6-hour course, with 17 receiving FonF, 16 receiving FonFS, and 15 participating in theme-based talks without attention to the target vowels as the experimental group, comparison, and control, respectively. Auditory measurements of tongue position were used to determine the phonetic accuracy of learners' pronunciations elicited in controlled read-aloud and spontaneous image description tasks (i.e., formant 1 [F1] for the height and formant 2 [F2] for the backness of the tongue). While the results showed that both methods of instruction led to substantial gains in phonetic accuracy (i.e., adjusting F1/F2 values) in the controlled task, only the FonF methodology was successful in the spontaneous task, showing particularly large effects in the delayed posttest [29]. Nothing got better for the control group. Results suggest that there may be significant advantages to teaching FonF to EFL students, particularly in terms of helping them acquire more native-like pronunciations in spoken English. Finally, the article discusses how these results can be applied in the classroom.

The purpose of this study by Siti Salina Mustakim was to better understand how teachers of the Contemporary Children's Literature Program at the upper primary level handle the subject. This paper uses classroom observations and interviews as research tools to compare and contrast the methods used by five ESL teachers of Year 5 students and to explore the various difficulties these educators encounter when instructing literature [30]. The preliminary results of the methods indicated that there was little effort made to incorporate literature concepts into the classroom. Educators lacked originality and relied heavily on the CDC's premade lessons. Because the school did not supply the necessary material, the Pre, While, and Post-Reading strategy was not fully implemented. Nonetheless, there is a lot of hope that the initiative will help students improve their language skills in the classroom. By analyzing how educator's approach teaching and learning in the classroom, this research adds to the literature on authentic education.

The purpose of the study by Ruzbeh Babae (2014) is to give credence to literature as a significant tool for training rudimentary linguistic abilities like speaking, listening, reading, and writing [31]. In order to make readers aware of the primary reasons why language instructors are suggested to use literary texts in their classrooms, it is important to emphasize the reasons for using literature in language classes and the major factors for choosing appropriate kinds of literary texts in such classes. The benefits of different types of literature to language instruction, as well as some of the challenges that teachers of languages encounter when using literature as a teaching tool, are also taken into account here.

Because of their potential to help students move beyond the referential and into the representational realms of language,

reading diaries are commonly used in the instruction of foreign languages. In this article, Ochoa Delarriva (2015) presents findings from a qualitative study of reading logs created by upper-level students in an English language teacher education program in Argentina [32]. The students were required to keep the logs as part of their coursework in a literature course. The Authors were able to reflect on the usefulness and applicability of reading logs and the need to encourage diversity in literature teaching in English language teacher education by categorizing them according to the various literature teaching models used in the program.

III. METHODOLOGY

This section discusses in detail about the cross-cultural teaching model of foreign literature under the application of machine learning technology. Fig. 1 depicts the schematic representation of the proposed teaching model. 1307 Chinese students participated in the current research. All of the applicants are sophomores at one of three different Chinese high schools in Lu'an City. They may have been following a standardized curriculum and syllabus set out by the "People's Republic of China Ministry of Education" (Li 2020). Table I displays participant information in detail.

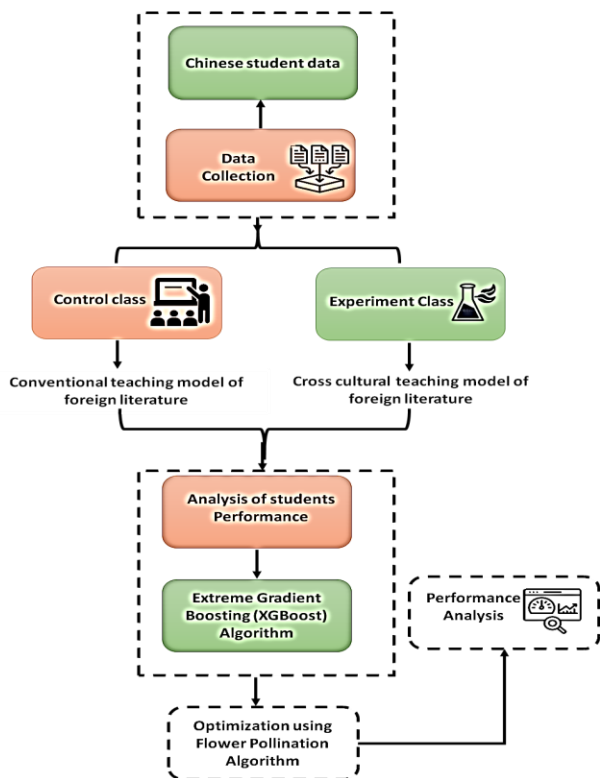


Fig. 1. Schematic representation of the proposed teaching model.

TABLE I. PARTICIPANTS CHARACTERISTICS

School	Total participants	Male	Female	Mean Age
A	829	399	430	16.92
B	154	94	60	16.64
C	324	179	145	16.72
Total	1307	672	635	16.83

A. Student Categorization

Among 1307 participants, 50 percent of the participants i.e. 653 students were in the control group and the remaining students were in the experimental group. CC students follow conventional teaching method of foreign literature whereas EC students follow cross cultural teaching method of foreign literature.

B. Conventional Teaching Method

The most prevalent teaching style used in schools all around the globe is teacher-centered instruction and lectures. Teachers that use this style of instruction choose activities and provide resources that are suitable for the students' abilities in foreign literature learning. Here, a curriculum establishes the foreign literature material, and all students study the same subjects at the same time. Only a little amount of information on foreign literature, chosen by the instructor or the school library, is available to students. The majority of the time, academic subjects is discrete and unrelated to one another. These learners recite material exactly and sometimes engage in critical information analysis. A little amount of attention is paid to how to use ideas or facts in conventional teaching model based foreign literature learning. Foreign literature learning takes place in an often-quiet classroom according to conventional teaching (CT) model. This CT model can be efficient particularly for

- Disseminating information that is hard to get elsewhere.
- Quickly presenting the facts.

However, there are various difficulties with this kind of instruction in foreign literature learning, including:

- Not all students learn best by listening.
- Maintaining students' attention is often challenging.
- The strategy typically calls for little to no critical thinking.
- It assumes that all students learn in the same impersonal manner.

C. Cross Cultural Teaching Method

Since China joined the "World Trade Organization," there has been an uptick in demand for people with foreign language skills in all industries. At the same time, however, more strict and detailed requirements for English proficiency and diverse abilities have been imposed. As globalization has accelerated in recent years, China and other nations have cooperated and competed more often, and interactions between Chinese civilization and other cultures have been booming [25]. China desperately needs individuals with cross-cultural aptitude given the history of mutual learning between Chinese and other cultures. Most pupils cease to be really interested in conventional education. Therefore, in this study, we suggest a cross-cultural teaching strategy.

There are three definitions for cross-cultural education: first, it relates to the simultaneous teaching of foreign literature based on multiple cultures in the environment where various cultures coexist; second, foreign literature students who have exposed to a specific cultural background are exposed to

another cultural environment with varied customs for foreign literature education. Third, it's about making an intentional effort to bring together people from different cultural backgrounds in the classroom so that students of literature from other countries may learn about other cultures' languages, traditions, and values. An understanding of English is frequently necessary when analyzing works written in other languages. From the perspective of a student's capacity for intercultural communication, CCTM-based foreign literature learning seeks to strengthen intercultural communication abilities and encourage both intercultural communication and cultural adaptation, thereby establishing a highly robust intercultural communication theory.

Multiculturalism's protection of the cultural rights of ethnic minorities enables cross-cultural education to embrace and comprehend cultural differences, which is essential for successfully addressing the problem of cultural diversity. The essential notions of intercultural education are understood and seen differently by different academics due to differences in language habits between nations and experts. As a result of its explosive growth, cross-cultural studies is now acknowledged as an interdisciplinary field of applied social science and cultural education research devoted to the examination of the causes and consequences of variation in social structures, institutions, and individuals in response to their context. To face the problems of this age, a new kind of education based on understanding and appreciating other cultures has emerged. Human rights, the end of discrimination, and the cultivation of talent are all areas where intercultural training and civic education overlap. The decline of connectedness and synchronization strategies grounded in local communities all contribute to the pressing need to include people of different ethnicities and backgrounds into the framework of cross-cultural civic community in the postmodern era. International political and economic relations sparked the idea of cross-cultural competency. Thus, intercultural competency studies continue to be conducted with a focus on implementation. As individuals continue to investigate cross-cultural encounters, the foundations of what it means to be culturally competent grow. From this, it develops its own theory of intercultural communication and a model of intercultural proficiency.

Teaching FL with a cross-cultural focus allows institutions to better prepare their students for the global workforce by helping them develop the critical thinking skills necessary to effectively communicate and collaborate across cultural boundaries. However, due to China's late entry into the area, numerous issues remain in the implementation of FL courses at the tertiary level. Teachers that use a speculative approach to FL education must alter their students' conceptual frameworks in order to successfully implement cross-cultural speculative FL instruction. First, the teacher needs to have a deep understanding of the significance of cross-cultural speculative ability, and base their teaching work on this understanding; second, the teacher needs to have a complete understanding and mastery of the connotation of cross-cultural thinking ability, and use this as the starting point and the foothold to do all types of teaching work effectively; third, the teacher needs to have a deep understanding of the significance of cross-cultural sensitivity, and base their teaching work on this

understanding; Fourth, educators ought to abandon the notion of conventional opposites in time, stop seeing FL culture through "tinted glasses," assess it objectively, scientifically, and dialectically, and take advantage of what other nations have to offer.

IV. ANALYSIS OF STUDENTS' PERFORMANCE

A. Machine Learning based Extreme Gradient Boosting (Xgboost) Algorithm

The "Extreme Gradient Boosting Method (XGBoost)" was used to analyze the students' performance in both groups. Given a collection of student information denoted by the notation $V=\{(h_w, t_w)\}$ where h_w represents the performance profile of students and t_w is their associated binary label, Assuming that the XGBoost model is made up of R decision trees, the objective function may be found by using the equation (1):

$$\hat{t}_w = \sum_{r=1}^R l_r(h_w), l_r \in L \quad (1)$$

Where L is the space of regression trees, and for each l_r there is a corresponding tree whose performance scores are also stored in L. Equation (2) describes the loss function used to forecast student performance.

$$F(l_r) = \sum f(\hat{t}_w, t_w) + \sum \Omega(l_r) \quad (2)$$

For predicting student performance, the first term is the derivative of a loss function, F, which measure the difference between the real output \hat{t}_w and the anticipated output t_w . The second is a regularisation term, which devalues the prediction's complexity to prevent over-fitting. In the case where Ω and \hat{t}_w can be represented as:

$$\hat{y}_w^{(y)} = \hat{y}_w^{(y-1)} + l_y(h_w) \quad (3)$$

$$\Omega(l) = \gamma Y + \frac{1}{2} \|w\|^2 \quad (4)$$

where, Y represents the total number of leaf nodes and w represents the performance grade. From this, we may derive that

$$F(l_y) \approx \sum_{g=1}^Y (g_w) i_g + \frac{1}{2} (\sum_{w \in w_g} x_w + \lambda) i_g^2 + \gamma Y \quad (5)$$

where, g_w and x_w represent the first- and second-order gradient statistics of the loss function in predicting student performance, respectively. Parameters γ and λ are constants used to adjust the level of regularisation. They help prevent prediction models from becoming too specific.

B. Optimization using Flower Pollination Algorithm (FPA)

The "Flower Pollination Algorithm" (FPA) is used to enhance the performance of XGBoost in making predictions. The inspiration for the invention of it was taken by Xin-She Yang in 2012 from the flow pollination experienced by flowering plants. Multi-objective optimization is now a part of FPA's capabilities. In the sake of simplicity, we will employ the following four rules:

- It has been shown that pollen-carrying insects follow trajectories that are compatible with Levy flights, suggesting that biotic and cross-pollination may be thought of as a kind of global pollination (Rule 1).

- For local pollination, abiotic pollination and self-pollination are used (Rule 2).
- "Flower constancy," which pollinators like insects may acquire, is equivalent to a reproduction probability that scales with the degree of similarity between two blooms (Rule 3).
- The interaction or switching between local and global pollination may be controlled by a switch probability p [0, 1], slightly slanted toward local pollination (Rule 4).

In order to improve the accuracy of the algorithm's prediction of students' performance, it first generates a random initial population and evaluates it. Before a new student's performance can be calculated, the pollination type must be established using a fixed probability p (K4). That is, we select a random number k between 0 and 1, and if k is less than u , then both global pollination and flower constancy (K1 and K3) may occur as follows:

$$h_w^{y+1} = h_w^y + \gamma F(h_w^y - gbest) \quad (6)$$

Where student w 's performance at time y is denoted by h_w^y , the current best performance is denoted by $gbest$, is a scaling factor, and F is a step size derived from Lévy flight, as follows:

$$F(a, s) \sim \frac{\lambda \Gamma(\lambda) \sin(\frac{\pi \lambda}{2})}{\pi} \frac{s}{a^{1+\lambda}}, |a| \rightarrow \infty \quad (7)$$

where $()$ is the standard gamma distribution with index, s is a variable used to adjust the distribution's tail amplitude ($s=1$ in the proposed FPA), and a big step function ($a \gg a_0 > 0$) is built using the necessary nonlinear transformation as:

$$a = \frac{P}{|D|^{\lambda-1}} \quad (8)$$

When P and D are two random student samples chosen from a Gaussian normal distribution with mean equals 0, and standard deviations σ_p and σ_d :

$$P \sim (0, \sigma_p^2), D \sim (0, \sigma_d^2) \quad (9)$$

$$\sigma_p = \left[\frac{\Gamma(1+\lambda)}{\lambda \Gamma((1+\lambda)/2)} \cdot \frac{\sin(\frac{\pi \lambda}{2})}{2^{(\lambda-1)/2}} \right], \sigma_d = \quad (10)$$

Since σ_p and σ_d cannot be selected individually for any value of, the standard deviation σ_d is fixed at 1. If, however, k is larger than u , then the local pollination and flower constancy (K2 and K3) are carried out as follows:

$$h_w^{y+1} = h_w^y + \varepsilon (h_g^y - h_r^y) \quad (11)$$

where h_w^y and h_r^y are two student results chosen at random and $\varepsilon \in [0, 1]$ is a random integer. Next, the current best performance is updated, and the search iterations are restarted until the termination criterion is met.

V. RESULTS AND DISCUSSIONS

The investigation of student's performance and perceptions regarding cross-cultural teaching model (CCTM) based foreign literature learning is conducted using machine learning algorithm. The learning performance and perceptions of students being exposed to the suggested CCTM was evaluated

using XGBoost prediction model optimized by FPA (XGBoost-FPA). To state the effectiveness of CCTM based foreign literature learning, we compared the suggested model with existing teaching models in foreign literature learning. The existing teaching models in foreign literature learning considered for the comparative investigation are Conventional Teaching (CT) model, Zoom Web Conference System (Zoom WCS) [33], Translanguaging + Task-based Language Teaching (TL+TBLT) model [34], Content and language integrated learning (CLIL) model [35], Flipped Learning (FL) model [36]. This study aimed at exploring the Chinese students' perceptions of using cross-cultural Teaching model in foreign literature learning in terms of Perceived Usefulness, Perceived Ease of Use, and student acceptance [37]. In addition, the learning performance of students being exposed to the suggested CCTM was evaluated in terms of student's overall performance, learning ability, and student engagement.

A. Perceived Usefulness

The degree to which a student thinks that utilising CCTM for studying foreign literature would improve their academic performance is known as student's perceived usefulness. Fig. 2 shows the comparative investigation of student's perceived usefulness for various teaching models in foreign literature learning. It is noted that student's perceived usefulness for CCTM based foreign literature learning was higher than that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. Higher student's perceived usefulness, observed for CCTM, using XGBoost-FPA illustrates that CCTM is highly useful for Chinese students who are learning foreign literature.

B. Perceived Ease of Use

One of the most important variables in determining whether students would adopt CCTM-based foreign literature learning is student's perceived ease of use. It is defined as how simple it is for students to access CCTM-based instruction in foreign literature. Fig. 3 shows the comparative investigation of student's perceived ease of use for various teaching models in foreign literature learning. From Fig. 3 and Table II, it is observed that student's perceived ease of use for CCTM based foreign literature learning (predicted using XGBoost-FPA) was higher than that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. This indicates that CCTM is easily accessible by Chinese students for learning foreign literature.

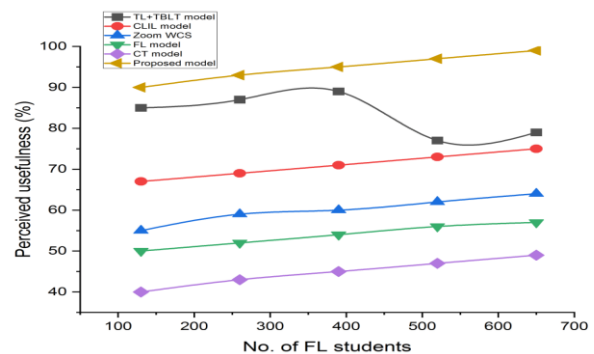


Fig. 2. Analysis of student's perceived usefulness for various foreign literature teaching models.

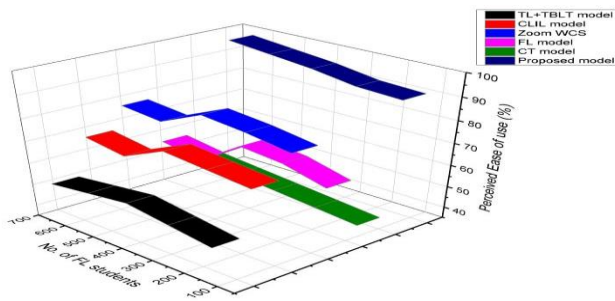


Fig. 3. Analysis of student’s perceived ease of use for various foreign literature teaching models.

TABLE II. COMPARATIVE EVALUATION OF STUDENT’S PERCEPTIONS REGARDING VARIOUS FOREIGN LITERATURE TEACHING MODELS

Student’s Perception Variables	TL+TBLT model	CLIL model	Zoom WCS	FL model	CT model (Control Group)	CCTM (Proposed model)
Perceived Usefulness (%)	79	75	64	57	49	99
Perceived Ease of Use (%)	52	69	79	58	45	97
Student’s Acceptance (%)	69	79	59	57	48	97

C. Student’s Acceptance

Student’s acceptance is defined as the degree to which a student is satisfied with the CCTM based foreign literature learning. Fig. 4 shows the comparative investigation of student’s acceptance for various teaching models in foreign literature learning. Chinese students receiving CCTM based foreign literature learning reported to have higher acceptance level compared to that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. The findings depict that Chinese students are highly satisfied with CCTM based foreign literature learning.

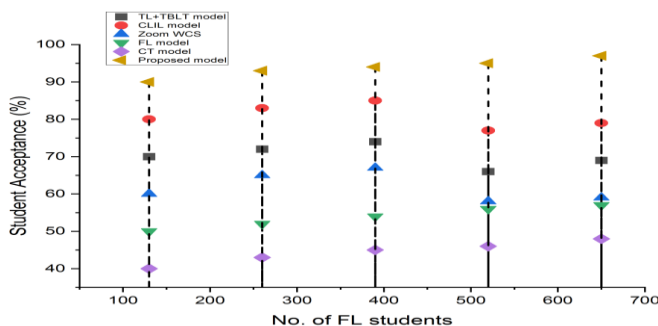


Fig. 4. Analysis of student’s acceptance for various foreign literature teaching models.

D. Student’s Academic Performance

Student’s academic performance means the extent to which a student has attained knowledge on foreign literature through CCTM. Fig. 5 shows the comparative investigation of student’s academic performance in various teaching models in foreign literature learning. It is noted from Table III that academic performance of students receiving CCTM based foreign literature learning was higher than that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. Higher student’s academic performance observed for CCTM (as predicted by XGBoost-FPA) shows that CCTM enhances the efficiency of foreign literature education.

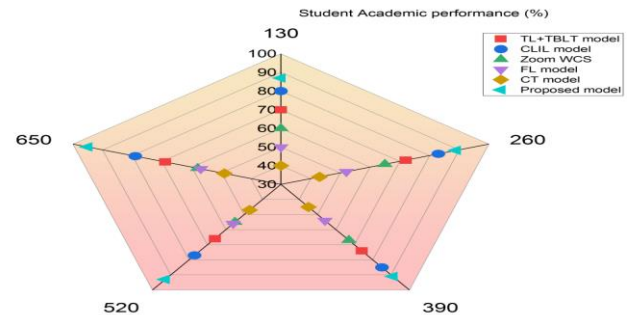


Fig. 5. Analysis of student’s academic performance in various foreign literature teaching models.

TABLE III. COMPARATIVE EVALUATION OF STUDENT’S PERFORMANCE REGARDING VARIOUS FOREIGN LITERATURE TEACHING MODELS

Student’s Performance Variables	TL+TBLT model	CLIL model	Zoom WCS	FL model	CT model (Control Group)	CCTM (Proposed model)
Student’s Academic Performance (%)	69	79	58	57	49	95
Student’s Engagement (%)	85	74	64	53	39	96
Student’s Learning Ability (%)	69	79	54	64	46	98

E. Student’s Engagement

The term "student engagement" refers to the extent to which a student participates in class discussions and other collaborative tasks. Fig. 6 shows the comparative investigation of student’s engagement in various teaching models in foreign literature learning. It is noted that student’s engagement in CCTM based foreign literature learning (predicted by XGBoost-FPA) was higher than that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. The results showed that Chinese students are highly engaged in CCTM based foreign literature classroom.

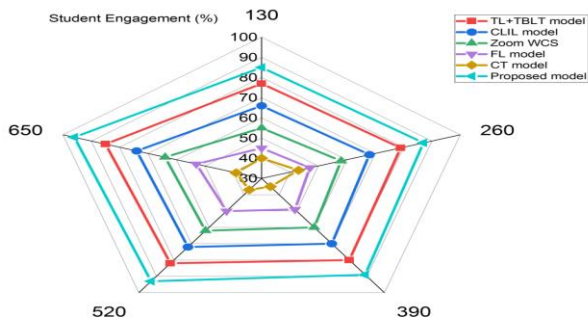


Fig. 6. Analysis of student's engagement in various foreign literature teaching models.

F. Student's Learning Ability

Student's learning ability is defined as the student's capacity to comprehend and understand foreign literature. Fig. 7 indicates the comparative investigation of student's learning ability in various teaching models in foreign literature learning. It is noted that student's learning ability in CCTM based foreign literature learning (predicted by XGBoost-FPA) was higher than that for existing teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. This proved that CCTM based foreign literature learning improves the ability of Chinese students to learn foreign literature.

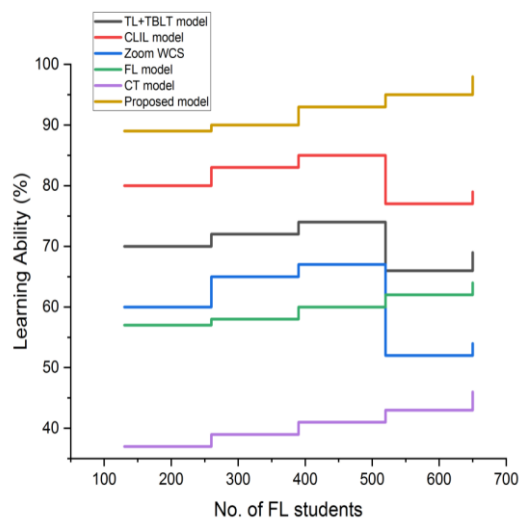


Fig. 7. Analysis of student's learning ability in various foreign literature teaching models.

VI. CONCLUSION

This research presents the cross-cultural teaching model (CCTM) for foreign literature learning by Chinese students. The performance and perceptions of Chinese students regarding CCTM based foreign literature learning were automatically estimated by XGBoost prediction model which was optimized by FPA (XGBoost-FPA). The effectiveness of CCTM in foreign literature learning was confirmed by comparing with existing foreign literature teaching models like CT model, TL+TBLT model, CLIL model, Zoom WCS, and FL model. The findings indicated that students exposed to CCTM based foreign literature learning are reported to have

acceptance level of 97%, learning ability of 98%, academic performance of 95%, engagement level of 96%. Moreover, student's perceived usefulness and perceived ease of use for CCTM based foreign literature learning were found to be 99% and 97%. Chinese students are highly satisfied with the suggested CCTM based foreign literature learning. These results confirm that CCTM can improve student's foreign literature learning ability, make them involved in foreign literature learning. Future research may resolve the shortcomings of this study. First of all, the study's student sample size is small, which might restrict how broadly the findings can be applied to ensure the effectiveness of CCTM. Future research with a bigger sample size could provide results that add to the CCTM's potency in foreign literature learning.

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