Article

The Construction and Practice of a TPACK Development Training Model for Novice University Teachers

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Abstract: The smart age has created new goals, and offers novel approaches for teachers’ professional development. The acquisition of technological pedagogical content knowledge (TPACK) has become essential for novice university teachers’ professional development. With the aim of developing teachers’ TPACK, this study constructed a BOPPPS–TPACK training model by following four key design principles: smart-tool-based, pedagogy-driven, microteaching-integrated, and creatively enhanced. This paper describes a practical study involving 145 teachers that was carried out using questionnaire surveys, interviews, and electronic record analyses. The results showed that the BOPPPS–TPACK training process could achieve the effective coupling of BOPPPS and TPACK and enhance novice university teachers’ ability to engage in in-depth learning and TPACK transfer, creating a method and system to guide teachers’ professional development. Measures such as optimizing the construction of smart environments for teachers’ professional development, enriching pedagogical content of knowledge-based representations, and extending feedback collection to practical settings can help to enhance TPACK development.

Keywords: teachers; BOPPPS; TPACK; training model

1. Introduction

The advent of the smart age has accelerated a change in teachers’ roles, establishing new educational and pedagogical goals and demands while introducing novel methods and approaches [1]. A good teacher in this age must be equipped with the awareness, knowledge, and skills required to integrate information technology into the curricula and transition from a “teaching-centered” to a “learning-centered” approach, to improve the efficiency, effectiveness, and benefits of teaching [2]. Acquiring technological pedagogical content knowledge (TPACK) has become integral to teachers’ professional development in higher education. TPACK is a framework proposed by Mishra and Koehler of Michigan State University in 2005 [3], consisting of three core and four hybrid components (Figure 1a) [4]. Existing studies on TPACK development largely focus on the student-teacher, pre-service-teacher, and novice-teacher communities and are concentrated around themes such as applications and evaluations [5]. TPACK can enhance teachers’ ability to apply artificial intelligence technology [6], better empower students in the smart teaching context [7], significantly influence the effectiveness of online learning [8], and improve teachers’ hybrid teaching competencies [9], among other things. Thus, it is an essential skill for novice university teachers seeking to bolster their smart teaching competencies.

Smart technology has extended the practical boundaries of education and pedagogy, exacerbating the risk of teachers being marginalized in hands-on teaching activities. The cultivation of TPACK among novice teachers is influenced by a multitude of factors, such as pre-service educational experience, the amount of time and energy that can be effectively invested, and the method of training. It needs to be enhanced and optimized repeatedly through research-practice [10,11]. Under the traditional teacher education model, new teachers can only passively accept lecture-oriented training, unidirectionally acquire technical
and teaching-method knowledge, and try to integrate their learning and understanding of TPACK by themselves in a long teaching practice, which is extremely inefficient. Thus, this study aims to investigate how the TPACK ability of new university teachers can be improved quickly and effectively. Studies have demonstrated that teacher training has to be organically merged with technological support [12], as teachers who pay little attention to curriculum design are unlikely to deliver high-quality curriculum teaching, even with adequate equipment and skills [13]. The BOPPPS model (Figure 1b) [14] of effective teaching, adopted widely by higher education institutions, emphasizes student-centered participatory learning, and has presented participatory learning practices in multiple contexts using informatized teaching approaches. However, theoretical research on pedagogical knowledge is of limited help to TPACK. This study assists novice university teachers in developing an in-depth understanding of the interplay between information technology, subject matter content, and teaching methods, by constructing a BOPPPS-based training model to facilitate their TPACK development [12]. Allowing teachers to enhance their learning through peer support, providing the settings for teachers to learn according to their learning styles and learn by doing [15], and conducting real-time training in the actual context of informatized teaching, will all help to convert the training activities into teachers’ everyday teaching practices [16] and improve their TPACK capabilities.

![Figure 1. Two studies: (a) The TPACK Framework; (b) The BOPPPS Teaching Model.](image)

2. Design Principles

The BOPPPS–TPACK training model was designed with the following principles in mind:

- **Smart-tool-based design:** smart teaching tools have opened up an infinite world of possibilities for informatized teaching. This training model offers learning projects on smart teaching tools and encourages teachers to choose the information technology suited to their pedagogical objectives, create a participatory learning environment, and avoid mindless and inefficient technology use. This forms the foundation of TPACK-based capacity building for novice teachers [17].

- **Pedagogy-driven design:** as this model is driven by a BOPPPS-based structured pedagogy, it offers novice teachers with a weaker foundation in pre-service professional development a system and methodology to guide their teaching practices. Hence, it facilitates learning practices related to technological pedagogical knowledge (TPK) and effectively boosts novice teachers’ learning and practical efficiency.

- **Microteaching-integrated design:** the development of TPACK cannot be truly promoted without constant attempts to effectively integrate content knowledge (CK), technological knowledge (TK), and pedagogical knowledge (PK) and to optimize teaching effectiveness through microteaching. This model provides a setting for the deliberate practice of TPACK and creates more possibilities for reflecting on and optimizing teaching practices, based on real-time feedback from the student’s perspective. It helps novice teachers to
readily step up to the podium, establish a firm footing, and interact with students off the podium to achieve student-centered participatory teaching.

- Creatively enhanced design: Through two to three rounds of microteaching exercises, educators can repeatedly attempt to integrate TK, PK, and CK creatively and continue to incorporate opinions and advice from the learners’ perspective, creating endless possibilities for optimizing smart teaching.

3. Construction of the BOPPPS–TPACK Training Model

In the smart age, an individual’s TPACK can be enhanced by professional learning, mutual assistance among peers, and independent development [18], requiring long hours of learning and training [13]. The BOPPPS–TPACK training model constructed in this study is illustrated in Figure 2. The outer circle represents the training process based on the BOPPPS model, while the inner loop indicates the learning content and implementation methods of the TPACK and BOPPPS training. The dotted arrow line marks the interplay between the two.

![Figure 2. The BOPPPS–TPACK Training Model for Novice University Teachers.](image-url)

- Bridge-In: the key to the bridge-in stage is to inspire novice teachers’ interest and motivation to learn, and to answer the “why” of learning. This can include arranging for teachers to “vote with their feet” on whether or not good teaching is about good design, brainstorming answers to questions like how to design online–offline hybrid teaching, introducing topics on effective teaching with the support of information technology, and discussing the importance of TPACK. Information technology solutions, such as Rain Classroom’s bullet screen feature and the Zhitiao Fun teaching tool, can also be used to collect learners’ views in real-time.

- Objective/Outcome: the learning objectives consist of three dimensions: knowledge learning, skills training, and emotional development. They include familiarizing oneself with every element of BOPPPS and being able to operate two to three types of information technology tools; being able to design BOPPPS–TPACK microteaching sessions independently; completing two rounds of TPACK microteaching exercises and identifying each TPACK element and its level of integration in the exercises; and adapting to the demands for informatized teaching and actively enhancing one’s TPACK capabilities to achieve effective student-centered teaching. Trainers should clearly outline the training objectives to ensure they are assessable and measurable.
• Pre-Assessment: the pre-assessment concerns trainee teachers’ prior knowledge reserves. Showcasing BOPPPS–TPACK demonstration lessons and arranging for teachers to identify the PK and TK involved can help them to adjust the level of difficulty and progress of instruction in a timely manner. Utilizing informatized teaching platforms to promptly collect pre-assessment data is both a training requirement and a demonstration of one’s informatized teaching skills.

• Participatory Learning: the participatory learning stage is central to the model, and focuses on enhancing teachers’ TPK and technological content knowledge (TCK) by having them complete Microteaching Design 2 and the TPACK Microteaching Exercises. Designing microteaching exercises based on adults’ learning characteristics from a constructivist perspective enables trainers to make timely adjustments to the assisted learning strategies while helping learners to review their learning progress and ensure that the training objectives are achieved through the learning–practice–feedback–optimization–practice loop. Learner-centered participatory learning activities are not limited to a fixed component, but are perpetuated throughout various components of the training model.

• Post-Assessment: learning effectiveness can be examined promptly through TPACK Microteaching Exercise 2, the microteaching lesson plan, and microteaching video data, among others. Trainee teachers can also reinforce their learning by observing one another and transferring their observations to classroom practices, to truly uphold and apply the philosophy of student-centered participatory teaching.

• Summary: this is when trainers and trainee teachers come together to systematically organize, reflect on, and summarize their learned content, and discuss whether the TPACK objectives have been achieved. They also reflect on the pain points and key points in the CK–PK–TK integrated design, and personalize extended plans for teachers’ subsequent professional development. Meanwhile, feedback from the trainee teachers is conducive to refining the model.

Implementation of the BOPPPS–TPACK model takes 20–24 h, of which four hours are dedicated to BOPPPS model learning, eight hours to two rounds of micro-teaching drills, four to six hours to information technology topic learning, three to five hours to micro-teaching design, and one class hour to group microteaching video recording. Designing a personalized TK learning checklist and structured microteaching exercises based on the characteristics of each discipline is the key to the model.

Novice teachers were separated into learning groups of four to five individuals to complete the microteaching exercises (see Table 1). The two group-based microteaching exercises followed largely the same procedure, and were conducted based on ground rules that were agreed upon during the warm-up, such as demonstrating equality and respect, sharing their thoughts with honesty, and maintaining good timekeeping habits. The first exercise focused on providing feedback about the integrity of each BOPPPS component and the level of TK integration, and on building novice teachers’ TPK and TCK capabilities and their ability to redefine their CK around the pedagogical objectives. The second exercise focused on reflecting how seamlessly TK, PK, and CK were integrated, and discussing the effectiveness of TK in supporting the achievement of the pedagogical objectives. Before the exercises, the trainers prepared materials and information such as the lesson observation form, peer evaluation and feedback form, Bloom’s taxonomy of pedagogical objectives, and a list of participatory teaching methods for future use.
### Table 1. Time Allocation of the Microteaching Exercises.

<table>
<thead>
<tr>
<th>No.</th>
<th>Time Allocated</th>
<th>Task List</th>
<th>Participants and Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Instructor</td>
</tr>
<tr>
<td>1</td>
<td>5–10 min</td>
<td>Pre-instruction preparation (e.g., teaching aids, PowerPoint slides, and personal hygiene)</td>
<td>√</td>
</tr>
<tr>
<td>2</td>
<td>10 min</td>
<td>BOPPPS microteaching and participatory learning</td>
<td>√</td>
</tr>
<tr>
<td>3</td>
<td>5–7 min</td>
<td>Guidance by the facilitator and written feedback by group members</td>
<td>√</td>
</tr>
<tr>
<td>4</td>
<td>13–15 min</td>
<td>Oral feedback by group members and summary by the facilitator</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>40 min</td>
</tr>
</tbody>
</table>

4. Empirical Research into the BOPPPS–TPACK Training Model

4.1. Research Methods

Effective training is training that results in desirable effects, efficiency, and benefits that can foster teachers’ ability to learn, reflect, reform, and put what they have learned into practice. It enables teachers to complete most learning tasks within a given period of time (e.g., the training cycle), enriching their development and enhancing school education with both tangible benefits and latent impacts [11]. Compared to traditional teaching contexts, smart teaching allows trainers to more easily conduct mixed-method evaluations combining qualitative and quantitative approaches, due to the increased number of data collected and the electronic records, growth personas, and other information made available throughout the training process.

4.1.1. Quantitative Research Method

In order to evaluate the effectiveness of the BOPPPS–TPACK training model, this study used the quantitative questionnaire method. Drawing on the TPACK structural framework and Koh et al.’s [19] TPACK survey, this study developed a self-report questionnaire by combining relevant research and the objectives of the training model; responses to the questionnaire were recorded using a 5-point Likert scale. The questionnaire was composed of two sections: one collected basic information, including the teacher’s gender and job title; the other measured each element of the TPACK knowledge structure over seven dimensions, containing ten items in total. Reasonably designed questionnaires with good internal consistency and structural validity can obtain more quantitative data and offer valuable research benefits.

4.1.2. Qualitative Research Method

To supplement the quantitative method outlined above, this study also used the random interview method and electronic file analysis. As the facilitators participated in the entire process and witnessed teachers’ growth throughout the program, this study included 20 interviews with facilitators and trainee teachers. Furthermore, we conducted an analysis of 30 electronic microteaching records using randomized sampling. These methods allowed us to obtain first-hand information in a timely manner and effectively make up for the lack of quantitative research.

To comply with research ethics, the research questionnaire did not collect teachers’ personal information, and the interviewees and electronic files were anonymously coded to conceal their year of training.
4.2. Research Process

To confirm the effect of the BOPPPS–TPACK training model, this study conducted an empirical study of the model using novice university teachers at M University, a provincial comprehensive teaching and research university. In recent years, most new teachers have graduated from non-education specialized universities, and growth in the teaching profession is relatively weak. There is a general expectation among education students that they will learn educational concepts, practice teaching skills, adapt to information-based teaching requirements, and develop strong teaching skills.

In this study, 145 novice university teachers participated in the BOPPPS–TPACK training program. Micro-demonstration courses were provided and pretest questionnaires were issued at the start of the program. A posttest questionnaire, random interviews, and electronic file analysis were conducted after the teachers had completed the required 20–24 h of BOPPPS–TPACK training. From these, we evaluated teachers’ TPACK knowledge and skills in different situations. A total of 145 questionnaires were distributed, of which 129 valid responses were returned, amounting to a response rate of 88.9%.

The pretest and posttest data were analyzed using SPSS 25.0 software. The pretest had a Cronbach’s \( \alpha \) of 0.970, a KMO value of 0.925, and a significant Bartlett’s test of sphericity \((p < 0.001)\); the posttest had a Cronbach’s \( \alpha \) of 0.972, a KMO value of 0.925, and a significant Bartlett’s test of sphericity \((p < 0.001)\). Thus, our method displayed satisfactory internal consistency and favorable construct validity.

It is worth mentioning that designing and customizing the personalized TK learning form according to professional characteristics is one of the core aspects of this training model. The novice university teachers at M University selected TK according to professional characteristics.

Taking several specific disciplines as an example (see Table 2), Teacher Z of Horticulture chose to study flash animations and Rain Classroom and achieved the expected learning effects by using the former to animate the irrigation process and the latter to collect students’ feedback. Teacher G of Biotechnology chose to learn how to use the Qing Hua Online teaching platform and OBS Studio screen-recording software. Teacher G also used AE to produce a captivating and short micro-lesson video as an online learning resource for hybrid teaching, and Rain Classroom to collect pre-assessment and post-assessment data, receiving positive feedback from all novice trainee teachers and group members. Applying the idea of combining algebra and geometry, Teacher L of Mathematics used the Geometer’s Sketchpad to illustrate linear spaces and transformations and utilized a MATLAB script to demonstrate the relationship between eigenvalue and matrix multiplication (the power method), which deepened the other group members’ understanding of linear algebra.

### Table 2. The TK Learning Checklist for Novice Teachers in Selected Disciplines.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>TK Learning Checklist Regarding Information Technology</th>
<th>Scenario(s) of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticulture</td>
<td>Generic TK Learning: Remote live streaming and online teaching management platforms (e.g., UMU, DingTalk, Tencent Meeting, Ke'bang, Cool, Qing Hua Online, and Xuexitong), PowerPoint design, video editing, image processing, audio processing, pedagogical data analysis, and mind mapping.</td>
<td>Personalized TK Learning: Production of Flash animations; online survey systems; Rain Classroom; Camtasia screen-recording software; DeepDream Obs Studio screen-recording software; production of Adobe After Effects animations; Rain Classroom; Animations in the Geometer's Sketchpad; matrix computations with MATLAB. Demonstration of the irrigation process; collection and analysis of student feedback. Editing of videos related to plant disease control; image generation. Micro-lesson production; hybrid teaching; demonstration of biotechnology applications. Equation derivation.</td>
</tr>
<tr>
<td>Plant Protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biotechnology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Results and Discussion

5.1. Novice Trainee Teachers’ Self-Reported TPACK

Figure 3 presents a clearer picture of how the trainee teachers’ reported the effectiveness of the training using a box plot of their self-reported TPACK.

![Box Plot of Self-Reported TPACK](image)

Figure 3. Box Plot of Self-Reported TPACK.

Figure 3a is a box plot of teachers’ self-reported TPACK prior to the training. The mean values for the knowledge dimensions PK, TK, CK, TPK, TCK, and TPACK were 4.08, 3.94, 4.07, 3.99, 4.00, 4.07, and 4.02, respectively. This shows that, among their self-reported PK, TK, and CK, the trainee teachers rated themselves as having the highest CK, followed by PK, and having the lowest TK, or information technology knowledge. Regarding TPK, TCK, and PCK, teachers rated themselves as having the highest PCK, followed by TCK and then TPK. By observing the box plot distribution and calculating the skewness and kurtosis coefficients, we found that each indicator had a negatively skewed distribution and a kurtosis coefficient greater than 3. This indicated that the results of the teachers’ pretest self-reports were more concentrated and generally higher in value than a theoretical normal distribution.

While improving PCK has been demonstrated to be comparatively easy in existing practices, acquiring TK and TPACK is challenging [20]. Figure 3b shows a box plot of teachers’ self-reported TPACK after the training. As the mean values for PK, TK, CK, TPK, TCK, PCK, and TPACK were 4.22, 4.11, 3.92, 4.03, 4.04, 4.07, and 4.07, respectively, the scores in all the knowledge dimensions, except for CK and PCK, had increased from the pretest scores. In particular, there was a significant improvement in PK and TK—the main training subjects—and a moderate improvement in TPK and TCK. By observing the box plot distribution and calculating the skewness and kurtosis coefficients, this study found an increased skewness for each indicator except CK and a reduced kurtosis coefficient across all of the dimensions. In other words, the teachers’ posttest self-reports yielded more dispersed and significantly improved results.

Where centralized and intensive training is adopted to enhance teachers’ pedagogical skills and teaching effectiveness [15], deliberate practice allows teachers to experience the normativity and mutual aid that characterize teaching through peer-to-peer collaboration, and it also shifts the focus of attention from their own teaching to students’ learning [21]. A comparison of Figure 3a,b reveals that the trainee teachers generally reported greater improvements in TK and PK, and various degrees of improvements in TPK, TCK, and TPACK. This suggested that the model catered to most novice teachers’ needs regarding professional development and achieved satisfactory overall results. It is worth noting that, although CK was not included in the training, there were certain differences in the pretest and posttest results in this regard. For instance, the pretest self-reported CK scores exhibited
a negatively skewed distribution, while the posttest self-reported data demonstrated a
decreased skewness and kurtosis coefficient, and was closer to a normal distribution. These
changes in the self-reported CK ratings potentially occurred because the trainee teachers
generally rated themselves higher during the pretest, due to a lack of peer comparison.
During the training, however, by observing the microteaching practices of fellow group
members, they realized that their subject-matter knowledge could be represented in more
forms. This inspired a fear of incompetence, ultimately causing their posttest self-reporting
to be more rational and closer to the ideal normal distribution.

Each trainee teacher’s self-reported improvements from the BOPPPS–TPACK training
were investigated and plotted, as shown in the box plot in Figure 4. The results demonstrate
that the trainee teachers rated their improvements in TK and PK the highest. Related
dimensions of integrated knowledge—TPK, TCK, and TPACK—were also improved. For
the same reason that might have led to the self-reported posttest CK being more rational
and closer to the ideal normal distribution, improvements in CK and related dimensions of
integrated knowledge—PCK and TCK—might have been underestimated. By observing
the distribution of improvements in Figure 4, it is evident that, while improvements in TK
and PK were both negatively skewed, the former was more stable and evenly distributed.
Among the integrated knowledge dimensions associated with CK, only the scores for PCK
exhibited a decline and a positive skew, similar to improvements in CK. This indicates that
the model of integration of PCK, compared with TCK, is more reliant for CK.

![Figure 4. Self-Reported Improvements Following the BOPPPS-TPACK Training.](image)

As the new generation of novice teachers tended to be more information literate
and could learn about and apply information technology with greater ease, their TCK
improved more rapidly. Due to their limited knowledge reserve in pedagogy, however,
they had greater difficulty acquiring PK and putting it into practice. This not only hin-
dered their ability to properly transfer CK by leveraging their PK, but also resulted in
sluggish improvements in PCK. Thus, it is evident that PK and PCK are the pain points in
improving TPACK.

5.2. Interviews and Electronic Record Analysis on TPACK Learning Effectiveness

The results of the effectiveness evaluation based on self-reports by the novice trainee
teachers, interviews, and electronic record analysis are presented as follows. The learner-
centered approach to participatory learning satisfied the novice teachers’ personal needs;
the menu-based elective courses on information technology, in particular, were well-
received by the participants. Meanwhile, micro-exercises created a safe and respectful
environment for learners, and presented possibilities to foster in-depth reflections [22]. The group-based microteaching exercises ensured learner participation and learning effectiveness. The ground rules set for these exercises, such as active participation, honest sharing, encouragement, appreciation, and daring to innovate, also made sure that behaviors like giving effective feedback from the learners' perspective took place in real life. This ensured in-depth participation and continuous knowledge construction among learners.

The subsequent follow-up study revealed that the trainee teachers could continuously deliver smart teaching by applying TPACK in the classroom. They also won multiple awards at intra-school and provincial pedagogical skills competitions, pedagogical innovation competitions, and lesson-plan design competitions for young teachers. This lifted the novice teachers' confidence in their passion for teaching, and highlighted the effects, efficiency, and benefits of the BOPPPS–TPACK training model.

Analysis of the microteaching videos showed that 87.6% of the micro-lessons could fully encapsulate each component of BOPPPS. The organic integration of components, such as bridge-in and pre-assessment, participatory teaching and post-assessment, and post-assessment and summary, was even achieved in some videos. In addition, 91.3% of the videos highlighted information technology applications such as visualization and the teaching of data generation using platforms like Rain Classroom, Duifene, and Xuexitong across multiple components, including bridge-in, pre-assessment, post-assessment, and participatory learning.

The information technology adopted has considerably improved teaching effectiveness. This enables higher education institutions to overcome the inefficient use of information technology, a prevalent problem in the field of education and pedagogy, and tackle the dilemma of non-homogenized development among the different elements of TPACK [23].

6. Conclusions

The process, methods, and evaluation criteria of conventional TPACK acquisition must be redefined in the smart age. This analysis of M University has demonstrated that the BOPPPS–TPACK training model standardizes the TPACK development path of novice teachers consistently and naturally. From the traditional model of centralized lectures to “learning by doing” in the information environment, information technology is deeply integrated into student-centered participatory learning. In the shift from an initial teacher-centered, teaching-method-based approach to integrated technology-based teaching, knowledge serves as the core, with micro-teaching exercises aiding in consolidating the principles. This approach aims to complete TPACK integration throughout the learning process. It particularly helps to promote in-depth learning and transfer effective teaching strategies while demonstrating the model's unique advantages and positive outcomes.

However, previous research has demonstrated that the BOPPPS–TPACK model has some limitations, and needs to be improved in practice. First, optimizing the construction of smart environments for teachers' professional development and enriching PCK-based knowledge representations would be helpful. The BOPPPS–TPACK microteaching exercises demonstrated that novice teachers generally represent their CK relatively monotonously. Hence, attention should be paid to fostering their CK throughout their careers. For example, activities should be regularly organized to allow teachers to observe, discuss, and exchange views on informatized teaching and gain in-depth experience into the efficiency and advantages of applying technologies like visualization, system context diagrams, and interactive learning, to teaching. In doing so, they can improve their teaching with the flexible use of smart technology and screens, and re-process an abundance of online teaching resources while continuously enriching their PCK-based knowledge representations. Furthermore, the outputs of smart teaching should also be fully utilized to co-construct the classroom with university students.

Second, extending feedback collection to practical settings is necessary. The novice teachers' learning groups were largely homogeneous, and possessed characteristics such as similarities in foundation and needs, and mutual aid among peers. Nevertheless, influenced
by their personal experiences, microteaching exercises based on learning settings restricted the acquisition of real-life feedback and experience from students' perspectives. The two microteaching activities did not promote the in-depth integration of CK, TK, PK, and innovative teaching design. Therefore, returning to classroom practices to enhance PK learning and improve teaching practices based on students' feedback can create a more effective pathway to teachers' professional development than simulated microteaching.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

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