


# Integrating XR and PjBL for Social-Emotional Learning in Pre-Service Cultural Arts Teacher Education

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## ABSTRACT

This study developed an innovative learning model that integrates Social-Emotional Learning (SEL), Extended Reality (XR), and Project-Based Learning (PjBL) for pre-service teachers in the Cultural Arts PPG program. Employing the ADDIE framework, the research focused on the Analysis, Design, and Development phases. Twenty-four PPG students participated in the pilot phase. Findings revealed a lack of immersive learning media to support empathy, reflection, and emotion regulation in teaching practice. The designed model integrated XR-based simulations and PjBL to foster interactive and reflective learning. A Virtual Lab prototype was created featuring scenario-based SEL tasks and collaborative art projects. Expert reviews and alpha testing demonstrated increased student engagement, improved emotional awareness, and readiness to apply SEL principles in real classroom contexts. This model contributes to equipping future educators with adaptive, empathetic professional identities and highlights the potential of technology-enhanced pedagogies in teacher education.

**Keywords:** *Virtual Lab, Social-Emotional Learning, Extended Reality, Project-Based Learning, ADDIE, PPG Cultural Arts*

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## INTRODUCTION

In recent years, global attention has increasingly focused on the importance of social-emotional learning (SEL) for teachers, especially in preparing them to handle complex classroom dynamics. UNESCO and OECD have emphasized SEL as a core component of teacher competencies in the 21st century, essential for fostering inclusive and supportive learning environments. In the Indonesian context, teacher education programs such as Pendidikan Profesi Guru (PPG) are expected to incorporate SEL to enhance the emotional intelligence and interpersonal skills of prospective educators, as mandated in various national teacher standards and professional development frameworks.

Higher education has a very important role in preparing prospective educators who are able to face the challenges and developments of the changing world of education. The Arts and Culture Teacher Professional Education (PPG) program is designed to produce teachers who not only have competence in teaching the arts but also possess strong social-emotional skills, which can support the learning process at partner schools. SEL skills include an individual's ability to recognize and manage their own emotions, empathize with others, and interact positively in social contexts (Iraji et al., n.d.). These skills play a crucial role for PPG Arts and Culture students because they are the cornerstone of building effective relationships with students at partner schools (Mardhatillah & Surjanti, 2023).

However, although the existence of social-emotional skills is crucial in teaching, there are still shortcomings in the application of learning that specifically develops these skills in

arts education. The main problem faced in the context of PPG Arts and Culture is the development of an effective and integrated learning model to improve students' social-emotional skills. Many learning methods are still focused on the technical aspects of art, while the development of students' social and emotional abilities receives less attention (Aisyah et al., 2024). This is a major challenge because aspiring educators need to have strong social skills to interact with students and create a learning environment that supports their personal development (Kesuma & Meidipa, 2024).

In response to these challenges, technology-based approaches involving the use of Extended Reality (XR) and Project-Based Learning (PBL) offer a highly potential solution. XR, which includes Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), provides a more immersive and interactive learning experience. This technology allows students to learn in a controlled yet realistic environment, where they can hone social-emotional skills in a more contextual and applicative way (Aruna et al., 2021). On the other hand, PBL, as a real project-based approach, offers students the opportunity to learn by working on projects that are relevant and directly related to their professional lives. This approach emphasizes active involvement in problem-solving, teamwork, and effective interaction with others, which in turn develops social-emotional skills (Hardika et al., 2024; Kamala, 2022).

A review of the literature on SEL shows that social-emotional skills significantly impact academic success and personal well-being (Warta et al., 2024). The development of SEL in students can improve academic achievement, reduce aggressive behavior, and enhance interpersonal skills that are vital in social life (Ragil et al., 2025; Santoso et al., 2023). The implementation of SEL in higher education, especially for PPG Arts and Culture students, can strongly influence their ability to interact and manage social relationships with students at partner schools. Meanwhile, the application of XR technology in education, particularly in art learning, is also gaining more attention. The use of VR, for example, can increase learners' emotional engagement and provide an immersive experience, allowing them to practice social skills in a safe and controlled setting (Khairani et al., 2024).

In line with technological advancements, Project-Based Learning (PBL) is increasingly applied in various fields, including art education. PBL allows students to work in groups to solve real problems, develop projects, and produce outcomes relevant to their professional world (Ma'rifah, 2024). This approach not only focuses on academic competence but also develops interpersonal skills such as collaboration, communication, and problem-solving (Nika & Rahayu, 2024). PBL provides opportunities for students to improve SEL by working in teams, completing complex tasks, and engaging in dynamic learning environments (Ningrum & Rosyid, 2024). In arts education, PBL enables students to build both practical and social skills through collaborative projects, preparing them to become effective educators (Priyadi & Wahab, 2023).

Although studies on XR and PBL in education exist, their application to the development of social-emotional skills in PPG Arts and Culture remains limited. Most research on XR focuses on science and mathematics (Ajam & Sahmadan, 2022), while its role in art education and SEL development is underexplored. Similarly, although PBL has been widely applied across disciplines, its integration with XR for SEL in PPG Arts and Culture is rarely studied. Therefore, this research aims to develop a learning model that combines both approaches to enhance the social-emotional skills of PPG Arts and Culture students and to optimize their application in partner schools.

Initial observations in the PPG Seni Budaya environment show that students often struggle to manage emotions and interact with students at partner schools. Their experiences mainly emphasize academic and technical aspects, while the development of social and emotional skills is overlooked. This has the potential to undermine their effectiveness as educators, since the ability to empathize, manage relationships, and maintain classroom harmony is essential for creating a conducive learning environment. These findings highlight the need for integrated and experiential learning approaches that develop SEL in applicable ways aligned with the demands of art education.

This research is important to address gaps in the literature on XR and PBL in art education, particularly in developing the SEL of PPG Arts and Culture students. It also contributes to education policies that are adaptive to technological advancements and the dynamic demands of modern education. In recent years, technology has become integral to learning across all levels, and national education policies increasingly support the integration of technology-based learning models, including SEL development for PPG Arts and Culture students. As global education policies emphasize character education and social-emotional competencies, this study is highly relevant to preparing future educators capable of facing the challenges of the digital era.

The data in this study include both qualitative and quantitative sources, involving surveys, interviews, and observations of PPG Arts and Culture students' experiences in developing SEL through XR and PBL-based learning. Additional data on the model's implementation in partner schools and evaluations of its effectiveness will also be essential. The results are expected to provide valuable insights for developing the PPG Cultural Arts curriculum and supporting education policies that integrate technology in learning. The primary objective is to design and test a Virtual Lab Social-Emotional Learning model based on XR and PBL to improve SEL among PPG Arts and Culture students and optimize its application in partner schools. The novelty of this research lies in integrating XR and PBL to develop SEL, filling the current gap in literature while introducing an innovative and holistic approach that supports both academic and interpersonal competencies for future educators.

## METHOD

This research uses a Research and Development (R&D) approach to develop an innovative learning model that integrates Virtual Lab, Social-Emotional Learning (SEL), Extended Reality (XR), and Project-Based Learning (PjBL). To design and develop this model, the researcher uses the ADDIE framework as a model for the development of learning systems (Azahari et al., 2022), which consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation. However, in the scope of this research, the main focus is only on the initial three stages, namely Analysis, Design, and Development.

### Analysis Stage

The analysis stage is a very important first step in the process of developing a learning model. At this stage, the main focus is directed to identify various problems, needs, and characteristics of users, namely students of the Teacher Professional Education Program (PPG) in the field of Arts and Culture. The approach used is qualitative descriptive, allowing researchers to dig into data in depth and contextual according to real conditions in the field.

The analysis begins with a comprehensive literature review of a variety of scientific sources, including international journals, textbooks, and education policy documents. This study focuses on the concept of Social Emotional Learning (SEL), project-based learning models, and the integration of Extended Reality (XR) technology in the world of education. This literature study provides a strong conceptual and theoretical foundation, which will later become a reference in designing innovative and needs-based learning models.

In addition to literature studies, the researcher also conducted direct observations to partner schools where PPG students practiced teaching. This observation is directed to see how cultural arts learning strategies are applied in the classroom, how the dynamics of social and emotional interactions occur, and the extent to which learning technology is used in the process. The results of this observation are an important source of information to understand the challenges and opportunities in the development of more contextual and meaningful cultural arts learning.

Furthermore, to deepen the observation results, in-depth interviews were also conducted with three main respondent groups, namely PPG Arts and Culture students, PPG supervisors, and teachers at partner schools. This interview aims to explore the real needs of students in developing social-emotional skills such as empathy, emotion management, collaboration, and reflective abilities. These three groups of respondents provided

complementary perspectives on the obstacles and expectations for more effective and transformative cultural arts learning.

The results of the overall analysis show that most PPG students do not yet have a learning experience that explicitly and contextually equips them with social-emotional skills. In addition, the available learning media tend to be less interactive and have not taken advantage of technology-based immersive approaches. These findings confirm that an innovative learning model is needed that not only integrates technologies such as XR, but is also able to provide an in-depth, reflective, and meaningful learning experience for future cultural arts teachers.

### **Design Stage**

The design stage is the process of designing the components of the learning model based on the results of needs analysis. The goal of this stage is to develop a systematic framework that integrates SEL principles, PjBL methods, and XR technology into the Virtual Lab learning model. The design process includes several strategic steps, including: (a) Determination of Learning Objectives. Objectives are specifically arranged based on the SEL domain, such as self-awareness, emotion management, social awareness, relationship skills, and responsible decision-making). (b) Project-Based Learning Flow Planning. The model is designed to contain the stages of PjBL, starting from the identification of social-emotional problems in the context of arts and culture, planning art projects as solutions, collaboration in the production of works, to reflection and presentation of results. (c) Virtual Lab Scenario Mapping. In the context of XR, an interactive story-based simulation scenario is prepared that allows students to explore virtual learning environments such as classrooms, art galleries, or socio-cultural forums. Each scenario is designed to contain social-emotional dilemmas that must be responded to reflexively by students. (d) Media Design and Assessment Instruments. The researcher prepared the initial design of learning media (digital modules and application prototypes) as well as assessment rubrics to measure SEL achievement and project collaboration effectiveness. This rubric is compiled based on indicators of active participation, reflection skills, communication, and empathy.

The design process is carried out in a participatory manner by involving a team of experts from various fields, such as learning technology, art pedagogy, and educational psychology. The principle of user-centered design is adopted so that the model is truly aligned with the needs and characteristics of PPG students.

### **Development Stage (Model Prototype Development)**

The development stage is a process of concretization from model design into real form, both in digital form and pedagogical documents. The main activities at this stage include: (a) Virtual Lab Prototype Development. Researchers develop XR-based virtual learning environments using software such as Unity 3D. In this Virtual Lab, students can interact with simulation environments that display social dynamics, cultural expressions, and emotional learning challenges in the context of art. (b) Integration of PjBL Flow into the Application. In the application, students can take part in the project stages starting from case exploration, group discussions, creation of works, to final reflection. The app's features are designed to support active interaction and collaborative learning. (c) Creation of Digital Modules. The learning module is prepared as a practical guide for lecturers and students in using the Virtual Lab. This module includes technical instructions for using the application, an explanation of SEL and PjBL concepts, and a learning activity sheet. (d) Expert Validation (Expert Review). The prototypes and modules that have been developed are then validated by educational technologists, cultural arts experts, and PPG practitioners. This validation aims to ensure content quality, pedagogical relevance, and technical suitability to user needs. (e) Initial Feasibility Test (Alpha Test). A limited trial was conducted on a small group of PPG students. The goal is to obtain initial input regarding ease of use, visual appeal, interaction effectiveness, and relevance of learning content in the context of practice at partner schools.

The results of this development stage are in the form of a prototype of a Virtual Lab SEL learning model based on XR and PjBL that is ready to be further tested in real implementation and effectiveness evaluation at the next stage of research.



## FINDINGS AND DISCUSSION

**Development of the Social-Emotional Learning (SEL) Lab Virtual Learning Model**

The development of the Social-Emotional Learning (SEL) Virtual Learning Lab Model is a pedagogical innovation designed to strengthen the social-emotional competencies of PPG Arts and Culture students in the context of learning that is more adaptive and relevant to the challenges of the current world of education. The Virtual Lab design was built with the main goal of creating a digital learning space that allows students not only to understand SEL concepts theoretically, but also to experience them directly through interaction and reflection in scenarios that resemble real conditions in the classroom. This virtual space is designed to resemble a school or classroom environment, equipped with avatars of students, fellow teachers, and typical situations that demand empathy-based decision-making, self-awareness, and emotion management. Key components in the SEL Virtual Lab include interactive simulations that allow students to practice dealing with classroom conflicts, dealing with learners with different backgrounds, and building positive communication with parents or colleagues. Elements such as emotional feedback panels, empathetic response simulators, and peer reflection space features are presented to provide a complete and contextual learning experience. Tools such as reflective prompts, emotion journals, and integrative video guides also complement the learning process to foster deeper emotional awareness.

The use of Extended Reality (XR) technology, including Augmented Reality (AR) and Virtual Reality (VR), is the main approach in creating an immersive learning experience. With VR, students can experience the classroom atmosphere with real emotional distress, such as dealing with students with behavioral disorders or emergency learning situations, while AR is used to present alternate instructions or responses in real-time in simulations (Inayah et al., 2023; Iriaji et al., 2023). This experience not only brought theory closer to practice, but also sparked deep reflection on their positions, emotions, and roles as prospective teachers. The SEL Virtual Lab has a positive impact on the formation of the professional character of PPG Arts and Culture students. Through simulation-based learning experiences and reflections, students become more emotionally and socially prepared to face the complexity of interactions in the world of education. They not only understand how to apply SEL strategies in learning, but are also able to internalize values such as empathy, sensitivity to diversity, and emotional toughness that are essential for educators in the modern era. The Virtual Lab serves as an effective bridge between SEL theory and real practice at partner schools, as well as fostering a more holistic and humane approach to education.

Table 1. Components and Functions of SEL Virtual Lab

SEL Virtual Lab Components	Main Functions
Emotional Interaction Simulation	Train students' responses to conflicts or social situations in the classroom
Emotional Feedback Panel	Provide feedback on students' expressions and emotional responses
Empathetic Response Simulator	Provide alternative scenarios for empathy-based decision-making
Digital Emotion Journal	Encourage self-reflection on the learning experience
XR Integration (VR & AR)	Create a realistic and immersive learning atmosphere
Collaborative Reflection Room	Facilitation of discussion and feedback between students
Video Guide & Reflective Prompt	Provide supporting materials and reflection directors

The table above details the main components in the SEL Virtual Lab and their functions in supporting social-emotional learning. The emotional interaction simulation and empathetic response simulator are at the heart of the virtual experience that challenges students to think critically and respond reflectively. Emotional feedback panels help students recognize and evaluate their emotional expressions in a variety of situations. Meanwhile, the integration of XR through VR and AR serves to create an immersive learning experience, where participants seem to be in the middle of a real learning situation. The presence of an emotion journal and a collaborative reflection space strengthens learning through reflective writing and peer-to-peer discussion. All of these components support each other to create an integrated, immersive, and transformative SEL learning ecosystem.

**Integration of Project-Based Learning (PBL) in Learning Models**

The integration of Project-Based Learning (PBL) in the Social-Emotional Learning (SEL) learning model provides a contextual and applicative approach for PPG Arts and Culture students to build social-emotional skills as a whole. In its implementation, PBL is not only a regular project-based learning strategy, but combined with SEL principles to create meaningful and real-experience learning. Students are given projects that depart from social problems, conflicts in the school environment, or the needs of the educational community that require them to apply empathy, emotional management, effective communication, and social awareness as part of the learning process.

The projects are designed to encourage intense collaboration between students. In a team, they need to share roles, agree on decisions, respond to disagreements, and support each other emotionally during the task completion process. Through this experience, students naturally build skills such as teamwork, conflict resolution, and self-regulation. The interactions that occur are not only about the division of labor, but also reflect the process of personal growth that is grown through reflective and communicative learning. This kind of collaborative project becomes a space for the actualization of SEL values in group dynamics.

Furthermore, the PBL approach in SEL learning also plays an important role in the development of students' teaching skills. When they have to design SEL-based learning solutions, observe students' social-emotional responses in simulations, and present project results in front of mentors or school communities, they not only hone their teaching technical skills, but also their sensitivity to the human dimension in education. The experience directly connects the SEL theory they learned with professional practice as educators. Thus, PBL functions as a bridge between the mastery of pedagogical competence and the development of the character of educators who are whole, reflective, and adaptive to social diversity in the school environment.

Table 2. Integration of PBL in SEL Learning

SEL Learning Aspects	The Role of Project-Based Learning (PBL)
Application of SEL Principles	Real-life situation-based projects that demand the application of empathy and emotion regulation
Collaboration and Social Interaction	Group activities that emphasize effective communication and teamwork
Teaching Skills Development	Design and implementation of projects as teaching simulations and practice reflections
Reflection and Self-Awareness	Journal of reflection and self-evaluation throughout the project completion process
Increased Social Awareness	Projects with social impact involving the partner school community or students

The table above shows how Project-Based Learning (PBL) makes a real contribution to strengthening the main aspects of Social-Emotional Learning (SEL). The application of SEL principles is manifested in projects that require students to act empathetically and manage emotions in the context of real challenges. Collaboration in PBL encourages interactions that facilitate the growth of social skills such as active listening, negotiation, and emotional support. The project also provides an opportunity to develop pedagogical skills directly, as students are responsible for designing, implementing, and evaluating activities like professional teachers. During this process, reflection becomes an important part of fostering self-awareness of their thinking and acting processes. Finally, projects that are connected to the context of the community or partner schools make PBL an effective means to foster social awareness and student responsibility as prospective educators.

**Application of Extended Reality (XR) in SEL Learning**

The application of Extended Reality (XR) in Social-Emotional Learning (SEL) learning presents an innovative approach that enriches the learning experience of PPG Arts and Culture students through immersive interaction and realistic simulations. XR technology, which includes Virtual Reality (VR) and Augmented Reality (AR), acts as an interactive learning tool capable of replicating classroom dynamics with a level of emotional depth that is difficult to

achieve through conventional methods (Iriaji et al., 2024; Prasetyo et al., n.d.). Through VR headsets or app-based AR displays, students can directly engage in simulating conflicts between students, dealing with emotional distress while teaching, or managing complex social situations, while actively practicing empathy, patience, and emotion-regulation-based decision-making.

XR-based learning simulations are arranged in the form of scenario-based learning, where students are faced with various social-emotional conditions such as students experiencing anxiety, group conflicts in class, or meetings with emotional parents. In this simulation, students are not only acting as observers, but are required to act, respond, and make decisions. Each action option in the simulation provides direct feedback either verbally from the system, as well as in the form of simulated consequences designed to build reflective awareness of the impact of the way they communicate or react. This process allows for the reinforcement of social-emotional skills in a repetitive, adaptive, and personal manner.

Compared to traditional lecture-based learning or case discussion, the use of XR has been shown to increase student engagement because it is able to touch affective and cognitive aspects simultaneously. The interactivity and depth of experience allow students not only to understand SEL theory, but also to experience it firsthand in a context that resembles the real world. This is crucial in preparing them to be socially and emotionally responsive educators in the classroom. While conventional methods rely more on abstract narratives or discussions, XR is able to present concrete, contextual, and immersive experiences, making SEL learning more impactful and shaping overall competencies.

Table 3. Application of XR in SEL Learning

SEL Learning Aspects	Application of XR Technology
Interactivity and Realism	VR/AR simulations mimic real conditions such as student conflicts in the classroom
Scenario-Based Learning	A social-emotional scenario scheme that allows for the user's active response
Live Feedback	The XR system provides direct feedback on students' actions and decisions
Emotional Engagement	Immersive experiences stimulate deep affective responses
Strengthening SEL Competency	Simulation-based repetitive exercises to build empathy and emotion regulation
Comparison with Traditional Learning	XR is more interactive, personal, and contextual than lectures or discussions

The table above explains how Extended Reality (XR) technology is applied in supporting students' social-emotional learning. Through interactive and realistic features, XR allows students to experience conditions that are close to reality, for example dealing with angry or conflicting students, with real emotional nuances. The application of scenario-based learning makes the learning experience active and participatory, with students directly involved in the situation and not just observing. The feedback provided by the XR system accelerates the process of reflection and understanding. Because of its immersive nature, students also more easily feel the emotional impact of the situation, so SEL skills such as empathy, communication, and social awareness can be honed naturally. When compared to traditional learning that tends to be passive and theoretical, the XR approach is more effective in creating deep, contextual learning, and preparing students to face the social realities in the world of education.

### Implementation Optimization at Partner Schools

Optimizing the implementation of learning at partner schools is an important step in bridging the simulated experience in the Virtual Lab with the reality of teaching in the field. PPG Arts and Culture students who have undergone intensive training through Virtual Lab Social-Emotional Learning (SEL) and Project-Based Learning (PBL) have begun to apply the skills they gained while undergoing teaching practices at partner schools. The experience in the Virtual Lab—such as managing conflicts, responding to class dynamics, and fostering empathy—is the first provision in dealing with real-life conditions full of student character

diversity. However, when applied in the real classroom, students face new challenges, such as adjustment to school culture, limited facilities, and more complex student emotional dynamics than simulations.

In terms of readiness, students show increased confidence and high reflective awareness in designing learning that integrates SEL values. The PBL approach carried out during the training period also shapes a systematic and responsive way of thinking to classroom problems (Nurhaq & Sunarya, 2025). Students are not only prepared in terms of teaching techniques, but also in the ability to build interpersonal relationships, manage classes inclusively, and create a safe and supportive learning environment. This makes the teaching experience at partner schools a validation of the effectiveness of technology-based and project-based training in preparing educators who are cognitively, affectively, and socially intact.

Feedback from partner schools reinforces the positive narrative of this learning model. The school noted that PPG students have better social sensitivity than previous practices, are able to resolve minor conflicts in the classroom with a non-confrontational approach, and show creativity in inserting SEL elements into cultural arts lessons. Principals and teachers welcomed the integration of technology and the SEL approach as it enriched the learning model in schools and created a more inclusive classroom atmosphere. This optimization shows that when the ecosystem of training, field practice, and school partnerships runs synergistically, the quality of education and professionalism of future teachers can be improved in a sustainable manner.

Table 4. Optimization of Virtual Lab and PBL Implementation at Partner Schools

Implementation Aspects	Observation Results at Partner Schools
Application of SEL Skills	Students apply empathy and conflict management in classroom interactions
Field Challenges	Adjustment of school culture, infrastructure limitations, and student reality
Teaching Readiness	Increased PBL's confidence, reflectiveness, and creativity
Partner School Response	Appreciation of students' ability to manage emotions and relationships
Innovations in Cultural Arts Learning	Integration of SEL values in artistic activities, such as expressive or collaborative drawing
Recommendations for Program Strengthening	Strengthening field orientation and mentor support at partner schools

The table above summarizes how the implementation of Virtual Lab SEL and PBL has a real impact on student teaching practices at partner schools. Students are able to apply skills previously honed in simulations, especially in building a supportive classroom atmosphere and managing students' emotional dynamics. However, they also face typical field challenges such as differences in school culture or technological limitations. Even so, their readiness as prospective teachers is reflected in their ability to adapt, reflect, and create learning. Feedback from partner schools shows that there is a recognition of the effectiveness of this approach in forming more humane and innovative teachers. In addition, the integration of SEL in art lessons opens up new spaces for more personalized and collaborative student expression. In the future, strengthening the aspect of field assistance and synergy with mentors at partner schools is recommended so that the implementation process takes place more optimally and sustainably.

### **The Influence of Learning Models on Students' Social-Emotional Skills**

The learning model that integrates Extended Reality (XR) and Project-Based Learning (PBL) has a significant influence on the development of social-emotional skills of PPG Arts and Culture students. In the emotional aspect, students show improved ability to understand and respond to emotions adaptively, especially when interacting in classroom conflict simulations or when undergoing group projects that demand emotional stability. The experiences gained through XR-based learning, such as being in a virtual classroom environment that gives rise to complex emotional situations, train students to recognize their personal reactions and manage them more consciously. PBL also encourages students to



develop empathy through teamwork and reflection, especially in the context of art that is full of personal expression and meaning.

In terms of social skills, this model shapes students to become more effective communicators and collaborators. In collaborative projects, students learn to actively listen, negotiate roles, and build professional relationships with peers and mentors (Pinardi & Basuki, 2023). This is especially important when they begin to interact with students at partner schools, where the ability to build trust and create an inclusive classroom atmosphere becomes crucial. Interactive exercises in XR also strengthen non-verbal communication skills and social sensitivity, two aspects that are often overlooked in traditional learning models.

To understand the impact of this model more objectively, an analysis of social-emotional learning outcomes was carried out using measurement instruments, such as the Likert scale based on self-reflection and direct observation by lecturers or teachers. The results of the measurements showed consistent improvements in almost all indicators of students' social-emotional skills. These changes not only occur conceptually, but are also reflected in tangible actions during field practice. Students are not only more skilled in delivering cultural arts materials, but also more responsive to students' emotional needs and able to create a positive and supportive learning climate.

Table 5. The Influence of Learning Models on Students' Social-Emotional Skills

Social-Emotional Skills Aspects	Observed Change Indicators	Evaluation Method
Emotional Skills	Increased empathy, emotion management, self-awareness	Self-reflection & XR simulation
Social Skills	Improved effective communication, team collaboration, interaction between individuals	PBL project observation & field interaction
Teaching Practice Response	Ability to create a supportive classroom climate, responsive to student dynamics	Feedback from teachers and students
Changes in Attitudes and Behaviors	Calmer when faced with problems, able to accept differences	Likert scale before and after

The table above summarizes the real influence of XR and PBL-based learning models on the social-emotional aspects of students. Emotional skills develop through training in simulation and self-reflection, where students learn to recognize and manage their internal responses in challenging situations. In a social context, collaborative projects facilitate improved communication and teamwork. Evaluations based on observations and feedback from partner schools show that students are able to create a more supportive learning atmosphere and pay attention to students' emotions, rather than just delivering subject matter. Through measurements based on the Likert scale, it is also seen that changes in student attitudes become more adaptive, inclusive, and reflective, which is an important indicator in the formation of the character of SEL-based professional educators.

### Obstacles in the Implementation of Learning Models

The implementation of a learning model that integrates *Extended Reality* (XR) and *Project-Based Learning* (PBL) in the development of social-emotional skills of PPG Arts and Culture students cannot be separated from a number of obstacles that arise at various stages. One of the main challenges is the uneven limitations of technology and infrastructure. Some partner schools do not have access to hardware such as VR headsets, high-spec computers, or stable internet networks, leading to a mismatch between the planned learning design and the technical realities in the field. Technical issues, such as lag when running XR simulations or difficulties in operating the software, also slow down the learning process and interfere with smooth execution.

In addition, PPG students face challenges in adapting the PBL and XR approaches into the learning ecosystem of partner schools that tend to be conventional. Some teachers or schools have shown resistance to the use of new technologies that are considered complicated or irrelevant to the needs of the local curriculum. Students also have to adjust to the limited learning time structure, the gap in technology understanding among teachers and students (Lubis, 2022; Niadi, 2023), and school policies that are not flexible to innovative learning

methods (Rahmat & Gunawan, 2022). Curriculum adaptation and licensing of the use of technology is often a time-consuming process and requires intensive negotiation.

In terms of developing social-emotional skills, students face obstacles in actualizing SEL theory in teaching practice. Limited time during field practice is often not enough to deeply explore reflection and emotion regulation exercises. Some students also have difficulty recognizing students' emotional dynamics directly, because their experiences are more shaped in a simulated environment. This suggests that strengthening social-emotional competencies requires time, repetitive practice, and intensive mentorship from mentors, both on campus and at partner schools. Therefore, the success of this model is highly dependent on ecosystem readiness, technology support, and sustainable mentoring strategies.

Table 6. Obstacles to the Implementation of XR and PBL Learning Models in SEL

Types of Constraints	Description of the Main Problem	Impact on Implementation
Technology and Infrastructure	Limited VR devices, laptops, internet, and technical difficulties at partner schools	XR simulation doesn't run optimally
Adaptation of Learning Models in Schools	Resistance to technology, curriculum differences, limited learning time	Barriers to the implementation of PBL and XR technology in the classroom
SEL Skill Development	Lack of practice time, difficulty applying theory to real social conditions	Lack of depth in student SEL reinforcement

The table above illustrates three main obstacles in the implementation of XR and PBL-based learning models for strengthening students' social-emotional skills. The limitations of technology are the initial obstacles that have an impact on the less optimal implementation of simulations and digital interactions. The second challenge relates to the partner school environment, where the culture and learning system have not fully supported innovative approaches, so students have to adapt and negotiate within limited spaces. The third obstacle arises from the aspect of internal development of students themselves, especially related to the time and capacity of social-emotional practice which cannot be fully explored in the limited duration of field practice. All of these obstacles show that the successful implementation of innovative learning models depends not only on program design, but also on technical readiness, school culture, and systematic mentoring strategies.

### The Impact of Learning Models on the Implementation of Cultural Arts Learning

The Extended Reality (XR) and Project-Based Learning (PBL) learning models have a significant impact on the implementation of Cultural Arts learning in partner schools, especially in terms of improving the quality of teaching and creating a humanistic learning environment. By integrating social-emotional skills into the learning design, PPG students are not only facilitated to master the art content technically, but also to present a learning process rooted in empathy, social awareness, and emotion management. Classroom management becomes more adaptive for students to respond to student needs emotionally, mediate small conflicts with a dialogical approach, and build more personal interactions with students. Art learning, which has tended to be technical in nature, has become more reflective and relevant to students' daily experiences.

The relevance of social-emotional skills in teaching cultural arts is very felt when students begin to apply a participatory and inclusive learning approach. Art, which is naturally an expression of inner self and cultural identity, is a very effective medium for developing empathy, tolerance, and collective awareness in the classroom (Fitriana et al., 2024). Students who are trained in SEL are more sensitive to the social and emotional background of students, and are able to adjust their teaching strategies to suit the needs of each individual. This creates a more open learning space and respects diversity of expression. Cultural arts learning is not only a place for skill transfer, but also a space for character formation and deep social connections.

Table 7. The Impact of Learning Models on Cultural Arts Learning

Impact Aspects	Description of Changes That Occurred
Improving the Quality of Teaching	Students are better able to manage classes, guide art discussions reflectively, and encourage active student participation.

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Social-Emotional Value Integration	Values such as empathy and social awareness are present in the art learning material and process.
Relevance of Context and Expression	Students relate art themes to social, cultural, and student life issues directly.
Improving the Inclusive Learning Climate	The classroom environment becomes more supportive, open to diversity, and encourages collaboration between students.
Strengthening the Role of Art in Education	Cultural arts are positioned as a means of character development and social sensitivity, not just a technical skill.

The table above summarizes various aspects of the positive impact of the application of XR and PBL-based learning models on the implementation of cultural arts learning. The improvement in the quality of teaching is seen in the management of the classroom which is more dynamic and dialogue-based. Students not only convey art materials, but also integrate SEL values in the learning process, making artistic activities a space for reflection and social meaning. The relevance of art teaching to students' social contexts strengthens the appeal of learning, while building a more inclusive classroom climate. This whole process emphasizes the role of cultural arts as a medium of character education, shaping a learning space that is not only creative, but also empathetic and transformative.

### Implications and Implementation

The implementation of the Extended Reality (XR) and Project-Based Learning (PjBL) based learning models, data shows a significant increase in the social-emotional competence of PPG Arts and Culture students. Based on the results of the evaluation through the Likert scale, there was an increase in the average score of 22% on the empathy indicator, 37% on the emotion regulation, and 40% on the ability to collaborate after participating in the learning series. This data is supported by the results of field observations that record changes in student behavior in responding to class conflicts and social interactions in a more reflective and solution-oriented manner. In a qualitative response, students said that they felt more emotionally and socially prepared after experiencing the XR simulation. One student stated that "the experience in the virtual space made me more sensitive and calm in dealing with students with different characters."

The success of this model is greatly influenced by the unique features of XR and PjBL. In XR, the presence of simulated classroom scenarios that are close to reality – such as dealing with a problematic student or communicating with a student's parents – triggers a profound affective experience. The empathetic response simulator and emotional feedback panel features allow students to see the immediate impact of their behavioral and communication choices in specific social-emotional scenarios. This makes learning more than just understanding theory – students actively experience, feel, and evaluate how they build empathy-based interactions and emotional awareness.

The PjBL approach is a complementary element that strengthens real practice. Through social problem-based projects in partner school settings, students develop active listening skills, resolve conflicts, and develop SEL-based learning solutions. More than 85% of students stated that involvement in team projects helped them build social awareness and confidence in designing inclusive and humanist learning. Reflective activities during the project process, whether through journals or discussion forums, contribute to the maturation of attitudes, social responsibility, and the courage to make decisions in a real context.

The integration of XR and PjBL has proven to be effective in accelerating the growth of the professional character of prospective educators. Students not only gain a conceptual understanding of Social-Emotional Learning (SEL), but also internalize these values in real practice. Thus, the combination of XR and PjBL creates a learning ecosystem that is not only innovative and interactive, but also shapes prospective teachers who are more empathetic, reflective, and adaptive to social dynamics in the classroom of the future.

### CONCLUSIONS

The integration of Extended Reality (XR) and Project-Based Learning (PjBL) has proven to be effective in improving the social-emotional skills of PPG Arts and Culture students. The

immersive and reflective features of XR and PjBL's contextual approach encourage deep, adaptive, and relevant learning. Significant improvements in empathy, collaboration, and emotion regulation suggest that this model successfully bridges theory and practice, while also shaping the character of educators who are humanistic and responsive to classroom dynamics.

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