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# Transformation of cell physiology learning through collaborative integration of local wisdom of Mamanda arts

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**Abstract**

Conventional methods in learning cell physiology are less effective, so a more interactive approach is needed. Mamanda art offers an innovative solution by modeling biology concepts through drama, comedy, and dialogue, while instilling moral values and collaborative skills. The main objective of this research is to describe the learning activities of cell physiology through collaborative integration of local wisdom of Mamanda art. Collaborative character as a symbol of harmonious dynamics is applied in the learning process through Mamanda art media. This research is qualitative research with learning process observation method. The study population was two classes of participants in the Animal Physiology course, Biology Education Study Program, FKIP ULM. The sample used is a total sample. The first class amounted to 40 students; the second class amounted to 43 students. The two classes were compared qualitatively. The data were analyzed descriptively using a Likert scale of 1-5. The stages of learning are: First stage, introduction to the art of Mamanda and the concept of cell physiology; Second stage, division of labor and division of players; Third stage, Mamanda performance staging cell physiology models; Fourth stage, synchronization of cell physiology concepts and role playing in Mamanda art; and Fifth stage is case study. All stages of learning activities were observed by observers. The results showed that learning cell physiology through collaborative integration with local wisdom of Mamanda art can be implemented well. This learning model can also improve the character of collaboration by integrating the local wisdom of Mamanda art in students.

***Abstrak.*** *Metode konvensional dalam pembelajaran fisiologi sel kurang efektif, sehingga diperlukan pendekatan lebih interaktif. Seni Mamanda menawarkan solusi inovatif dengan memodelkan konsep biologi melalui drama, komedi, dan dialog, sambil menanamkan nilai moral dan keterampilan kolaboratif. Tujuan utama penelitian ini adalah mendeskripsikan kegiatan pembelajaran fisiologi sel melalui integrasi kolaboratif kearifan lokal seni Mamanda. Karakter kolaboratif sebagai simbol dinamika yang harmonis diterapkan dalam proses pembelajaran melalui media seni Mamanda. Penelitian ini merupakan penelitian kualitatif dengan metode observasi proses pembelajaran. Populasi penelitian adalah dua kelas peserta mata kuliah Fisiologi Hewan, Program Studi Pendidikan Biologi, FKIP ULM. Sampel yang digunakan adalah sampel total. Kelas pertama berjumlah 40 mahasiswa, kelas kedua berjumlah 43 mahasiswa. Kedua kelas dibandingkan secara kualitatif. Data dianalisis secara deskriptif dengan menggunakan skala likert 1-5. Tahapan pembelajaran yaitu: Tahap pertama, pengenalan seni Mamanda dan konsep fisiologi sel; Tahap kedua, pembagian kerja dan pembagian pemain; Tahap ketiga, pertunjukan Mamanda yang mementaskan model fisiologi sel; Tahap keempat, sinkronisasi konsep fisiologi sel dan bermain peran dalam seni Mamanda; dan Tahap kelima, studi kasus. Semua tahap kegiatan pembelajaran diamati oleh pengamat. Hasil penelitian menunjukkan bahwa pembelajaran fisiologi sel melalui integrasi kolaboratif dengan kearifan lokal Kesenian Mamanda dapat terlaksana dengan baik. Model pembelajaran ini juga dapat meningkatkan karakter kolaborasi dengan mengintegrasikan kearifan lokal Kesenian Mamanda pada siswa.*

# A. Introduction

The introduction contains a formulated background of Character is very important in forming a high-quality next generation (Elder & Swinney, 2020), including the development of individual qualities to create good individual responses morally in various situations. Law of the Republic of Indonesia Number 20 of 2024 concerning the National Education System has focused on character education. The implementation of character education faces complex nature and broad scope, because the integration of character education with various fields of study is inadequate (Akbar et al., 2022; Harmadi et al., 2022; Nur, 2022). This shows the importance of integrating character education with various fields of science through habituation in everyday life (Kosasih et al., 2020). This habituation can be done through Exercise, model examples and building conditions in the transmission of values and character (Hakam, 2018). However, when compared to a complex life, the big challenge is the decline in collaborative character, which is influenced by increasing individuality and technological advances (Amrulloh et al., 2019).

Based on field observations, current cell physiology learning generally uses lecture and discussion methods. The focus is often on delivering concepts theoretically without involving students much; many students have difficulty understanding abstract concepts of cell physiology, especially if only explained theoretically; Interaction between students is often minimal, and collaborative work in class may be limited to group discussions, which are sometimes not entirely effective in helping to understand the material. The ideal conditions expected are a deeper understanding of cell physiology concepts to understand abstract concepts more concretely and visually, increasing active student involvement in the learning process with more interactive and enjoyable, collaborative learning allows students to work together in groups.

The gap between the learning conditions of cell physiology concepts in the field and the expected ideal conditions results in many students not fully understanding the abstract concepts of cell physiology with conventional methods. Conventional learning tends to be passive, so it does not involve students actively, even if group work is done, the development of collaboration skills is not optimal.

This gap requires a learning model that clarifies the abstract concept of cell physiology by modeling the process of cell physiology, increasing student learning activity and motivation with interactive and enjoyable learning, developing social and collaborative skills. The gaps that occur in the implementation of learning the concept of cell physiology can be overcome by applying a role-playing learning model, for example by adapting Mamanda art, strengthening collaborative activities such as acting out scenarios that describe biological processes in cells, using student worksheets that require students to have high-level thinking skills. This shows that a change is needed in the conventional approach to learning cell physiology towards a more interactive and collaborative direction, using the Mamanda role-playing model.

Collaborative character development in educational environments provides a means through collaborative learning (Bovill, 2020; Cook-Sather, 2022; Medero et al., 2022; Barkley et al., 2014; Kaendler et al., 2015; Talmo et al., 2022) by integrating character education and local wisdom in schools, families and communities. The development of educational curricula based on local wisdom has shown promising results (Masub et al., 2016). Collaborative learning has not only been proven to increase student learning motivation (Pai et al., 2015), but also has a positive impact on learning outcomes .

The traditional art of Mamanda theater is one of the typical performing arts of the Banjar tribe in South Kalimantan, Indonesia. This art is a type of folk theater that combines elements of drama, dance, music, and interactive dialogue. This theater involves royal plays with characters such as Kings, Ministers, Advisors, Commanders, to ordinary people. The uniqueness of Mamanda art lies in its ability to interact with the audience directly. Players can speak or have spontaneous dialogue with the audience (improvise) during the performance. Mamanda emphasizes local values and often inserts moral or educational messages, which makes this art not only entertainment, but also an educational medium (Fajarini, 2014; Ramdiah et al., 2020). Elements of Entertainment in Mamanda Art: Interactive dialogue, comedy, traditional music, and theatrical movements.

Educational Elements in Mamanda Art: Moral teaching, social roles, creativity and collaboration. Cast and audience interact frequently, emphasizing the importance of cooperation in problem solving. The relationship between Mamanda art and Biology Learning in that Mamanda art can be used as an approach to modeling biological concepts, such as cell physiology. Different characters in Mamanda can represent different components of a cell (nucleus, ribosomes, mitochondria, etc.), and interactions between characters can illustrate biological processes such as transcription or translation. Entertainment elements, such as comedy or theatrical movements, help reduce boredom when learning concepts. complex biology.

Cultivating 'Good' Character in Learning using Mamanda art, including in terms of collaboration. Mamanda art emphasizes interaction between characters who must work together to solve problems (Lee, 2019). This fosters collaborative character among students when learning biological concepts that require teamwork; creativity, through improvisation in dialogue and scenes, students are

encouraged to think creatively, both in understanding biological material and in solving problems innovatively; and openness. Direct interaction with the audience reflects openness to accepting new ideas and opinions, can be linked to critical thinking skills in learning (Dewi et al., 2017; Verstegen et al., 2021).

Mamanda art, with its interactive and narrative format, can be used to explain physiological material by utilizing the role elements in it. In this context, players can play the role of various cell components or biological processes that occur in cell physiology. For example: The King can represent the cell nucleus, the command center that controls all cellular activities; Ministers or Advisors can represent other organelles such as mitochondria or ribosomes, which play important roles in energy production or protein synthesis; Commanders or soldiers can depict the role of proteins or enzymes that maintain and repair cells. Through the storyline delivered in the form of a theatrical narrative, students can visualize how cells work, from the processes of transcription, translation, to protein packaging. Interaction and dialogue between characters allow players to act out complex biological processes in a way that is easier for students to understand.

The diverse local wisdom in Indonesia is a strong foundation for character education. Cultural values and traditions are the main basis for shaping students' character such as morals, respect, cooperation, and concern for the environment (Hidayati et al., 2020; Nugroho, 2016; Sugiyo & Purwastuti, 2017). Local wisdom is part of the culture of the Indonesian nation, a strong foundation in building character that is in accordance with the values in Indonesia (Suhartini et al., 2019; Irwandi & Fajeriadi, 2019; Eko et al., 2020; Trilaksana et al., 2023), but the success of character education based on local wisdom in Indonesia needs to be handled carefully through cooperation between the government, society and the private sector. This cooperation is of course needed in the provision of resources, teacher training and evaluation of the effectiveness of character education programs including the quality of character learning (Anwaruddin, 2015; Ma'Arif, 2018).

Learning and curriculum containing local wisdom have various forms (Ningrum, 2016; Parwati et al., 2018; Pornpimon et al., 2014): Integration of local wisdom curriculum into the formal curriculum; implementation of local wisdom learning experiences often involves a direct learning approach and is based on student experience; collaboration with the local community is very important in implementing local wisdom in education; cultural celebration events at schools incorporate local wisdom into education to have a more lively dimension; integrating local languages into the education system can preserve and promote local wisdom in areas characterized by linguistic diversity.

The curriculum guides the achievement of character education by integrating character values in all aspects of learning, through social-emotional development, out-of-class activities, teacher role models, and continuous reflection and evaluation. The role of local wisdom in Mamanda art, through values such as mutual cooperation, social interaction, cooperation and respect for the role of other people, is very relevant in building the character of collaboration. The collaborative learning approach is a learning approach based on collective learning activities that acquire knowledge by solving problems dynamically in a group. Interdependence in collaborative learning shows the contribution of group members to achieving common learning goals. Individual accountability in collaborative learning remains important. Each learner is responsible for their understanding and assessment of individual and group achievement.

This study aims to describe cell physiology learning activities through collaborative integration of local wisdom of Mamanda art. The urgency of Mamanda's art approach in learning the concept of cell physiology is through role-playing in Mamanda's art, the concept of cell physiology can be modeled. The abstract, unobservable, and unpractical concept of cell physiology results in students having difficulty mastering the material. In order to make it easier for students to master the concept of cell physiology, the concept of cell physiology is modeled through role-playing in Mamanda's art.

## B. Material and method

This research is qualitative research with an observation method of the implementation of the learning process. Learning sessions involve active participation of students in role-playing. Mamanda's interactive theater performances facilitate dynamic involvement of students both as players and as spectators. This creates an in-depth learning process that integrates character education and local wisdom.

The research population was all students of Animal Physiology course, Biology Education Study Program, FKIP ULM. The research population consisted of two classes of participants. The sample used was the total sample. The first class has 40 students, the second class has 43 students. The first and second classes are only for qualitative comparison, not quasi-experimental. Data were analyzed descriptively using a Likert scale of 1-5. All students actively participated in this research as students who carried out learning the concept of cell physiology through collaborative integration of local wisdom in Mamanda arts.

The learning process is carried out as followsL (1) Introduction to Mamanda art and the concept of cell physiology by showing videos from YouTube. Phase I is carried out at the first meeting (2) Division of work and division of players. Group work for the

preparation of the Mamanda performance and Mamanda performance practice as an independent task. Work progress and progress of Mamanda performance practice are monitored at the next meeting; (3) Mamanda performance that stages a model of cell physiology activity with a cell kingdom setting (4) Synchronization of the concept of cell physiology and role-playing modeling in Mamanda art; (5) Case study, group discussions and class discussions are carried out on problems/cases related to cell physiology (Figure 1).

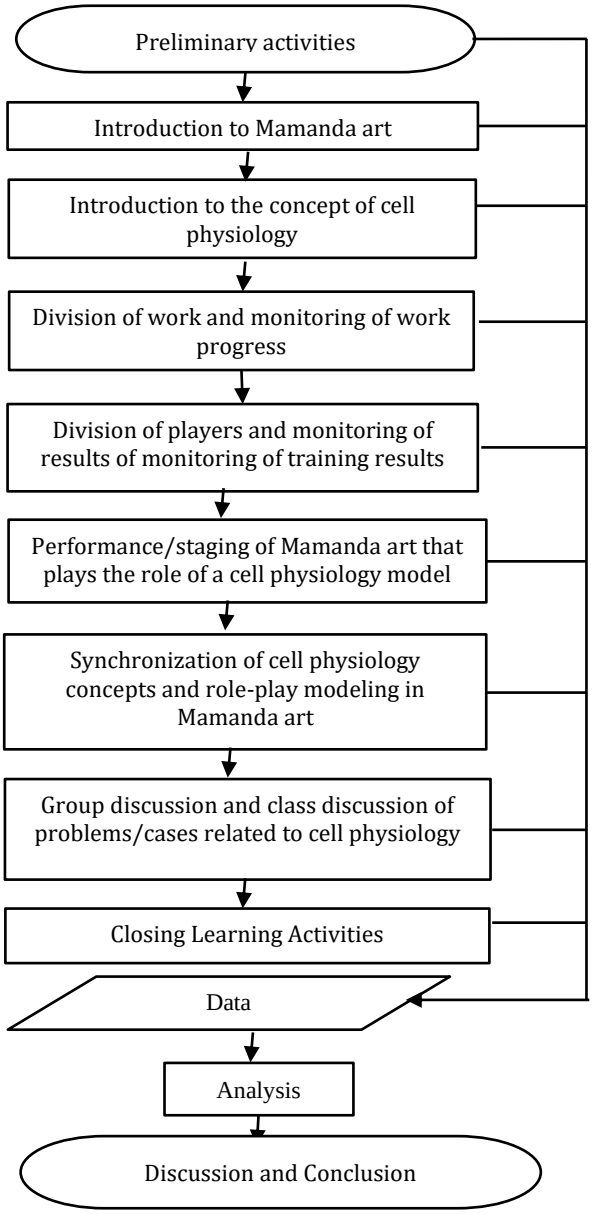


Figure 1 flowchart of learning and research process

Based on the learning process, an observation sheet was created with a Likert scale of 1-5, namely: 1 = Done very poorly; 2 = Done poorly; 3 = Done quite well; 4 = Done well; 5 = Done very well. All learning activities are observed by observers using observation sheets. Observation results are presented in table form as material for analysis.

## C. Results and discussion

The results of the cell physiology learning process through collaborative integration of local wisdom of Mamanda art are presented in Table 1 and Tabel 2. In learning cell physiology, concepts such as the central dogma of biology (transcription, translation), the role of cell organelles, and protein pathways are often abstract and require visualization to be more easily understood. By adapting traditional theater arts such as Mamanda's role-playing approach, cell physiology concepts can be combined with Mamanda's story elements and characters to help students understand these complex mechanisms. Modeling abstract concepts through role playing makes it easier for students to master the concept. (Nazarov, 2022)

The overall average of learning activities (Table 1) in the first class with a score of 3.88 (sufficient to good) and improved in the second class learning activities with a score of 4.66 (good to very good). In the first class meeting, the introduction of students to Mamanda art had activities with quality that was still quite good. This was caused by the low appreciation of students towards Mamanda art because: The younger generation, Mamanda art is less interesting due to the dominance of pop culture and modern entertainment such as films, television, and social media; The younger generation is less interested in Mamanda art because Mamanda art is rarely shown in mass media such as the internet and television; The assumption of traditional theater as something old-fashioned or irrelevant to modern life (Kleiden, 2002).

Students' low level of familiarity with Mamanda art can be improved by focusing more on the learning concepts that will be discussed in relation to Mamanda art, namely by focusing on the cell kingdom as a form of Mamanda play that will be performed. This can be done by taking students to watch Mamanda's performance live, as an independent task and as a structured task. Through examples of Mamanda performances, it is hoped that students will be inspired to use art to express themselves and become emotionally involved so that Mamanda art as a local Banjar culture is more interesting to know and interesting to use in learning. Efforts to increase students' introduction to Mamanda art as explained above were carried out at the second class meeting, and this proved successful in increasing learning activities from adequate to good.

Students' introduction to the concept of cell physiology is still low in the first class meeting. This is caused by: Cell physiology involves abstract concepts and requires a deep understanding of biological processes that occur at the molecular level. This can make it difficult for students to visualize and understand the material (Borghi, 2022; Henningsen-Schomers & Pulvermüller, 2022; Dove 2021); Many

scientific terms can be difficult for students to understand, especially if they are not familiar with these terms (Cao et al., 2015); and Learning focuses more on theory, so students find it difficult to understand the concepts of cell physiology in a concrete way.

**Table 1 Results of the learning process of cell physiology through collaborative integration local wisdom of Mamanda art**

| No. | Observed elements | Assessment (Scale 1-5) | |
|---|---|---|---|
| | | Class I | Class II |
| I | Meeting I. | | |
| | A. Preliminary activities. | 5 | 5 |
| | B. Core activities: | | |
| | Phase 1. Introduction to Mamanda and the concept of cell physiology. | | |
| | a. Introduction to Mamanda art. | 3 | 4 |
| | b. Introduction to the concept of cell physiology | 3 | 4 |
| II | Meeting II. | | |
| | Phase 2. Division of Work and Players. | | |
| | c. Division of work and monitoring of work progress. | 4 | 5 |
| | d. Division of players and monitoring of results of monitoring of training results. | 4 | 5 |
| III | Meeting III. | | |
| | Phase 3. Performance/staging. | 3 | 4 |
| | e. Performance/staging of Mamanda art that plays the role of a cell physiology model. | | |
| | Phase 4. Synchronization. | 4 | 5 |
| | f. Synchronization of cell physiology concepts and role-play modeling in Mamanda art. | | |
| IV | Meeting IV | | |
| | Phase 5. Case Study | 4 | 5 |
| | g. Group discussion and class discussion of problems/cases related to cell physiology. | | |
| | C. Closing Learning Activities | 5 | 5 |
| | **Average** | **3,88** | **4,66** |

**Table 2 Observer comments and suggestions**

| No. | Comments and suggestions | Actions in second class learning |
|---|---|---|
| 1 | The introduction of Mamanda art and the concept of cell physiology still stand separately, the relationship between Mamanda art and the concept of cell physiology in learning is not yet clear. | The relationship between Mamanda's art and the concept of cell physiology in learning has been made clearer. |
| 2 | The playback songs used during the demonstration of different protein glycosylation processes should be different songs. | The play back songs used during the demonstration of the protein glycosylation process were different. |
| 3. | The euphoria after the show should be managed well so that it is not excessive and does not take up too much time. | The euphoria after the show was well managed and didn't take much time. |

**Table 3 Compatibility of Mamanda art characteristics and cell physiology concepts**

| No. | Characters in Mamanda arts | Organelle components in cell physiology |
|---|---|---|
| 1. | The king is the ruler who gives orders and controls the running of the kingdom. | The nucleus acts as the control center of the cell that stores genetic information (DNA) and regulates cell activity. |
| 2. | The Vizier is the King's advisor who is tasked with conveying the King's messages and instructions to the implementers in the field. | RNA (specifically mRNA) functions to carry genetic instructions from DNA in the nucleus to the ribosome to be translated into. |
| 3. | Hulubalang is a soldier who is tasked with carrying out the King's orders in the field, maintaining stability, and completing heavy tasks. | Ribosomes are tasked with translating instructions from mRNA into polypeptide chains or proteins. |
| 4. | Supporting characters who play a small role but help the main character in completing the mission. | Amino acids, which are the small units that form proteins when assembled by ribosomes. |

Students' improvement in the introduction of concepts is done by providing more concrete examples through models (Lang, 2021), visualization (Cetin, 2020; Mladenović et al., 2021; Aysolmaz & Reijers, 2021), repetition (Silver et al., 2024) and practice (Hyun et al., 2020). This can be done by providing video links and other links related (Lange & Costley, 2020). to the concept of cell physiology. So that teachers can provide sufficient emphasis on key concepts in cell physiology, so that participants focus on the most important things. Based on research and implementation in the field, role-playing as a learning

method is indeed effective in bridging understanding from abstract concepts to concrete concepts. This model combines direct experience, visualization, and active participation, thereby increasing students' understanding of difficult material. Role-playing in science learning allows students to gain a deeper understanding of abstract concepts through physical actions and direct experiences, which involve more of the senses in the learning process (Aldrich et al., 2014). Science learning through role-playing, students show increased conceptual understanding and active participation, because they can more easily understand complex interactions and mechanisms by acting as elements in the system (Nazarov, 2022). Role-playing based learning activities can help students connect theory to real experiences, thereby increasing long-term retention and understanding. Efforts to improve the introduction of this concept have yielded better results with increasing student introduction activities to the concept (Ismail et al., 2022) of cell physiology becoming good in the second grade.

In the first performance of the cell kingdom that models the physiological processes of cells, the quality of the performance is often still low for the following reasons: (1) Lack of Rehearsal and Preparation. Although rehearsals have been done, the first performance is often the first time that actors, musicians, and crew work together in the context of a full performance; (2) The students, as players and crew may still be adjusting to the stage; The first performance usually comes with greater pressure for all involved, because this is the first opportunity to show the results of their work. This pressure can cause anxiety or stress that affects performance; Students as players or crew have very minimal stage experience; (3) Immature Coordination. In the first performance, coordination between the various elements of the performance (actors, musicians, lighting, sound, and stage management) may not be fully mature. This can cause delays or inconsistencies that reduce the quality of the performance. The first performance is the first time the team works with direct interaction from the audience. Adjusting to audience reactions, such as laughter or applause, can take time and affect the flow of the performance; (4) Unexpected Technical Problems. In the first performance, technical problems that were not detected during rehearsals, such as problems with microphones, lighting, or stage props, may arise. These technical errors can disrupt the flow of the show. Sometimes, the first performance is held in a new location for the cast and crew; Lack of Experience in Dealing with Challenges. During the first performance, unexpected obstacles may arise, and the team may not have the experience or a solid backup plan to deal with them quickly. The first performance is also often used as a "test run" to see how the audience reacts to various elements of the show. If these elements do not go according to plan, this can affect the overall quality; (5) Limited Flexibility. Actors may tend to follow the script or direction very closely in the first performance, without much improvisation or adjustment, so that the performance can feel stiff or lack dynamics. In the first performance, full mastery of the script and stage movements may not have been achieved, resulting in some moments that seem awkward or less fluid (McMullan, 2021).

Deficiencies that occur during the performance can be overcome by: (1) After the performance, constructive evaluation and feedback on all aspects that need improvement; (2) Frequent practice, repetition of difficult scenes and simulation of the performance. Frequent practice, repetition of difficult scenes and simulation of the performance can overcome adjusting to the stage, overcome anxiety, can anticipate unexpected technical matters, players can develop themselves to be less rigid and easily improvise; (3) Motivation and increase in the players' self-confidence; (4) Increased collaboration between players and team members involved (Ioannou et al., 2020).

Efforts to improve the performance of the performers in Mamanda's art performances which stage the concept of cell physiology, as carried out above, are showing results. This can be seen in Mamanda's performance/art performance activities which model cell physiology with good activity at the second class meeting.

Good learning activities in the first class meeting and the second class meeting are: Division of work and monitoring of work progress; Division of players and monitoring of training results; Synchronization of cell physiology concepts and role-playing modeling in Mamanda art; Group discussions and class discussions of problems/cases related to cell physiology. These four activities have good quality in the first class meeting and the second class meeting, but need to be improved by increasing monitoring activities and teacher involvement when students carry out independent and structured tasks. This monitoring improvement can be done in such a way both offline and online. Improving learning activities can also be done by increasing student involvement and activity in discussions and problem solving, both problems related to performance tasks and tasks related to learning concepts/materials. Role-playing models (as in Mamanda art) can increase student involvement in discussions and problem solving lies in several factors that stimulate active participation and direct involvement of students. This method encourages students not only to listen and receive information passively, but also to interact, experience directly, and think about solutions collaboratively (Kara, 2022).

The success of efforts to improve learning activities in the introduction of Mamanda art and the

introduction of the concept of cell physiology from sufficient to good quality, as explained above, has also directly increased learning activities: (1) Division of work and monitoring of work progress; (2) Division of players and monitoring of results of monitoring of training results; (3) Synchronization of cell physiology concepts and role-play modeling in Mamanda art; and (4) Group discussion and class discussion of problems/cases related to cell physiology. from good to very good. This happens because learning activities are well controlled and implemented according to the demands of learning criteria (van Alten et al., 2020).

Learning activities that are very good in the first and second class meetings are: preliminary activities and closing activities. In the preliminary activities, learning activities are very good because all components of opening learning are carried out very well, such as: greeting and returning greetings, praying, checking student attendance, preparing students to learn (checking the completeness of learning in the learning room, checking the neatness of students and checking the cleanliness of the learning room), and stating learning objectives (Hawa et al., 2021; Hasna & Suwarjo, 2023; Belzer, 2021). In the closing activity, the learning activity was very good because all components of closing the learning were carried out very well. Teachers who successfully close learning well if the following components are met: Reflecting and concluding the lesson, providing an evaluation related to the material studied, asking students to do exercises at home, studying the material for the next meeting, closing prayer (Hawa et al., 2021; Solehudin et al., 2024)

Some of the problems faced in learning (Table 2) and how to overcome them are: (1) Making a comparative table of role/character analogies in Mamanda with cell components involved in the cell physiology process (Table 3) and conducting a discussion session after the introduction stage of Mamanda art so that students as players are able to recognize the character of the character being played (Deer & Vera, 2021) so that they are able to connect it with the concept of cell physiology; (2) The songs that are the background during the performance of various protein glycosylation processes still have to be different songs. This is overcome by recording more different songs, especially Banjar regional songs as background music during different glycosylation processes; (3) Post-performance euphoria should be managed well, do not let it be excessive and do not take up too much time, overcome by determining a clear time for the appreciation and discussion session after the performance (Charlesworth & Pandit, 2020), immediately divert the euphoria to structured reflection activities, provide simple but focused activities such as small group discussions or quick quizzes related to the material that has been learned, give appreciation to students in a measured way and directly link it to the learning process, and prepare transition activities such as light stretching or short ice-breaking activities, to help students refocus on learning after the performance.

## D. Conclusion

Mamanda art has local wisdom, one of which is the character of collaboration. The character of collaboration in the local wisdom of Mamanda art can be used in the role-playing learning model of the concept of cell physiology, and this Mamanda role-playing learning model can be implemented well in the learning process of the concept of cell physiology, so that the abstract concept of cell physiology can be modeled and easily mastered by students. The scientific impact for the future of the results of this study for the development of interdisciplinary learning methods, the development of collaborative and participatory teaching strategies in various disciplines, triggering further development of role-playing learning models in science, technology, engineering, and mathematics (STEM) subjects, strengthening the importance of local wisdom in modern education, perhaps including innovation in curriculum design that emphasizes character education, such as collaboration, through an art-based approach. Suggestions for follow-up recommendations in the form of further research to explore more deeply how local wisdom from Mamanda art, especially in the aspect of collaboration, can contribute to the development of character education.

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