Authentic Assessment Design Using PhET Rationale

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This evaluation is consistent with the principles of authentic assessment, as it requires students to demonstrate their understanding of organelles in a practical, real-life setting. Rather than simply labeling diagrams, students are required to articulate how organelles collaborate to facilitate transport across membranes, a crucial process for all living cells. Authentic assessments focus on significant tasks, real-world reasoning, and the application of knowledge (Shannaq, 2024, March), all of which are integrated into this activity.

A formative assessment was chosen to allow students to evaluate their understanding of organelles and their functions prior to advancing into more complex cell biology topics. Formative assessments offer continuous feedback and help identify misunderstandings during the teaching process (Banda & Nzabahimana, 2021). The PhET simulation provides instant visual feedback, enhancing students' capability to self-correct.

PhET was selected due to its free availability, accessibility, and research-backed approach. Its simulations offer interactive visuals that aid learners in comprehending abstract biological processes. Visual representations enhance a deeper understanding of concepts, especially in middle school science, where students benefit from tangible examples (Ajjawi et al., 2024). PhET's "Cell Membrane" simulation enables students to see diffusion, osmosis, and active transport, making it a valuable resource for linking organelle structure to cell function.

This evaluation enhances the gamified learning experience by enabling students to function as investigators finishing a scientific task. XP, badges, or progress points can be conveniently granted for the successful completion of the digital report. This boosts motivation and ensures the gamified storyline continues to advance.

The assessment also takes into account diverse learning needs. Students can demonstrate understanding in multiple ways, through screenshots, written explanations, and analogies. PhET simulations feature visual scaling, simplified modes, and guided instructions, which support learners with diverse cognitive profiles.

References

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