

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: GTZ , 2021 cohort

Recorder: Shang Lei

Hello, fellow student! In order to better understand the application effects of artificial intelligence systems in the teaching of blood cell morphology, we are conducting this interview survey. Your feedback is very important to us and will help improve teaching methods and enhance teaching quality. The information gathered from this interview will only be used for educational research and will not disclose your personal privacy, so please feel assured in your responses. Thank you for your support and cooperation!

- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: The morphology of blood cells and bone marrow cells is diverse and difficult to differentiate. Certain cell morphologies at different stages have a high degree of similarity, making their characteristics challenging for beginners to recognize.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning convenience, etc.) Which teaching method do you prefer?**

Student: The greatest advantage of artificial intelligence compared to traditional teaching methods is the significant improvement in learning efficiency. When students encounter uncertain images under a traditional microscope, they must seek help from the teacher; however, artificial intelligence can quickly provide

answers, which aids students in their thinking and summarization while also alleviating the teaching pressure on teachers.

3. In the artificial intelligence system, the cell images are all annotated by the teacher. How much does this help you understand blood cell morphology? Does it save you the number of times and time spent asking the teacher questions?

Student: Artificial intelligence greatly helps me understand blood cell morphology, allowing me to quickly review a large number of cell morphologies in a short period and grasp their characteristics.

4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?

Student: I discussed with my classmates. In-class discussions help quickly extract diverse cell morphology features, which aids in expanding thinking and deepening understanding. It is necessary to add a discussion module, as it can help students promptly address questions after class and also make it easier for teachers to answer those questions.

5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?

Student: In the practical class, I gained a preliminary understanding of cell morphology, I was focused, my emotions were fully engaged, and I am very satisfied with the classroom atmosphere.

6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to

identify, and what do you think are the reasons for this difficulty?

Student: There is a significant improvement. The types of blood cells with noticeably improved recognition accuracy include: Basophilic Erythroblast, Polychromatic Erythroblast, Orthochromatic erythroblast, Promyelocyte, Myelocyte, Metamyelocyte, and megakaryocytes. The cells that still present recognition difficulties are: Myeloblast and monocytes. The reason is that these cells have highly similar morphologies, making it difficult to grasp their characteristics.

7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such as adding an English language option, setting up an online Q&A function, etc.)

Student: The desired additional feature is that the artificial intelligence should provide the rationale for the recognition results, such as the reasoning process.

8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?

Student: Yes !

9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?

Student: I believe that artificial intelligence has great application prospects in the integration of medicine and engineering. It can free clinical doctors from certain low-quality repetitive tasks while also improving their work efficiency.

10. Do you think this system will replace traditional microscopy teaching?

Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?

Student: I believe it is possible to replace traditional microscopy teaching. Although the use of microscopes is a necessary research and work skill for clinical doctors, microscopy teaching is an inefficient way of teaching and holds little significance for classrooms primarily focused on morphological recognition. It is bound to be replaced by more efficient methods such as artificial intelligence. However, if the teaching aims to focus on microscope operation and specimen preparation, this teaching method can be retained.

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: JCJ , 2021 cohort

Recorder: Shang Lei

Hello, fellow student! In order to better understand the application effects of artificial intelligence systems in the teaching of blood cell morphology, we are conducting this interview survey. Your feedback is very important to us and will help improve teaching methods and enhance teaching quality. The information gathered from this interview will only be used for educational research and will not disclose your personal privacy, so please feel assured in your responses. Thank you for your support and cooperation!

- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: I feel a bit difficult; the blood cells in the bone marrow are in a process of differentiation, and the morphology of blood cells at adjacent differentiation stages is similar, making them hard to distinguish.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning convenience, etc.) Which teaching method do you prefer?**

Student: When using AI-assisted learning, the provided samples are more numerous and include type judgments of blood cells. First, I can make my own judgments and then compare them with the AI's judgments, which generally reduces the need to consult teachers, making the learning process more efficient.

- 3. In the artificial intelligence system, the cell images are all annotated by**

the teacher. How much does this help you understand blood cell morphology? Does it save you the number of times and time spent asking the teacher questions?

Student: As mentioned in the previous question, it is indeed very helpful and saves time and the frequency of asking teachers questions.

4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?

Student: We had a discussion, which helps understand the reasoning behind classmates' judgments and deepens memory. There is no need to add a separate discussion module; we can discuss with nearby classmates offline. This is because the more participants there are in a discussion, the relatively lower the efficiency becomes.

5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?

Student: I have a preliminary understanding of cell morphology, I am focused, my emotions are engaged, and I am satisfied with the classroom atmosphere.

6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to identify, and what do you think are the reasons for this difficulty?

Student: The ability to recognize morphological features has significantly improved. The recognition ability for erythroblast and immature granulocytes has been enhanced. However, I find it relatively difficult to identify plasma cells, monocytes, and primitive cells at various stages, which I believe is due to the

limited number of such cells and the constraints of classroom time.

- 7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such as adding an English language option, setting up an online Q&A function, etc.)**

Student: No need.

- 8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?**

Student: I will study again when necessary.

- 9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?**

Student: Artificial intelligence can assist in diagnosis and clinical decision-making, and it should be learned and utilized to promote career development.

- 10. Do you think this system will replace traditional microscopy teaching? Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?**

Student: The advantages of this system are quite obvious, and it will replace traditional teaching. Artificial intelligence-assisted teaching requires students to demonstrate autonomy, so classroom assessment and feedback are very important. They can clarify the level of knowledge mastery in order to identify and fill any gaps.

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: XZX , 2021 cohort

Recorder: Shang Lei

Hello, fellow student! In order to better understand the application effects of artificial intelligence systems in the teaching of blood cell morphology, we are conducting this interview survey. Your feedback is very important to us and will help improve teaching methods and enhance teaching quality. The information gathered from this interview will only be used for educational research and will not disclose your personal privacy, so please feel assured in your responses. Thank you for your support and cooperation!

- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: I find it somewhat difficult; the cell morphologies are similar, making it hard to distinguish and remember.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning convenience, etc.) Which teaching method do you prefer?**

Student: Learning becomes more portable, and the combination of the two is superior. After explaining with PPT, using artificial intelligence systems can deepen memory.

- 3. In the artificial intelligence system, the cell images are all annotated by the teacher. How much does this help you understand blood cell morphology? Does it save you the number of times and time spent asking**

the teacher questions?

Student: It is more convenient for learning, reducing the number of questions and the need for inquiries

- 4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?**

Student: In the process of studying, I did not engage in discussions with classmates, but I believe that discussing with peers is beneficial for mutual learning, deepening memory, and expanding ideas. Personally, I feel that there is no need to add a discussion module; offline self-discussion is sufficient.

- 5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?**

Student: I have a preliminary understanding and I am satisfied with the classroom atmosphere.

- 6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to identify, and what do you think are the reasons for this difficulty?**

Student: It may be due to not having a comprehensive grasp of the knowledge taught in class, which caused some confusion in the second half, resulting in a decrease in assessment accuracy. However, analyzing the problems after the assessment has increased my understanding of the knowledge.

- 7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such as adding an English language option, setting up an online Q&A function,**

etc.)

Student: I think it's quite good at the moment, and I can't think of any ways to improve the functionality right now.

8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?

Student: Yes, I will make use of this feature for studying and exam preparation.

9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?

Student: Enhance learning ability and lay the foundation for the integration of medicine and engineering. I believe that by using this system to increase learning samples and repeatedly recognize cells, it will help deepen understanding and consolidate knowledge points.

10. Do you think this system will replace traditional microscopy teaching? Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?

Student: I don't think so, because the working basis of artificial intelligence is built on the conditions set by humans, while human cells are dynamically changing and will always present new variations that require manual identification. I don't have any other suggestions.

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: XLY , 2021 cohort

Recorder: Shang Lei

Hello, fellow student! In order to better understand the application effects of artificial intelligence systems in the teaching of blood cell morphology, we are conducting this interview survey. Your feedback is very important to us and will help improve teaching methods and enhance teaching quality. The information gathered from this interview will only be used for educational research and will not disclose your personal privacy, so please feel assured in your responses. Thank you for your support and cooperation!

- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: I find it a bit challenging. Firstly, the classification of blood cells is quite diverse and complex, making it difficult to remember the theoretical knowledge. Subsequently, one needs to correlate various cell morphologies with each category of cells. After mastering the characteristics of different cell morphologies, it also involves some cells having similar shapes, which can sometimes be easily confused, making them hard to distinguish. For example, there was a time when I found it hard to differentiate between lymphocytes and monocytes, which have somewhat similar nuclei.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning**

convenience, etc.) Which teaching method do you prefer?

Student: The images from the new teaching system are clearer and can display classifications according to different types of cells. Compared to traditional microscopes, which require continuous searching for less abundant cells on a single slide, artificial intelligence can directly showcase a large number of similar cells, presenting the morphological characteristics of each type more distinctly, making it easier for me to summarize and conclude.

3. In the artificial intelligence system, the cell images are all annotated by the teacher. How much does this help you understand blood cell morphology? Does it save you the number of times and time spent asking the teacher questions?

Student: It is quite helpful, and it offers two modes for displaying answers: showing and hiding them. This allows for self-assessment while reducing the time spent on confirming answers for each cell with the teacher. Students can adjust the number of practice cells in each category according to their own circumstances. Additionally, having the time to reflect after seeing the answers enhances learning.

4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?

Student: Yes. I have learned from the unique distinguishing methods and perspectives of other students, which has helped with my understanding and memory. I believe it is essential for the system to include a discussion module, as this would allow for in-depth discussions on cells that are generally controversial among everyone, enhancing our understanding. At the same time, we can listen to other students' thoughts, answer each other's questions, and progress together.

5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class

duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?

Student: Yes! I was very focused throughout the class. On one hand, I found this teaching method to be very refreshing, and on the other hand, I learned a lot, making it very efficient! I am very satisfied! The teachers are incredibly patient!

6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to identify, and what do you think are the reasons for this difficulty?

Student: The ability to recognize cells has noticeably improved. After studying, I can distinguish quite clearly between the three major types: neutrophils, monocytes, and lymphocytes. However, I find it challenging to differentiate between platelets and fragments. I didn't pay much attention to platelets during my studies, as I thought they were relatively simple, but later, when watching videos, I occasionally found platelets a bit unfamiliar.

7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such as adding an English language option, setting up an online Q&A function, etc.)

Student: I believe we can add some annotations for the details of cell differentiation, especially for some cell classifications that many students find difficult to understand. Simple explanations could enhance understanding and memory.

8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?

Student: Definitely. I feel that this would also be very useful for exam review.

9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?

Student: Consider it a new perspective! Using artificial intelligence in daily learning may lead to unexpected benefits.

10. Do you think this system will replace traditional microscopy teaching? Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?

Student: If we only consider the theory examination related to visual recognition, I believe it may replace microscope teaching. However, I feel that every step in using a traditional microscope is essential to master. For example, tasks such as sample preparation, slide making, examining under the microscope to find cells, and adjusting magnification cannot be practiced through the AI demonstration.

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: XWX, 2021 cohort

Recorder: Shang Lei

Hello, fellow student! In order to better understand the application effects of artificial intelligence systems in the teaching of blood cell morphology, we are conducting this interview survey. Your feedback is very important to us and will help improve teaching methods and enhance teaching quality. The information gathered from this interview will only be used for educational research and will not disclose your personal privacy, so please feel assured in your responses. Thank you for your support and cooperation!

- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: I find it very difficult, mainly because certain cell morphologies are hard to distinguish, and memorizing the characteristics of various cell types is cumbersome.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning convenience, etc.) Which teaching method do you prefer?**

Student: The artificial intelligence system for teaching can provide a vast number of blood cell images, significantly improving learning efficiency. I am more inclined to prefer teaching through artificial intelligence systems.

- 3. In the artificial intelligence system, the cell images are all annotated by the teacher. How much does this help you understand blood cell**

morphology? Does it save you the number of times and time spent asking the teacher questions?

Student: The cell images are annotated with answers by the teacher, allowing us to quickly summarize the morphological features and patterns of the cells. It also makes self-testing very convenient, greatly saving the number of questions we need to ask the teacher and the time involved.

4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?

Student: In class, I discussed with my classmates, mainly about the names of certain uncertain types of cells, for mutual verification. We could also remind each other of the key characteristics to deepen our impressions. There is a need to increase discussion modules; teachers could provide some atypical cell images for students to discuss.

5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?

Student: I have gained a profound understanding of cell morphology. I am focused, and the classroom atmosphere is very relaxed. I am very satisfied.

6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to identify, and what do you think are the reasons for this difficulty?

Student: I have significantly improved my ability to recognize cells. The accuracy of identifying granulocytes at various stages has markedly increased through learning. However, distinguishing lymphocytes from early erythroid

cells may be more challenging, possibly due to the morphological diversity of lymphocytes and their fewer distinguishing characteristics.

7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such as adding an English language option, setting up an online Q&A function, etc.)

Student: The artificial intelligence system can enhance English language functionality, helping students deepen their impression of the English names of various cells and expand the depth of their learning. At the same time, the system can set up a quiz mode to test students' learning outcomes of cell morphology, which also adds an element of fun to the learning process.

8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?

Student: When there is a need, using the artificial intelligence system for learning will be very convenient.

9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?

Student: My main impression is that it has enhanced my learning efficiency, as the images are clear, the sources are abundant, and they closely resemble real clinical cases.

10. Do you think this system will replace traditional microscopy teaching? Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?

Student: I don't think so. I believe the advantage of the artificial intelligence system in teaching lies in its high efficiency; however, microscopes are still an important means of clinical slide reading. Therefore, we cannot completely abandon how students learn to use microscopes. In future teaching models, I suggest retaining a certain number of hours for microscope instruction, and then incorporating artificial intelligence teaching. Combining these two teaching methods will benefit students' comprehensive learning. Additionally, there might be some incorrect labels for certain cells in the artificial intelligence system, so I recommend that teachers perform accurate checks and corrections before teaching. For cells that are difficult to explain, they can be placed in a discussion area for teachers and students to discuss.

Interview Record of Students on the Application of Artificial Intelligence Image Analysis Systems in Blood Cell Morphology Education

Location: Laboratory

Interview Date: May 28, 2024

Interviewee: XLZ , 2021 cohort

Recorder: Shang Lei

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- 1. Before using the artificial intelligence system to learn about blood cell morphology, what was your perception of learning hematology? (Very difficult, somewhat difficult, relatively easy). If it was difficult, what were the main challenges? (Difficulty in distinguishing cell morphologies, the complexity of memorizing various cell characteristics, etc.)**

Student: I find it a bit difficult; the cell morphology is hard to distinguish.

- 2. What advantages do you think the artificial intelligence system has in presenting blood cell morphology compared to traditional microscopes and PPT teaching? (Image clarity, cell detail presentation, learning convenience, etc.) Which teaching method do you prefer?**

Student: I prefer the teaching method that combines the artificial intelligence system with PPT teaching, but traditional microscopes should not be overlooked. The artificial intelligence system can showcase a large number of a particular type of blood cells, which is very helpful for summarizing the characteristics of these cells.

- 3. In the artificial intelligence system, the cell images are all annotated by the teacher. How much does this help you understand blood cell**

morphology? Does it save you the number of times and time spent asking the teacher questions?

Student: I think it has been very helpful to me and has saved a lot of time.

4. During the learning process, did you discuss with your classmates? How does discussion help in studying blood cell morphology, such as deepening understanding and expanding thinking? Do you think it is necessary to add a dedicated discussion module in the system, and why?

Student: I discussed with my classmates, which deepened our understanding of the differences between certain types of blood cells. It is not necessary for the system to add a discussion module; instead, we can encourage students to discuss questions in class first and then provide feedback to the teacher.

5. In the cell morphology practical class, do you feel that you have gained a preliminary understanding of cell morphology despite the short class duration? Were you focused during the class? Were your emotions engaged? Are you satisfied with the overall classroom atmosphere?

Student: I gained a preliminary understanding of cell morphology. In class, I was able to focus my attention, and my emotions were effectively mobilized. I was very satisfied with the overall classroom atmosphere.

6. After the course assessment, do you think that learning through an artificial intelligence system has significantly improved your ability to identify blood cell morphology? In the assessment, which types of blood cells showed a significant increase in recognition accuracy after system learning? Are there any types of cells that you still find difficult to identify, and what do you think are the reasons for this difficulty?

Student: I clearly improved my ability to recognize cells. The accuracy of recognizing granulocytes at various stages significantly increased, but I still faced difficulties in recognizing lymphocytes and monocytes, mainly due to the diversity of cell appearances.

7. What additional features would you like the artificial intelligence system to include to better assist in the learning of blood cell morphology? (Such

as adding an English language option, setting up an online Q&A function, etc.)

Student: I hope the system can add English language options.

8. The artificial intelligence system breaks the time and space constraints of learning, allowing you to study blood cell knowledge anytime and anywhere. Will you take advantage of this benefit for your learning after class?

Student: I will use this system when I encounter necessary situations in the future, such as when treating patients with blood diseases.

9. What impact do you think the application of artificial intelligence systems in blood cell teaching will have on your future medical studies and clinical work? For example, in aspects such as fostering interest in learning, enhancing learning abilities, and laying a foundation for the integration of medicine and engineering, what specific feelings do you have?

Student: The artificial intelligence system has enhanced my learning ability and saved me time in searching for typical cells under the traditional microscope.

10. Do you think this system will replace traditional microscopy teaching? Why? Do you have any other suggestions or thoughts on the continuous application of artificial intelligence systems in blood cell morphology teaching and further optimizing the teaching model?

Student: I don't think so, but in the future, testing laboratories will definitely rely on computer and AI-based testing pipelines, which will still require humans to review the images recognized by the system when necessary.