

Practical Application of Mixed Teaching Mode in the Course of Graphic and Image Processing

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Abstract: "Graphics and Image Processing" is a very practical course. Teachers need to break the traditional teaching mode, use modern teaching means and methods, combine teaching content with practical projects, and improve students' interest and enthusiasm in learning. This paper discusses the mixed teaching and the course of "Graphic and Image Processing", describes the teaching design of "Graphic and Image Processing" in detail, and deeply analyzes the practical application of mixed teaching mode in the course of "Graphic and Image Processing", aiming at providing a new perspective and thinking mode for educators and promoting the teaching reform and innovation of "Graphic and Image Processing".

Keywords: Mixed teaching; Graphic image processing; Project-driven

1. Introduction

The application of mixed teaching mode in the course of Graphics and Image Processing shows the close combination of educational informationization and innovative teaching. Under the traditional teaching mode, graphics and image processing course focuses on the independence of theoretical teaching and experimental operation, while the mixed teaching mode realizes the seamless connection between teaching content and practical application through the organic combination of online and offline teaching resources. This model emphasizes personalized learning path, allowing students to choose different forms of teaching materials according to their own needs, such as video tutorials, online lectures and experimental simulations, thus greatly improving the participation and effect of learning. At the same time, teachers can obtain students' learning data in real time and make dynamic teaching adjustments to ensure the effective realization of teaching objectives. This model not only enriches classroom teaching methods, but also strengthens the interaction and cooperation between students and teachers, students and students, especially in project practice and teamwork. Therefore, the mixed teaching mode not only promotes teaching innovation, but also helps to cultivate students' comprehensive quality and application ability in the course of Graphic and Image Processing.

2. Mixed teaching and the course of "Graphic and Image Processing"

2.1 The core theory and principle of mixed teaching mode

In the field of education, blended teaching mode, as an educational innovation, has been widely concerned and applied. This model combines traditional face-to-face teaching with online learning supported by modern information technology to achieve the goal of optimizing teaching effect and improving learning efficiency. Especially in the highly specialized and technical course of "Graphics and Image Processing", the mixed teaching mode shows its unique advantages. From the perspective of teaching theory, blended teaching is based on constructivism and social and cultural theory, emphasizing students' subjectivity and cooperative learning, which is highly consistent with the diversified teaching needs and complex knowledge structure in the course of Graphic and Image Processing. Through instructional design and curriculum planning, this model skillfully integrates multimedia teaching, synchronous and asynchronous interaction, teaching evaluation and other links, and realizes the maximum utilization of teaching resources and the all-round optimization of teaching process [1]. For example, classroom reversal, online group discussion, virtual laboratory and other teaching strategies and tools can be used in the course to adapt to students with different learning styles and levels. The mixed teaching mode has also made innovations in the evaluation system, which not only has qualitative observation and evaluation, but also introduces quantitative data analysis and

diagnostic evaluation, thus reflecting students' learning state and teaching effect more comprehensively and accurately. Through its flexible teaching methods and comprehensive and meticulous evaluation system, the mixed teaching mode has realized the deep integration of teaching and learning in the course of Graphic and Image Processing, which has high educational value and practicability.

2.2 Analysis of Structural Fit between "Graphics and Image Processing" and Mixed Teaching

In the course of "Graphics and Image Processing", the application of mixed teaching mode has a very high degree of structural fit. First, the course itself is highly complex and multidimensional, covering many sub-fields such as pixel processing, image segmentation, feature extraction, data visualization, etc. These complex and multidimensional characteristics are highly consistent with the diversity and flexibility of the mixed teaching mode. Secondly, the course emphasizes the dual cultivation of experimental operation and theoretical knowledge, which can be realized by online autonomous learning and face-to-face experimental teaching in the mixed teaching mode. Online platform provides independent acquisition of theoretical knowledge, while face-to-face teaching emphasizes the cultivation of experimental skills and teamwork. Third, the course needs multi-angle and multi-level teaching evaluation, including but not limited to homework scoring, project assessment, peer evaluation, etc., which can be effectively realized through intelligent data analysis and adaptive evaluation mechanism in hybrid teaching mode [2]. For example, students can submit homework and participate in mutual evaluation through online platform, and teachers can also use data analysis tools to track and evaluate students' learning behaviors and achievements in all directions. From the complexity and multi-dimension of the course content, the dual needs of experiment and theory, and the multi-angle teaching evaluation, the mixed teaching mode has a high structural fit with the course of Graphic and Image Processing, which has strong application potential and educational value.

3. The teaching design of "Graphic Image Processing" course

3.1 Designated teaching objectives of courses

When the mixed teaching mode is applied to the teaching design of the course "Graphics and Image Processing", it is necessary to make clear the designated teaching objectives of the course. These goals not only need to conform to the syllabus and the unified regulations of the education department, but also meet certain standards in teaching evaluation, course difficulty and course content. Curriculum teaching objectives should include cognitive objectives, emotional objectives and skill objectives. Cognitive goal is the core knowledge and basic theory that students should master through course study, such as the basic algorithm of image processing and the basic principle of graphic drawing; Emotional goals mainly involve the subject interest, autonomous learning ability and teamwork spirit that students should have in the learning process; The skill goal is the practical operation ability and application skills that students should master through course study, including using professional software for image processing and applying programming language for graphic design. There are many factors to be considered in the setting of curriculum teaching objectives, including but not limited to students' prior knowledge, the availability of teaching resources and the timing arrangement of courses. In addition, the curriculum teaching objectives need to be closely combined with the teaching evaluation system to ensure the evaluability and operability of the teaching objectives. For example, students' achievement of the curriculum teaching objectives can be comprehensively and accurately measured through various evaluation methods such as final exams, usual grades and curriculum items [3]. Generally speaking, the designated teaching goal is the key link in the teaching design of Graphic and Image Processing, and its scientificity, rationality and operability directly affect the teaching effect and education quality of the whole course.

3.2 Resource allocation and integration of teaching materials

In the instructional design you mentioned, the mixed teaching mode is closely related to the designated teaching objectives of the course. The designated curriculum teaching objectives include cognitive objectives, emotional objectives and skill objectives, all of which can be effectively realized through the mixed teaching mode. From the perspective of cognitive goals, the hybrid teaching mode provides richer learning resources and personalized learning paths, which enables students to master the basic algorithms of image processing and the basic principles of graphic drawing more comprehensively. In terms of emotional goals, the mixed teaching mode can better stimulate students' interest in subjects and autonomous learning ability through the combination of online and face-to-face, and at the same time strengthen the cultivation of teamwork spirit. In terms of skill objectives, the

practical links and project tasks in the mixed teaching mode are helpful to improve students' practical operation ability and application skills, especially in using professional software for image processing and applying programming language for graphic design [4]. In addition, this teaching mode also provides more possibilities for diversified teaching evaluation, including final exams, usual grades and curriculum items, so as to measure students' achievement of curriculum teaching objectives more comprehensively and accurately. In the specific course of "Graphics and Image Processing", the mixed teaching mode has a strong correlation with the teaching objectives of the course, which can promote the effective realization of the teaching objectives in many aspects.

3.3 Teaching evaluation system and standard

In the teaching design of Graphics and Image Processing course, the teaching evaluation system and standard are the important guarantee to realize the teaching goal of the course. Comprehensive and accurate teaching evaluation can not only reflect students' achievements in cognitive goals, emotional goals and skill goals, but also serve as a reference for teachers to adjust their teaching methods and strategies in the teaching process. Teaching evaluation system should include formative evaluation and summative evaluation. Formative assessment mainly occurs in the teaching process, including usual homework, online tests, group projects, etc., as well as teachers' immediate feedback. The purpose is to monitor and guide students' learning progress and find and solve problems in time. Summative assessment is usually conducted at the end of the teaching cycle, such as final exam, course report or project presentation, which is mainly used to measure whether students have achieved the teaching objectives of the course. In this evaluation system, teaching standards play a connecting role, establishing the minimum requirements and the highest expectations for students' learning achievements, thus providing a clear and quantifiable evaluation basis for teaching evaluation. It is worth noting that this system needs to adapt to the mixed teaching mode to ensure that the teaching effect in online and offline teaching environments can be effectively evaluated and integrated. Teaching evaluation system and standard is an indispensable part of achieving high-quality teaching objectives in the course of Graphic and Image Processing, and its rationality and scientificity are directly related to the effectiveness of the whole teaching process and the quality of education.

4. The practical application of mixed teaching mode in the course of graphics and image processing

4.1 Quantitative evaluation of teaching effectiveness

From the cross perspective of educational evaluation and educational psychology, all-round and multi-level evaluation methods should be brought into the system. Firstly, according to Bloom's classification system of educational goals, evaluation goals can be subdivided into three categories: cognitive goals, emotional goals and skill goals. In terms of cognitive goals, besides relying on traditional standardized tests, diagnostic assessments, formatted tests and other tools, evaluation indicators based on metacognition and advanced cognitive processes can be introduced to ensure the depth and breadth of evaluation. This may include in-depth understanding of algorithm design and optimization, complexity and feasibility of data structure, and quantitative indicators of application ability. Secondly, in the evaluation of emotional goals, we can not only use emotional scale and quantitative tools of self-evaluation, but also use social network analysis and learner portrait technology to analyze students' performance in teamwork, critical thinking and subject interest more comprehensively. The change of emotion and attitude, as the internal factors affecting the learning effect, should be paid enough attention. For example, using the data tracking function in the Learning Management System (LMS), students' participation and emotional engagement can be measured more accurately. Finally, in the evaluation of skill objectives, laboratory practice, project completion and innovative design ability are taken as evaluation indicators, which need to be quantified from multiple angles such as job evaluation, practical operation assessment and academic paper review. With the help of virtual laboratory and simulation technology, teachers can measure students' performance in practical operation skills more accurately. For example, the efficiency of image processing algorithm realized by programming, the rendering quality of graphics using professional software and so on. The introduction of dynamic assessment and formative assessment can reflect students' learning progress and shortcomings more flexibly, thus providing data support for personalized teaching. Through this omni-directional, multi-level and high-density quantitative evaluation system of teaching effectiveness, we can not only comprehensively and deeply evaluate the practical effectiveness of the mixed teaching mode in the course of Graphic and Image Processing, but also provide powerful data support and theoretical basis for the follow-up curriculum reform and teaching strategy optimization.

4.2 Dynamic teaching adjustment strategy

The curriculum framework mostly focuses on theoretical teaching, experimental operation and online resources, and teaching evaluation and diagnostic evaluation constitute the key nodes for optimizing teaching quality and learning effect. First of all, according to students' cognitive level and knowledge structure, we should plan targeted teaching objectives and teaching contents to meet the diversified needs of multiple intelligences and learning styles. Teaching methods should be flexible and adaptable, such as integrating project-based learning, flipping classroom, peer evaluation and other multiple teaching strategies. In order to ensure teaching efficiency, we should use the comprehensive way of formative evaluation and summative evaluation, and capture students' learning status in concept understanding, operation skills and problem solving in real time through various teaching evaluation tools such as classroom observation, learning analyzer and achievement distribution map. In this context, the teaching feedback mechanism is particularly critical. Real-time feedback can not only correct students' learning misunderstandings immediately, but also provide basis for fine-tuning in the teaching implementation stage, such as flexibly adjusting teaching progress, revising teaching syllabus or reorganizing classroom interaction and group discussion. The teaching mode can adapt to students' learning needs in a dynamic way and realize individualized teaching. Educational information tools, such as Learning Management System (LMS), online evaluation system and cloud resource library, provide strong support for teaching. Using these tools, we can effectively integrate and optimize teaching resources, such as synchronous push of course materials, online real-time interaction and electronic homework correction, which not only improves teaching efficiency, but also optimizes learning experience and knowledge absorption [5]. A number of teaching evaluation indexes, such as course satisfaction, academic achievement and ability training, are comprehensively used to evaluate the practical application effect of mixed teaching mode in the course of Graphic and Image Processing, and then optimize teaching design and improve teaching quality. The above series of dynamic teaching adjustment strategies ensure the efficient and accurate implementation of the mixed teaching mode in this course, thus achieving the optimization of teaching quality and students' learning achievements.

4.3 The integration and optimization of curriculum resources and tools

Under the mixed teaching mode, the integration and optimization of curriculum resources and tools plays a core role in the teaching practice of Graphic and Image Processing. First, this model introduces modular curriculum design, and each module, such as image compression algorithm, edge detection, pixel transformation, etc., is equipped with special teaching resources for this module, including professional literature, case analysis, and experimental task book, etc. This setting can ensure that students can acquire the corresponding practical operation ability while acquiring theoretical knowledge. Second, the intelligent teaching assistant system is widely used in this course, which can not only automatically track students' performance in classroom activities, team projects and virtual laboratories, but also provide teachers with multi-dimensional information about students' learning conditions through data analysis, thus assisting teachers in teaching adjustment [6]. The third is to introduce multiple interactive teaching platforms, including online discussion forums, real-time question and answer systems, and project collaboration tools. These tools not only enhance students' sense of participation, but also greatly facilitate teachers' curriculum management and organization. Fourth, the course also introduces personalized learning path design. Under this path, students can choose different projects and tasks according to their own interests and specialties, which greatly improves students' learning motivation and interest. In terms of evaluation mechanism, in addition to the traditional mid-term and final exams, the course also adopts formative evaluation based on multi-dimensional evaluation system, including students' performance in classroom activities, the quality of online discussions, and experimental reports in virtual laboratories. This evaluation system can reflect students' learning state more comprehensively and accurately, and is more in line with the teaching requirements of mixed teaching mode. Through refined allocation of teaching resources, highly personalized learning path design and multi-dimensional evaluation mechanism, the integration and optimization of curriculum resources and tools has been fully reflected in this course, which has laid a solid foundation for realizing the long-term goal and sustainable development of the mixed teaching mode.

5. Conclusion

In the era of rapid development of information technology, China is deepening the modernization of education, and the mixed teaching mode of Graphic and Image Processing course shows its remarkable advantages. This model not only meets the diverse learning needs of students, but also improves teaching efficiency. Although there have been many successful practices, the integration of curriculum

resources, teacher training and evaluation mechanism still face challenges. In order to promote the continuous progress of education in China, we must further strengthen the research and application of mixed teaching mode, ensure its real benefits, and lay a solid foundation for the future of education in China.

References

- [1] Ma Ni, Wang Hongbing, Wang Lin. Construction and implementation of graphics and image processing course under SPOC mixed teaching [J]. *Science Teaching Journal-Electronic Edition (mid-)*, 2021 (10): 193-194.
- [2] Li Li, Zhang Xiaoliang, Jin Jihong, et al. Application analysis of results-oriented project teaching mode in the course of graphics and image processing [J]. *Software*, 2021, 42 (5): 38-41.
- [3] Zheng Lili, Luo Lunhong. Exploration of mixed teaching practice of knowledge and literacy integration "CorelDraw of Graphic and Image Processing" [J]. *Science Teaching Journal-Electronic Edition (mid-)*, 2022 (4): 223-224.
- [4] Chen Guixiang. Exploration on the practice of heterogeneous teaching mode in the same course of Graphics and Image Processing [J]. *Big Science and Technology*, 2019 (44): 30-31.
- [5] Xu Shaoman. Application of project-based teaching in the course of graphics and image processing in higher vocational colleges [J]. *Office Automation*, 2023, 28 (2): 62-64.
- [6] Yu Fangmei. Application of "Online + Offline" mixed teaching mode in Photoshop graphics and image processing course in secondary vocational schools [J]. *Guangxi Education (Secondary Education)*, 2022 (12): 107-109, 133.