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Research on Coupling Mechanism and Integrated Construction of University Teaching Model and Student Academic Evaluation in Popularization Stage

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Abstract: China's higher education entered massification stage in 2020. It is worth noting that by 2024 the gross enrollment rate reached 60.8%, which shows educational accessibility is continuously improving. Student demographics in higher education are now diversified. Learning needs of students are personalized and multifaceted. Educational objectives in higher education have multiple facets. In fact, traditional standardized teaching models cannot meet modern demands. There is a disconnect between these approaches. It has become a critical bottleneck and makes it hard to improve talent development quality. We use theories of higher education massification, multiple intelligences theory, educational equity and efficiency frameworks, and systems theory with integrated design principles as the theoretical base and we conducted questionnaire surveys and interviews at regional applied undergraduate universities and we also did case comparisons. We analyzed current teaching methodologies and assessment challenges. Then we identify underlying causal relationships. We establish an integrated model which includes instructional design, academic evaluation, support mechanisms and feedback loops. We propose reform pathways across four dimensions. These include macro-level policies, institutional governance, departmental implementation, and faculty practice. The results show that massification-stage reforms should prioritize synchronized pedagogical-evaluation reforms with competency development expected to be at the core and integrated design used as the driving force because only in this way can we achieve the goal of quality improvement. Only through this coordinated approach we can achieve evaluation-driven teaching improvements and learning enhancements. In this way, high-quality higher education development can be advanced.

Keywords: Popularization of Higher Education; Teaching Model; Academic Evaluation; Coupling Mechanism; Integrated Construction

1. Introduction

In 2020, the gross enrollment rate in higher education in China reached 54.4%, and this can mark the entry into popularization phase of development, and it is worth noting that Martin Trow's theory of higher education development stages is used here to analyze this transition process. The popularization phase includes scale expansion. Also, we can see that it should include systematic transformations in functional positioning, student demographics, curriculum design, teaching methodologies and quality standards. Data from 2024 National Education Development Statistical Bulletin shows the gross enrollment rate has risen to 60.8%, which means the popularization level can deepen now and the higher education system is expected to move to the next stage with more students enrolled in different types of institutions. Higher education is changing from the elite-oriented system to social public good. It can benefit all citizens.

Higher education now enters the massification phase and it shows some new characteristics. We can see student backgrounds become more diverse and learning needs are different from person to person. Also, educational goals are no longer single and we should consider multiple objectives. Students have big differences in their knowledge base and learning ability while their motivation and career plans are also different so we need personalized and flexible education methods. At the same time, society and economy develop fast and the requirement for talent changes from pure academic knowledge to interdisciplinary skills, practical ability and

innovation capacity which means we should pay more attention to skills and practical literacy. It is worth noting that traditional teaching models focus too much on teachers, knowledge and classrooms while the evaluation system only cares about scores and one exam decides everything so these old methods cannot meet the needs of massification era. We face several challenges in current system because the curriculum does not match industry needs well and personalized instruction is not enough and it is hard to implement diversified assessment and teaching and evaluation systems lack synergy. These problems become key bottlenecks that limit quality development of China's higher education and we should solve them. We should advance systematic reforms in teaching methods and evaluation systems so that we can achieve integrated synergy and this is an urgent task for talent cultivation in universities at massification stage.

Based on this foundation, we look at four questions in this study. First, what is current implementation status of teaching models and student academic evaluation in the higher education under massification, and what prominent issues exist in practice, and what practical challenges we can find in real operation? Second, what theoretical framework should guide reforms in both areas, and how we can construct the inherent logic and interdependent relationships between them? Third, how to develop teaching models and diversified academic evaluation systems that align with massification requirements, and at the same time how to ensure they can work together? Fourth, what internal and external support mechanisms are needed to advance collaborative reforms in teaching and evaluation, and how to establish stable support systems that can be sustainable in long term? We combine theoretical analysis with empirical research and this approach can address the fragmentation between teaching and evaluation systems. It is worth noting that the results can be used as a reference for reforming talent cultivation models in higher education institutions. In fact, we expect this study can offer practical pathways for the reform.

2. Theoretical Basis and Literature Review

2.1 Theoretical Basis

2.1.1 Theory of higher education popularization

We examine theory of higher education popularization proposed by Martin Trow, who is American sociologist, and it can be used as key framework to study how higher education develops, also it gives a basic structure to understand the main features and changing trends in the popularization phase [1]. In fact, Trow points out that when the gross enrollment rate exceeds 50%, it means the system enters the popularization stage. This phase includes the increase in student numbers. Also, it includes changes in quality across many aspects, such as functional positioning, curriculum design and teaching methodologies. At the same time, teacher-student relationships and quality standards can also change [2].

In the popularization phase, the core philosophy of higher education has shifted from elitist education to a new direction. It can include inclusive education and open education for all, and we should note that personalized education is considered as a key part in this process because the system needs to adapt to different student requirements. The main features of this stage can include large-scale implementation. It is worth noting that individualization and diversity should be considered as important factors in current higher education system because traditional uniform model cannot meet the current requirements [3]. The talent cultivation objectives have changed. We now focus on developing versatile professionals with interdisciplinary backgrounds who can adapt to societal and technological transformations in this complex environment, and this approach can help improve the overall capability of the workforce and the goal is to enhance their social adaptability at the same time [4]. At the same time, the boundaries of higher education curricula can become blurred and learning-life boundaries can be dismantled because traditional separation between study and daily life cannot satisfy the needs of modern education system. Teaching methodologies can diversify, and academic evaluation standards can transition from uniformity to pluralism [5].

2.1.2 Multivariate intelligence theory and student development theory

Gardner's theory of multiple intelligences can provide an important foundation for psychology and pedagogy, and we expect it can help us implement personalized teaching together with diversified academic evaluation when we consider the current popularization phase of educational development [6]. The theory posits

that individuals possess not just a single type of intelligence. In fact, they have at least seven distinct intelligences: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, and intrapersonal and we can observe significant variations in how these intelligences combine and their dominant domains among different individuals [7]. This framework can challenge traditional education paradigm. The paradigm has singular focus on linguistic and logical abilities as core intelligence concept and at the same time we expect it can challenge the conventional evaluation standard of "score-centricity" which can be found in current education system.

College students in popularization phase show very obvious diversity. They have different knowledge foundation, learning ability, motivation and also career planning [8]. It is worth noting that the theory of multiple intelligences can be used as a reference to deal with these teaching characteristics. It requires higher education institutions to respect students' cognitive differences. They should abandon standardized "one-size-fits-all" teaching models and can offer different learning pathways together with developmental options. Academic evaluation should go beyond single knowledge assessments and we can establish full system. It identifies students' different intellectual strengths. Also we can cultivate these strengths [9].

2.1.3 Education equity and efficiency theory

Equity and efficiency are two basic value orientations in higher education development. It is worth noting that their relationship shows dynamic adjustments across different stages, which makes it a key issue that should be addressed in the massification phase reforms [10]. In the elite education era and mass education era, equity focused on equal access to admission opportunities. Efficiency was shown as the volume growth of talent cultivation. But when education enters the massification stage, equity demands can change from single-dimensional admission fairness to multi-dimensional process and outcome equity, and efficiency priorities can also shift from volume expansion to quality-driven development [11].

This shift in value orientation can bring new requirements. We need to reform teaching models and academic evaluation systems in higher education institutions. In teaching model reforms, we should balance educational equity by providing tailored learning support and developmental guidance for students with different knowledge foundations and learning abilities and this can help ensure every student can gain good educational experiences. Regarding academic evaluation reforms, it is worth noting that we should try to avoid approaches that only focus on efficiency. Also, we should reduce the use of evaluation logic centered on pass rates and score distributions. Instead, we should focus on fairness and scientific rigor in assessments and the core function should shift to support full development of each student [12].

2.1.4 Systems theory and integrated design philosophy

Systems theory was first introduced by Bertalanffy [13]. It examines how different components connect and interact within a system, and also looks at the constraints between the system and its external environment. We apply this theory to higher education talent cultivation and this positions it as macro-system. In this system, teaching models and student academic evaluation form two subsystems that depend on each other. These components are not isolated and in fact they share intrinsic relationships. Teaching models serve as the foundation of academic evaluation, and they are also the target of evaluation, which means the evaluation content and methods can align with instructional design and implementation, and academic evaluation functions as guidance and feedback for teaching models. So the evaluation system should make the adaptive adjustments during reforms and can provide critical data for optimizing instructional practices [14].

The integrated design philosophy comes from systems theory and we use it in the educational reform, and it suggests we should avoid the old way where people study teaching models and academic evaluation separately because this isolation makes the reform hard to coordinate. In fact, in traditional method we handle these two parts without connection and we should not reform them one by one. Instead, we can put both into one talent development system and design them together, so the whole system can move forward [15].

2.2 Literature Review

2.2.1 Research on teaching model reform in universities during the popularization stage

Many scholars agree that higher education enters massification phase. The traditional teaching

model is teacher-centered, knowledge-centered, and also classroom-centered and we can say that it cannot meet diverse student demographics and personalized learning needs well when we look at current situation of universities today. So changes in teaching methodologies are expected to happen [16]. In fact, current research looks at educational philosophies, instructional formats and methods, and we also examine curriculum systems because these aspects can be important for us to understand the full picture of education reform in universities and colleges.

Regarding the teaching philosophy, many scholars agree that universities at massification stage should change from "teacher-centered" to "student-centered" [17]. Bie (2016) pointed out that undergraduate students at this stage have diverse learning goals and different learning methods [18]. So universities should adopt student-centered teaching philosophy. Also, they can refine training processes for different categories. It is worth noting that personalized developmental needs should be met at the same time. Zhang (2021) also argued that essence of student-centered approach is to respect students primary role [19]. In fact, we should design teaching activities based on their learning needs and ability differences. Academic support can be provided according to different situations.

For teaching formats and methods, we should use diversified approaches and new teaching methods. Also, information technology should be integrated with education. Chang Tongshan (2021) studied teaching reforms in mass higher education phase in United States. He said that higher education at this stage should go beyond traditional classroom limitations by using internet technologies to enable anytime and anywhere learning, and this can help promote diversified teaching formats [20]. Zou (2023) says that local universities are important in China's mass higher education system. They should shift from too much emphasis on theory and ignoring practice. This problem dominates conventional classroom instruction. Instead, they can adopt seminar-style teaching, project-based learning (PBL), case studies, and other methodologies, and should strengthen practical training components [21]. At the same time, scholars like Zhang (2021) and Chang (2021) say that teaching methods based on information technology, such as blended learning and smart education, as well as Massive Open Online Courses (MOOCs), can break traditional classroom constraints. It is worth noting that these methods can meet the large-scale, personalized teaching demands in mass higher education era [22].

We examine curriculum systems in this study. We focus on flexibility and interdisciplinary integration. Convergence is also considered. It is worth noting that this aspect is important. Martin Tro [2] shows that in popularization phase, higher education curricula can blur boundaries between academic disciplines and real-life contexts, and the demarcation between learning and daily life becomes indistinct. Based on this idea, domestic scholars [23] propose that university curricula should support deep integration between general education and specialized training and this can help achieve synergy between humanities education and scientific instruction. At the same time, we should promote interdisciplinary collaboration and convergence to enrich educational resources. This provides students with diverse course options that meet their varied learning needs [24,25].

2.2.2 Research on student academic assessment reform during the popularization stage

During popularization phase of higher education, academic evaluation reform is expected to be a key component that can ensure education quality and support the long-term development of the whole system in principle and we should pay attention to this issue. We should change systems from single-dimensional approaches to diversified frameworks [26]. It is worth noting that the old approaches are summative and discriminative, while the new frameworks should be formative and developmental, which means we can support the growth process instead of looking at final results. Studies look at evaluation philosophies, assessment criteria, content, and evaluation methodologies.

About the evaluation philosophy, many researchers criticize the traditional "score-centric" and "one exam determines a lifetime" assessment methods. They emphasize that academic evaluation function should shift from "selection and screening" to "promoting development". In fact, Li (2025) examines this from fairness and efficiency, and argues that academic evaluation during popularization stage can abandon value orientations centered on screening and selection, so core function can be redirected to serve students' growth and development while it cultivates academic

innovation capabilities and practical skills [11]. Zhong and Wang (2019) think that higher education at this stage should cultivate diverse talents, so evaluation philosophy needs transformation guided by developmental assessment principles and it should prioritize students' personalized growth and full competency enhancement [27].

We should establish diversified quality standards to get a full assessment framework. Chen examined the popularization of higher education at county level and pointed out that different tiers and types of higher education institutions should use different quality evaluation standards, instead of using one single metric for all universities to assess talent cultivation quality [28]. At the same time, many studies suggest that academic evaluation can go beyond knowledge testing and can include full assessments of students' competencies and values. It is worth noting that evaluations can measure textbook knowledge mastery and they can evaluate practical skills, new capabilities, teamwork abilities, and other qualities [29].

About evaluation methods, studies suggest we should use formative assessment and developmental evaluation. This can make evaluation more diverse. Zhang proposed we should change traditional percentage-based evaluation systems, and we can do this by establishing assessment frameworks that are more inclusive so that they can incorporate diverse methods such as portfolio evaluation and performance-based assessment [19]. Liu et al. pointed out that academic evaluation during popularization phase should move beyond the single-subject evaluation model which is dominated by teachers, and we can establish multi-stakeholder system that involves educators, students, peers, and industry professionals and this can help make evaluation more full and objective [3]. Also, it is worth noting that many researchers now recognize the importance of formative assessment. Studies suggest we should increase weight of process-based evaluations in academic assessments because this can help us incorporate classroom performance, homework completion, practical operations, and project research into evaluation criteria [30].

2.2.4 Research review

From existing literature we can see that teaching and evaluation in popularization phase should become diversified and personalized, and we believe the system should focus on students so that different needs can be considered. But in fact four critical shortcomings remain. It is worth noting that these problems make it hard to improve the teaching quality and block the reform process. First, there is a disconnect between macro-level theoretical research and micro-level practical studies and this makes it difficult to translate reform concepts into actionable systems and solutions we can use in real teaching activities. Second, teaching models and academic evaluation research have been isolated from each other for a long time, and they lack integration into unified talent development framework for collaborative analysis which means the whole system cannot work well. Third, localized empirical studies and case analyses are insufficient. We lack in-depth research on regional applied universities, and this results in conclusions with limited relevance and generalizability. Fourth, research on coupling mechanisms and integrated design remains inadequate, and this makes it hard to address the persistent two-skin dilemma in practice.

Some problems exist in previous studies. We use systems theory as main framework and combine empirical investigations from local universities with case studies from both domestic and international sources, which can help us understand the current situation in this field. It is worth noting that we focus on coupling mechanisms and integrated development. This approach can fill the research gaps and it should provide theoretical and practical support for teaching reforms in universities during the popularization phase.

3. Investigation and Analysis of Current Status of Teaching and Evaluation in Universities during the Popularization Stage

3.1 Study Design

In this study, we use questionnaire survey and interview methods. We want to understand the current status of university development among teachers and students, and school administrators are also included. It is worth noting that we try to identify specific issues. Also we explore potential solutions. For questionnaire administration, we use Wenjuanxing platform which can distribute survey and process data.

We design the student questionnaire with two question types. It has single-choice and multiple-choice questions. In total there are 20 items

divided into three sections. The first section collects students' basic personal information. The second section asks about their perceptions on teaching model in their university. Also, the third section includes their views on academic evaluation practices. It is worth noting that the questionnaire was tested by experts for validity, and the results show that the Cronbach's α coefficient reaches 0.82, which can indicate the reliability is acceptable so we can use the data for further analysis in this research. For the interview surveys, we select faculty members and administrative staff as interviewees, and the questions we design focus on institutional development status and teaching experiences and educational management and evaluation systems. The main questions we ask include the following four questions: "What are the main challenges that hinder teaching model innovation?", "How can teaching models and academic evaluations be coordinated?", "What are the biggest challenges in implementing diversified evaluation systems?", and "How should universities support reforms in teaching and evaluation practices?"

We selected C University as case study institution. It is a municipal applied undergraduate university in Ningbo city. Its educational positioning matches local industrial demands. The student population and disciplinary structure match regional universities in China's mass education phase. So we can say it has good representativeness. To ensure the survey sample is representative and scientific, and can avoid sampling bias, we use stratified random sampling for questionnaire surveys. Stratification was conducted based on two dimensions. One is disciplinary categories including economics, management, engineering, etc. The other is grade distribution from first to fourth years. Samples were selected at specific ratios in each stratification level, and it is worth noting that this accounts for cognitive differences among student groups, so in principle we can get full reflection of students' perspectives on teaching models and academic evaluation systems. The disciplinary stratification ratio references student population proportions in each discipline, and grade stratification considers learning experience variations across cohorts. We selected interviewees using purposive sampling methods, and it targets instructors with diverse teaching experience levels including young faculty, mid-career educators, senior teachers, and also academic titles like assistant professors, lecturers, associate professors, and professors, plus administrative staff from teaching management departments such as Academic Affairs Office and secondary college teaching offices. This approach can ensure multi-group coverage, and it enables feedback on current teaching practices and management decisions, and we can also get improvement suggestions from multiple perspectives, so the interview content is expected to have full relevance.

3.2 Basic Sample Characteristics Analysis

We collected 325 questionnaires in this survey from the participants in total, and after data checking we found 307 of them are valid while 18 ones are invalid, so the valid response rate is 94.4%. The gender distribution shows a good balance in this sample. We found that 152 participants are male (49.5%) and 155 are female (50.5%), and because of this it is nearly 1:1 ratio that can reflect university's overall gender balance, so we can say the sample is representative in terms of gender. In fact, this balanced distribution can avoid potential survey bias caused by gender differences.

We examine grade distribution. There are 56 freshmen (18.24% of total), sophomores are 91 (29.64%), juniors 82 (26.71%), and also seniors 78 (25.4%). The sample proportion can match actual student distribution in the university. It is worth noting that this can account for cognitive differences among students at different academic stages.

In this part we examine distribution by discipline. Management science accounts for 105 students which is 34.3% of the total, and economics accounts for 62 students (20.1%), while engineering includes 51 students (16.7%), literature has 45 students (14.6%), art studies has 40 students (13%), and other disciplines has only 4 students (1.3%). It is worth noting that economics and management science together can exceed 54.4% and this can align with the core strengths of University C academic disciplines. So we can say that the stratified sampling method used in this study is expected to demonstrate scientific rigor and it can provide a targeted approach for the sample selection process in our research.

3.3 Analysis of Current Teaching Models

We examine student evaluations about teaching

methods. The feedback is mostly positive regarding instructional diversity and how it can help with learning engagement. In the survey, 47.46% of students said the approach is "fairly appropriate" and 15.25% said it is "very appropriate", so these two groups together make up 62.71%, which means the majority accepts the current method we are using in the classroom and this is a good sign. Only 1.69% chose "very inappropriate" and 3.39% chose "somewhat inappropriate", and this is less than 5% of all responses. It is worth noting that most students can see the positive impact of varied teaching approaches on learning motivation. But 32.2% are neutral. This suggests there is room for improvement in stimulating academic enthusiasm. Also, teacher interviews show that this phenomenon comes from disconnects between curriculum content and the industry demands, and we should note that personalized teaching strategies are not fully implemented which can in principle help improve student engagement in classroom setting.

Most students think the classroom interaction is good. It is worth noting that over 70% respondents believe interactive elements can be emphasized in classroom instruction, and this percentage is expected to show positive attitude. Among them, 59.32% described it as 'fairly consistent' while 16.95% found it 'very consistent', and only small minority considered it inconsistent or somewhat inconsistent.

Most students think curriculum design has a good balance between the theory and practice. In fact, 45.76% of respondents chose "fairly consistent" and 25.42% selected "very consistent", so these two groups total 71.18% and this can indicate widespread approval for the integration of theoretical and practical elements in this course. The "average" rating accounted for 23.73%. At the same time, "somewhat inconsistent" and "very inconsistent" responses were low at 3.39% and 1.69% and this can reflect a positive trend. Also, differences across disciplines can be observed. Engineering students showed higher approval rates (78.2%) compared to humanities students (65.3%). It is worth noting that this can highlight varying educational demands within the different academic fields.

We use differentiated instruction and personalized guidance among students and teachers. It has a good performance in general. In fact, results from the survey indicate that over 60% of respondents rated their practices as "fairly consistent" (40.68%) or "highly consistent" (20.34%), which means these approaches can be widely adopted in current teaching activities and should have good effects in practice. However, nearly 40% of students still think current practices are average or unsatisfactory and there is still room to improve teaching personalization.

Students have high expectations for the online learning resources from school. In survey, 52.54% of respondents rated the resources as "fairly suitable" while 32.2% deemed them "very suitable", and these two groups can account for 84.74% of total responses. Only small percentage (1.69%) chose "very unsuitable" or "somewhat unsuitable". It is worth noting that most students recognize richness of the resources, and they find it convenient to access and use them.

We collected feedback from students about using industry-leading knowledge in the teaching content. Most gave positive evaluation. We found that 37.29% of responses indicated "fairly consistent" and 25.42% indicated "very consistent", which can total 62.71% and this proportion exceeds 60% of respondents, so we can say that the evaluation from most students is positive for this integration approach in principle. It is worth noting that 32.2% selected the "average" rating. Only 1.69% and 3.39% chose "not very consistent" and "very inconsistent". In fact, this can show the evaluation trend is positive.

We examine the student satisfaction data in Figure 1. Most students show moderate satisfaction with teaching model, and more than half can express high satisfaction. The data shows that 37.29% of respondents rate their experience as "average", which is the highest proportion among all options we provided in questionnaire. Also, 35.59% chose "fairly satisfied" and 23.73% selected "very satisfied", and these two groups together account for 59.32% of responses which has surpassed the 50% threshold and this result shows that positive attitudes should dominate in the overall sample we collected. It is worth noting that only 3.39% report extreme dissatisfaction. This indicates that while most students maintain moderate satisfaction level, over half still demonstrate high satisfaction. The overall satisfaction distribution exhibits a pattern of moderate highs and low extremes, and it reflects a balanced

sentiment that also has some polarization.

When we examine the students' views about current teaching models to find which areas need improvement most, it can be seen that updating the instructional content and simplifying the processes are the key priorities that can be addressed first in educational framework. Among all options, "Updating teaching content to match industry demands" got 62.71% support. Then "Simplifying teaching procedures to enhance efficiency" was supported by 52.54% of students, and this indicates that the current teaching process is too complex and has many redundant parts that can be removed to improve the overall efficiency of the educational system. These results show that most students think existing curricula has a gap with real-world industry practices. So we need to optimize both content relevance and procedural efficiency.

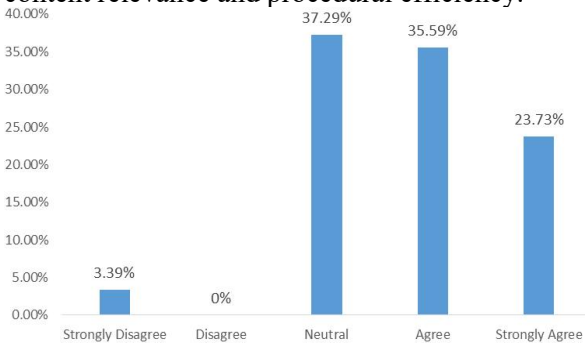

Figure 1. High Overall Satisfaction with Teaching Model Alignment among Students

The interview data from teachers and feedback from students show similar results. Most educators support the student-centered educational reforms and they have tried different teaching methods in practice, for example blended learning and case-based instruction, and these methods can be used to improve the teaching quality in actual classroom. However, we find that the implementation of these reforms faces some practical constraints in real situations. First, there are significant disparities in student learning levels and the class sizes are large while class hours are limited, so it is hard to provide personalized instruction to all students in current system. Second, the update cycles for textbooks and teaching materials are lengthy and we should note that the time allocated for professional practice and research is insufficient, which means the content can lag behind industry advancements in many fields. Third, high-quality digital resources are scarce and some teachers lack proficiency in digital teaching tools, so there is inadequate technical support. Fourth, teaching management practices are too standardized. Also, the incentives for innovation are insufficient and these factors can constrain teachers' enthusiasm for reform initiatives.

3.4 Analysis of Current Academic Evaluation Practices

Most students agree that evaluation methods are diverse. It is worth noting that 55.93% selected "fairly agree" and 23.73% selected "strongly agree", which together account for 79.66% of total responses, so we can say that most respondents think current evaluation methods have diversity. At the same time, only 1.69% chose "strongly disagree" or "somewhat disagree", and 16.95% rated it as "neutral", which reflects that disagreement or indifference is low.

Most students think academic evaluation is about full abilities. Among all respondents, 59.32% selected "somewhat consistent" and 20.34% chose "very consistent", so total is 79.66%, which can indicate students recognize the evaluation pays attention to holistic competencies. In fact, only 3.39% chose "very inconsistent" and 0% selected "somewhat inconsistent", while 16.95% deemed it "average", and this reflects students can accept this approach.

Weight of regular grades is considered reasonable by most students. In fact, when we combine the students who chose "fairly agree" and "strongly agree", the total percentage reached 83.05%, which can indicate that most students accept the weighting of regular grades in final evaluations and think it is rational. Only few students chose "strongly disagree" or "somewhat disagree", and this means the current grading structure has a good support.

It can be seen that students showed good satisfaction about clarity of academic evaluation criteria and teachers communication regarding these standards, and over 80% students acknowledged this clarity while 50.85% selected "fairly consistent" and 33.9% selected "very consistent". Also only 5.08% found it inconsistent.

Most students think that academic assessment results can reflect learning outcomes. We can see that the proportion selecting "fairly consistent" (54.24%) and "very consistent" (18.64%) is high and totals 72.88%, which can indicate that objectivity of academic evaluations is widely recognized. Also, 23.73% chose

average rating and this is acceptable. It is worth noting that "not very consistent" and "very inconsistent" were only 1.69% each.

Students in general have positive attitude toward current academic evaluation system in terms of motivational effectiveness, and we can see from the data that over 70% of respondents believe it can encourage learning and skill development, which means the system is expected to work well. Also, 54.24% rated it as "fairly consistent" and 16.95% chose "very consistent". It is worth noting that only 5.08% found it ineffective, where 1.69% deemed it "very ineffective" and 3.39% "somewhat ineffective", and this reflects overall positive feedback.

We find the satisfaction with convenience of academic evaluation inquiry and appeal channels can be considered high. It is worth noting that respondents rated 'fairly consistent' and 'very consistent' at 62.71% and 20.34% respectively, accounting for 83.05% of total responses and this can indicate most participants consider the inquiry and appeal channels provided by the schools or teachers to be user-friendly. Also, proportions selecting 'average,' 'somewhat inconsistent,' and also 'very inconsistent' were low at 11.86%, 3.39%, and 1.69% respectively, reflecting positive satisfaction levels.

Most students rate school academic evaluation as "fairly consistent", with over half of respondents agreeing (Figure 2). In fact, highest proportion (57.63%) chose "fairly consistent", and "very consistent" is chosen by 18.64%, so we can see total 76.27% of respondents express satisfaction with academic evaluation system. Only 20.34% rate it as "average", while 3.39% say it is "very inconsistent". It is worth noting that no respondents chose "not very consistent", and this indicates satisfaction level is high.

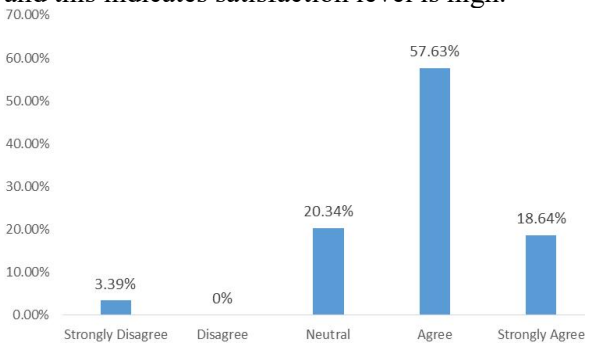

Figure 2. High Overall Satisfaction with School Academic Evaluation among Students in Terms of Alignment Degree

Students identify two key priorities for improving the academic evaluation systems. One is diversifying assessment methods and the other is reducing reliance on final exams. Overall data shows that over half of respondents (55.93%) prioritize expanding evaluation approaches and 54.24% emphasize minimizing dependence on final exam scores, and these results indicate that students want to change current evaluation system. Other major demands are identified as simplifying evaluation procedures (52.54%). Also, 44.07% want to clarify assessment criteria. These needs are aligned with teacher feedback. Challenges are highlighted in implementing diversified evaluations. In fact, teachers also mention excessive reliance on final exams. This can indicate core direction for academic assessment reform.

Teacher interviews show that diversified evaluation is accepted by many people. But in practice, we can see that significant path dependence exists and teachers follow old evaluation patterns even when they know new methods should be used, which makes the implementation of diversified evaluation very difficult in real classroom settings. Diversified evaluation can require much time and labor. Also, because competency indicators are difficult to quantify and fairness challenges can remain unresolved in current educational setting, teachers lack sufficient motivation to implement this method in their daily teaching practice and they prefer traditional ways that are easier to operate. Also, constrained by curriculum assessment systems, final examinations dominate the evaluation framework. Formative assessments can find it hard to play a leading role because the system is rigid and teachers must follow strict rules about grading that limit their freedom to use continuous assessment methods in their daily teaching practice. Next, collaborative evaluation mechanism between schools and enterprises is underdeveloped in current practice because corporate mentors lack deep involvement in course evaluation and they do not participate in the grading process, which means the evaluation can depend only on teachers inside the school and cannot include enterprise perspectives. It is worth noting that the evaluation model with only one subject cannot reflect students' professional competencies in a full way because it focuses only on knowledge from one course and misses important aspects of practical skills that are needed for their future work.

3.5 Summary of Survey Results

C University is a local applied undergraduate university. It has achieved some success in teaching and evaluation reforms that can follow the mass higher education direction, but we should note that deep transformation is not yet accomplished and more work should be done in this aspect so that the university can meet the requirements of modern education development. At teaching level, challenges exist. The personalization is insufficient and there is a disconnect between curriculum content and industry demands and the procedural efficiency is low. In evaluation system, it is hard to implement diversified assessment methods because we rely too much on final exams and the competency-based evaluation is not emphasized enough. It is worth noting that teaching and evaluation lack coordinated mechanisms. This prevents them from forming an organic whole that can support and enhance each other. In fact, both faculty and students share aligned reform priorities. They focus on improving teaching support systems and enhancing operability of diversified evaluations, and we should establish integrated teaching-evaluation coordination mechanisms. These priorities can provide problem-oriented guidance. Also they give practical foundations for subsequent integrated model development and reform pathway design.

4. Case Study on Integrated Reform of Teaching Models and Academic Assessment

4.1 Case Study Design and Methods

We want to understand how integrated reform works in practice and what are its operational mechanisms. It is worth noting that we select two universities as cases based on principles of representativeness and innovation, and we also consider whether they have reference value. One is University of Michigan in United States, which is a leading research university and it has a mature model that can integrate inquiry-based teaching with evaluation systems that are diversified, and this model has been developed for many years and can provide good experience for us to learn from. Another is Changshu Institute of Technology in China, and this is a representative local applied undergraduate institution where the industry-education integration approach and competency-based evaluation framework can align well with China's national conditions and can show how to fit local situation. In fact, we use text analysis and comparative case study methodology. Then we examine reform philosophies, institutional designs, implementation pathways and synergistic mechanisms of both institutions. The results can provide some actionable insights and lessons for reference.

4.2 In-Depth Case Analysis

4.2.1 University of Michigan, USA: Deep integration of inquiry-based learning and multidimensional evaluation

University of Michigan uses a framework. It combines inquiry-based teaching with evaluation system and can help students improve academic inquiry skills and new thinking. Also, problem-solving capabilities can be developed. In the pedagogy aspect, institution focuses on inquiry-based learning. In fact, courses include exploratory modules. These modules cover academic discussions and research projects, and practical investigations are also included. The learning environment goes beyond classrooms. It includes laboratories and research facilities, and international exchange platforms are also provided. We combine mentorship systems with small-group seminars and faculty members can change from knowledge transmitters to helpers of academic inquiry.

In academic evaluation, a full framework is established by us that can integrate process, outcomes, and competencies together, and formative assessment should account for at least 60% in evaluation system because we think the learning process is more important than only looking at final results. It includes project progress tracking, seminar participation, literature reviews, and also experimental documentation with collaborative performance evaluation. Summative assessment consists of research papers, thesis defenses, and academic presentations. The evaluation stakeholders includes instructors, research supervisors, peer faculty, and student peer reviews, so the assessment is expected to be objective from different dimensions and a full view of student performance can be obtained. Both approaches have the same core objective. They cultivate academic inquiry capabilities, and also they form a closed-loop system of "teaching-evaluation-feedback-optimization" which means teaching and evaluation can work together in principle. Teaching provides competency evidence for evaluation, and evaluation offers guidance for

teaching, so they can develop together and support each other.

4.2.2 Changshu Institute of Technology: Systematic Integration of Industry-Education Integration Teaching and Competency-Based Comprehensive Evaluation

Changshu Institute of Technology aligns with regional industrial demands. We want to cultivate applied talents with high quality through systematic combination of industry-education collaboration and competency-based evaluation which can meet the local industry needs. For teaching model, we work with the companies to develop talent development programs. These programs put job competency requirements and industry standards into curriculum systems and we use alternating work-study models. Also we integrate job positions, courses, competitions, and certification processes. Freshmen focus on theoretical foundations and seniors engage in corporate internships and dual-qualified teaching teams is expected to help integrate theory and practice. In fact, this approach can ensure students get both theory and practice.

In the college, we build a assessment system based on competency for academic evaluation that center on professional job requirements, and evaluation criteria can be aligned with corporate standards. The framework covers quantifiable indicators including practical skills, teamwork capabilities, and problem-solving abilities. Also, professional ethics is included. In fact, the evaluation process can integrate academic instruction and industry practice, and employer assessments should account for at least 40% of total evaluation. It combines course evaluations with skill certifications. Competition results are also included. Then we can achieve coordinated development across curriculum and certification. Competition performance is also improved. Through collaboration between industry and education and training driven by competency, teaching provides practical scenarios for evaluation and assessment offers guidance oriented to industry for instruction, and we can support a collaborative talent development model between academia and enterprises.

4.3 Cross-Case Comparison and Synthesis Insights

The two universities have different educational positioning and reform priorities. However, their reform initiatives share some common characteristics. It is worth noting that both put clear competency development objectives as core focus, and teaching goals can be coordinated with evaluation goals in the system to support the whole reform process and improve education quality, and they establish diversified teaching environments which can provide content support for multi-dimensional assessments. At the same time, both implement supporting institutional frameworks. This is expected to help integrated system operate in sustainable way.

China's higher education institutions face several implications in popularization phase. We can summarize them into four points. First, integrated reform should base on institutional positioning and talent development objectives. It needs differentiated strategies. We should avoid one-size-fits-all approaches. Second, diversified evaluation systems should root in multifaceted teaching processes. In fact, evaluation reforms detached from pedagogical innovation is hard to achieve practical implementation. Third, the core of integration is deep competency-oriented integration. Teaching focus should shift from knowledge transmission to skill development. Also evaluation criteria should change from knowledge assessment to competency-based metrics. Fourth, successful integration needs systemic support including internal enhancements in faculty resources and institutional frameworks plus technological infrastructure and at the same time external collaboration through school-enterprise partnerships and regional coordination can help establish a multi-stakeholder synergy framework.

5. Construction of an Integrated Teaching-Evaluation Model

5.1 Principles of Model Construction

This integrated model is based on learning characteristics, reform demands and case studies from the popularization phase. We follow four principles in this work. First, the systematic principle integrates teaching and assessment into a unified framework for talent development so that we can coordinate different elements and functions are complementary. Second, the developmental principle prioritizes student growth progression. Also, it emphasizes diagnostic capabilities and improvement functions of evaluation. Third, adaptive principle accommodates student heterogeneity through

tiered and categorized solutions. It is worth noting that teaching and assessment can be personalized here. Fourth, operational principle ensures practical implementation tailored to university teaching realities and it can help faculty adoption and dissemination.

5.2 Conceptual Layer of the Model

In fact, the conceptual layer is core of the integrated model. We establish student value enhancement as its fundamental value orientation. First, we follow a student-centered approach. Individual differences are respected and we provide personalized support according to learning needs and developmental goals. Second, we pay attention to developmental progress and we should shift from horizontal comparisons to longitudinal growth monitoring so that every student can achieve advancement and personal development in learning process and daily life with our continuous support and guidance. Also, we support holistic improvement by integrating knowledge and skills with competencies, which can align with the goal of cultivating versatile, application-oriented talents who have innovation ability and can work in complex environments in the future.

5.3 Structural Layers of the Model

We construct a teaching-evaluation integration model in this study. It includes teaching model subsystem and academic evaluation subsystem. Also, support and assurance subsystem is included. It is worth noting that these parts can work together and reinforce each other and they can operate in synergy as a whole system which can achieve the integration effect between teaching and evaluation in the practical application context (Figure 3).

The teaching model subsystem is a framework for implementation. Its main task is to provide different types of education that can meet personal needs. We can categorize training process by developing talent plans according to student knowledge level and learning ability, also considering career goals, and we design different teaching content and learning paths. At the same time, we build a full strategy repository that integrates exploratory collaborative learning, digital blended instruction, case-based teaching, and project-based learning, and on-the-job training programs are also included so that we can strengthen combination of theoretical knowledge with practical application.

The academic assessment subsystem is key part for quality monitoring and feedback. In fact, its main task is to build full evaluation framework with multiple dimensions. First, we can create a closed-loop evaluation system that includes pre-class diagnostic assessment and in-class formative evaluation, and post-class summative assessment is also integrated so that we can cover the whole learning process with good quality monitoring from start to end. It can support pre-learning diagnostic analysis. Also, real-time monitoring during instruction and post-learning comprehensive review can be achieved. Next, we develop a framework for competency indicators with multiple dimensions, and it includes cognitive abilities, new thinking, practical skills, emotional literacy, and lifelong learning capabilities, so we can give a full evaluation of comprehensive competencies.

We consider the support guarantee subsystem. It is the base for efficient operation. In fact, it includes two aspects. First, we support faculty through helping them transform their pedagogical philosophy and conducting training on information-based teaching, which covers differentiated instruction and assessment methodologies with diversification, while we establish incentive mechanism for teaching innovation that can encourage new methods. Second, institutional and management safeguards should be built, including flexible teaching management systems with refinement, evaluation protocols that are standardized, and also school-enterprise collaboration frameworks, so that we can synchronize the planning of teaching and assessment processes.

5.4 Operational Mechanism of the Model

We consider three core subsystems in our framework. It is worth noting that they can achieve dynamic coupling through goal coordination, process feedback, and the application of outcomes in practical teaching scenarios, and this forms a closed-loop operational system that connects all parts together in a systematic way. The goal coordination mechanism requires alignment between the teaching objectives and assessment criteria, with synchronized design tailored to different categories and levels, and this can ensure synchronized efforts in instruction and the evaluation, which is important for the whole system. The process feedback and adjustment mechanism can integrate formative assessment

throughout the teaching process, providing feedback on student progress and instructional challenges while it optimizes teaching strategies and learning pathways, so the system can adjust itself based on real situations. In fact, the outcome application and value-added mechanism uses evaluation results for student development guidance and continuous teaching improvement, driving skill enhancement and quality enhancement, and it can implement the principles of "evaluation-driven teaching" and "evaluation-enhanced learning."

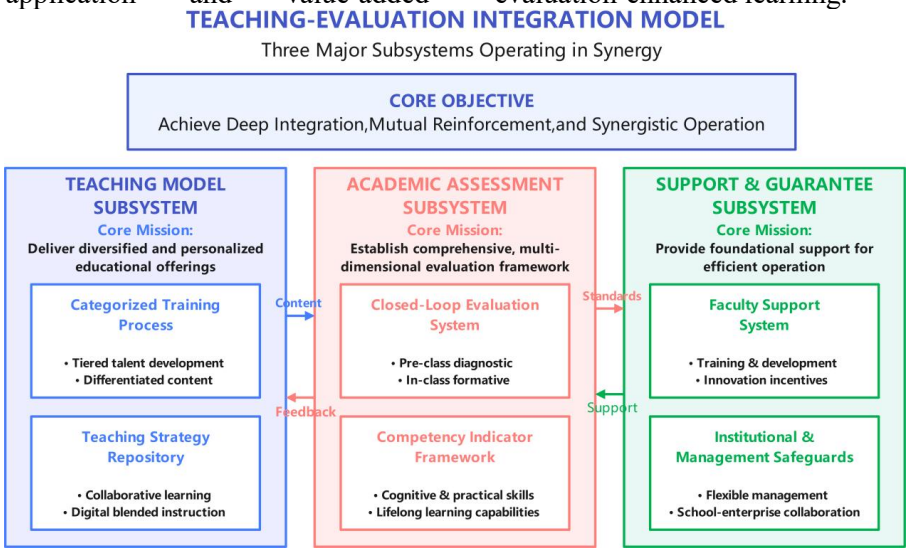

Figure 3. Structural Diagram of the Teaching-Evaluation Integration Model

6. Pathways and Strategies for Advancing the Integration of Teaching and Evaluation Reform

6.1 Macroeconomic Policy Level: Optimizing External Environment and Institutional Supply

We propose that government departments change from direct management to guidance and service, which can create favorable external environment for integrated reforms that supports the overall development of higher education system and provides necessary conditions for universities to carry out their work in flexible way. It is worth noting that policy and legal frameworks should be refined. We suggest that support measures with clear targets should be introduced and reform directions should be clarified by departments and supportive policies should be clear to everyone. At the same time, we can grant universities autonomy for distinctive reforms. More fiscal investment should be allocated through dedicated teaching reform funds. We can prioritize digital platform development and practical resource construction. Also, industry-academia collaboration projects should be supported. Then, educational evaluation reforms should be deepened in principle. The single-administrative assessment models should be avoided and third-party professional evaluation agencies can be supported, which means the evaluation system can become more diverse and objective because multiple stakeholders are involved in the assessment process and this can help improve the fairness. Core evaluation criteria should include effectiveness of integrated reforms and talent cultivation quality. Also, societal satisfaction levels should be considered. This can guide universities to refocus on their fundamental mission of education.

6.2 School Governance Level: Strengthening Top-Level Design and Internal Support

Universities are the main bodies to carry out educational reforms. We suggest that they should strengthen top-level design and also build internal safeguards. It is worth noting that integrating teaching and evaluation reforms into institutional development blueprint requires establishing collaboration mechanisms across different departments, which can coordinate efforts among academic affairs offices, human resources departments, faculties and research divisions. We believe teaching innovation needs more incentives. The entrenched "five-only" evaluation criteria (overemphasis on publications, grades, rankings, awards and salaries) should be avoided and we can incorporate teaching innovation outcomes and student satisfaction, with talent cultivation

quality as another core metric for faculty assessments and promotions, as well as excellence awards. In fact, reform enthusiasm can be boosted in this way. Next, we can advance educational digital transformation through smart teaching platforms and academic evaluation systems using big data and AI technologies. Process documentation and precise assessment can be enabled, while real-time feedback is also provided. In principle, this can improve the practical feasibility of reform initiatives.

6.3 Departmental Implementation Level: Implementing Categorized Training and Industry-Education Integration

Academic departments are key units for implementing reforms, and they need customized plans that can match disciplinary characteristics. We should adopt new talent cultivation models, and this can be done through tiered training approaches and curriculum optimization, and we can also introduce personalized courses with interdisciplinary and practical contents to meet diverse needs. Industry-education integration can be improved. We can collaborate with enterprises to co-develop curricula and establish evaluation standards, and it is worth noting that corporate involvement in practical teaching and academic assessment should be increased so that talent development can be aligned with societal demands. Curriculum design and evaluation frameworks can be improved by incorporating inquiry-based and project-based teaching methods into the classrooms. Also, case-based methods can be used at the same time. We should use formative assessment and competency-based assessment schemes. We can build a dynamic adjustment mechanism. This is expected to enhance the alignment between the teaching practices and evaluation criteria.

6.4 Teacher Practice Level: Transformation of Teaching Concepts and Enhancement of Professional Competence

Teachers are frontline implementers of educational reforms. They need to change mindset and improve competency. They should adopt student-centered pedagogical approaches in classroom. In fact, they need to change from knowledge transmitters to learning helpers and growth mentors, and they also should cultivate developmental assessment strategies because this is important for student development and can help improve the overall teaching quality. We can see that teaching design capabilities should be strengthened, which means teachers can apply blended learning and project-based learning, and also inquiry-based methods can be used by teachers to improve the teaching quality and support student learning activities. It is expected to emphasize interactive instruction and practice-oriented outcomes. Multidimensional evaluation expertise is needed, so teachers should master diagnostic assessment, formative assessment, and techniques for summative evaluation, and this includes the design of evaluation metrics with scientific basis that can support teaching and provide useful information for instructional refinement. Also, diverse evaluators should be used in practice. Effective feedback mechanisms can help achieve instructional refinement. These integrated requirements should be implemented across all curricular disciplines and teaching processes, and it is expected that all teachers can follow these guidelines to improve their teaching practice and achieve better educational outcomes for students in the long term.

7. Conclusion

We start from the background that China is now working on the popularization of higher education. Popularization of Higher Education Theory and Multiple Intelligences Theory are used as the theoretical basis. It is worth noting that Systems Theory is also used and it can help us understand the system structure. For methods, we use questionnaires and interviews. Case comparison is also adopted. C University is main subject we study and we also include two representative university cases, so we can examine coupling mechanisms and integrated development of teaching models and academic evaluation systems in popularization phase. Some conclusions can be obtained.

First, the core of higher education popularization is qualitative changes in educational philosophy and structure, and we can see that functions of education can also change in this process which is very important for us to understand the whole system. Students are diverse and have personalized needs. In fact, this can require teaching systems and evaluation systems to change at the same time. Martin Trow Theory and Multiple Intelligences Theory support this view. We should move away from homogeneous

teaching-evaluation paradigms because student demographics at C University are heterogeneous and this is evidence. This reality means the higher education institutions should abandon the traditional teaching-evaluation models and they can adopt diversified approaches with collaboration so this establishes logical foundations for subsequent research which can be used in future studies when we examine the details.

Also, we find that regional application-oriented universities have achieved some progress in teaching model reforms. However, they still face many challenges that can not align with the broader educational demands and their institutional positioning, which means the current situation is not satisfactory for the long-term development of these universities and the students they serve. We conducted a survey at C University last year. It is worth noting that over 60% of students can recognize the diversity of teaching approaches, but they report many problems in the actual implementation process that need to be solved. However, several serious issues exist in the current practice. These include disconnection between academic content and industry needs, inadequate personalized instruction, large-classroom teaching practices, and faculty digital literacy is insufficient, and we can see that pedagogical transformation is necessary and should be implemented as soon as possible to improve the teaching quality. In fact, these findings also underscore the persistent gap between theoretical frameworks and practical implementation in existing research.

Third, teaching models and academic evaluation systems are inherently coupled, which means there is a natural connection between them, and integrated collaborative reforms should be the key way to solve the disconnect between teaching and assessment that exists in higher education practice and it causes many problems. Case studies show that the University of Michigan integrates inquiry-based teaching with multi-dimensional evaluation systems. Also, Changshu Institute of Technology builds industry-academia collaboration framework with competency-based assessment, and these two cases from different countries both prioritize skill development. They can achieve teaching-evaluation synergy. It is worth noting that system theory and research from C University underscore the necessity of collaboration. By analyzing these two exemplary university cases from the University of Michigan and Changshu Institute of Technology, the integrated model we develop in this study clarifies their dynamic operational mechanisms and can resolve practical challenges while giving actionable pathways for regional applied universities.

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