Strategies used by universities to measure the effectiveness of their courses:

· **Student Evaluations**

· **Assessments and Examinations**

· **Learning Outcomes Assessment**

· **Graduation and Retention Rates**

· **Alumni Surveys and Employment Data**

· **Peer Reviews and Observations**

· **Course Engagement and Participation**

· **External Accreditation and Rankings**: Some universities seek external accreditation for their courses or programs. Accrediting bodies assess the quality and effectiveness of the courses based on established criteria. Additionally, universities often rely on rankings provided by external organizations or publications, which consider factors such as student satisfaction, research output, and employment outcomes to assess the effectiveness and reputation of courses and programs. (<https://nceac.org.pk/Documents/Forms/Accreditation%20CVF%202021.pdf>)

When designing a course for the first time, universities can use several metrics to assess its potential effectiveness. Here are some strategies to consider:

· **Needs Analysis**: Conduct a needs analysis to identify the learning needs and objectives of the target audience. This analysis can involve surveys, interviews, or focus groups with prospective students, industry professionals, or other stakeholders. Understanding the specific needs and expectations of the learners will help align the course design with their requirements.

· **Benchmarking**: Research and benchmark similar courses offered by other universities or institutions. Analyze their course structures, learning outcomes, teaching methods, and assessment strategies. This analysis can provide insights into successful practices and help identify gaps or areas for improvement in the proposed course design.

· **Expert Input**: Seek input from subject matter experts or faculty members with expertise in the course domain. Their knowledge and experience can help validate the course design and ensure it covers relevant topics, concepts, and skills.

· **Pilot Testing**: Conduct a pilot test of the course with a small group of students or learners who closely match the target audience. Gather feedback from these pilot participants to identify strengths, weaknesses, and areas for improvement in the course design. This feedback can inform adjustments to the curriculum, instructional materials, and teaching methods before the course is fully implemented.

· **Curriculum Mapping**: Create a curriculum map that aligns the course content with the intended learning outcomes. This mapping exercise ensures that the course design effectively covers the necessary topics, skills, and knowledge to achieve the desired learning objectives.

· **Formative Assessment**: Incorporate formative assessments throughout the course design process. These can include quizzes, assignments, or group activities that provide ongoing feedback on student progress and understanding. Formative assessments help identify any gaps in the course content or instructional methods and allow for timely adjustments.

· **Expert Review**: Seek feedback from instructional designers or educational experts who specialize in course development. They can provide valuable insights and suggestions for improving the course design, ensuring it aligns with pedagogical best practices.

· **Alignment with Accreditation Standards**: If applicable, ensure that the course design meets the standards and requirements of relevant accrediting bodies. This can help ensure that the course meets industry or professional standards and is aligned with established benchmarks of quality.

By employing these strategies, universities can gather data and feedback during the course design phase to assess the potential effectiveness of the course and make informed decisions to enhance its quality before its official implementation.

**Designing Conversational Evaluation Tools: A Comparison of Text and Voice Modalities to Improve Response Quality in Course Evaluations \*\***

<https://dl.acm.org/doi/10.1145/3555619>

Conversational agents (CAs) provide opportunities for improving the interaction in evaluation surveys. To investigate if and how a user-centered conversational evaluation tool impacts users' response quality and their experience, we build EVA - a novel conversational course evaluation tool for educational scenarios. In a field experiment with 128 students, we compared EVA against a static web survey. Our results confirm prior findings from literature about the positive effect of conversational evaluation tools in the domain of education. Second, we then investigate the differences between a voice-based and text-based conversational human-computer interaction of EVA in the same experimental set-up. Against our prior expectation, the students of the voice-based interaction answered with higher information quality but with lower quantity of information compared to the text-based modality. Our findings indicate that using a conversational CA (voice and text-based) results in a higher response quality and user experience compared to a static web survey interface.

| >> Design of an adaptive conversational course evaluation tool.  >> Interactively asking both quantitative and qualitative questions, following up as and when needed  >> Compared two interfaces (text-based and voice-based)  >> Students gave more comprehensive feedback judged by the quantity and the quality of the information given (improvement of response quality in surveys, ultimately leading to higher data quality)  >> a little beyond the scope of our research |
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**Design and Evaluation of an Undergraduate Course on Software Development Practices \***

<https://dl.acm.org/doi/10.1145/3159450.3159542>

This paper describes the design, evolution, and evaluation of a second-year undergraduate course on professional software development practices. The course design arose from two properties of a curriculum revision: the removal of redundancy across Discrete Mathematics, Data Structures, and Algorithms coursework and the identification of desired skills for students entering the upper-division courses. A research-informed design for the course incorporates code quality, version control, teamwork, user-centered design, risk management, design thinking, and reflective practice, presented in keeping with the values of agile software development. We describe the evolution of the course over its six years of implementation, including a transition from a Java-specific textbook to a more generic book about code quality and the transition from a six-week to a nine-week project. The course has become a linchpin for mid-major assessment of students' software development skills, and we discuss the strengths, weaknesses, and results of our assessment strategy. We provide a reflection of the role this course has had within our program and advice for those who might wish to adopt or adapt this design.

| >> Focus is more on design. Refinement is iterative |
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**Formative evaluation scheme for a web-based course design \***

<https://dl.acm.org/doi/10.1145/544414.544454>

In Fall 2000, University of Joensuu offered for the first time a Web-based university level Computer Science course to high school students in the surrounding rural region of North Karelia. To improve the course design, a formative evaluation scheme was developed for monitoring learning outcomes and identifying existing problems, pedagogical as well as technical. An analysis of the feedback given by those who dropped out of the pilot program offered important insights to the difficulties encountered by the students especially during the programming course. The main reasons for quitting were the problems to synchronize high school and university studies, given tight time constraints. Use of arrays and designing methods proved to be among the most difficult topics of programming. Based on the analyzed feedback, the curriculum has been modified to fit better to students' potential.

| Not relevant to our research topic. The course in question here is also web-based |
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**The Innovative Curriculum Construction of "Computer Fundamentals" Course Based on SPOC+MOOC in Higher Education \***

<https://ieeexplore.ieee.org/document/9201872>

In this study, an innovative curriculum construction scheme, which combined the application of MOOC and SPOC was introduced in a detailed manner, including the overall planning of the curriculum design, as well as the construction scheme of MOOC+SPOC. A comparison was conducted with the teaching effectiveness before and after utilizing the SPOC+MOOC curriculum design in higher education, taking the Computer Fundamentals course as an example. What's more, a survey based on questionnaires were conducted to investigate students' evaluation of this innovative curriculum construction scheme.

| Empirical evidence from the teaching practice used as evidence of the effectiveness of curriculum construction discussed in paper. Not much relevant to our research |
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**A Teaching Quality Evaluation System Based on J2EE Technology \***

<https://ieeexplore.ieee.org/document/9551345>

To realize the effective quantification of the qualitative evaluation of the teaching quality of gold courses in colleges, this paper designs and implements a teaching quality evaluation system based on J2EE. We draw lessons from the existing experience of teaching quality evaluation, adopt B/S operation mode and SQL Server 2016 as the background database, and provide an analysis and design scheme based on three-tier architecture, including requirement analysis and design, as well as the specific implementation process of key modules. Finally, through the operation test analysis of the system, it shows that the evaluation system designed in this paper can implement diversified learning evaluation and provide a good scientific means for the comprehensive construction and quality evaluation of golden courses in colleges.

| Not relevant |
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**A Quality Evaluation Scheme for Curriculum in Ideological and Political Education Based on Data Mining \***

<https://ieeexplore.ieee.org/document/9410064>

A large amount of data has been accumulated in the teaching and management of colleges and universities, while these data have not been effectively used. Thus, this paper introduces the design scheme of integrating data mining technology into the Curriculum in Ideological and Political teaching evaluation system, as well as the key technologies in the system development process. When the evaluation data is acquired, the data mining model of teaching quality evaluation is established, and the indicators of teaching quality evaluation are listed. Then the mining process and specific classification are provided in the analysis of association rules. This paper also designs an improved Aprior algorithm and describes its application in teaching evaluation. Finally, the mining object, data selection, data mining process and specific mining steps are determined in the cluster analysis. The relationship between teachers' basic information, teaching methods and teaching evaluation results is analyzed, and the clustering results are generated. Thus, the selection of evaluation methods, the formulation of relevant policies and the improvement strategies of teachers' teaching can be expected.

| Using relationship between teaching evaluation data and students’ performance, the specific factors affecting teaching quality are analyzed. No reference to a potentially useful evaluation scheme to measure course effectiveness. |
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**Revised Design-Based Research Methodology for College Course Improvement and Application to Education Courses in Japan \*\*\***

<https://www.jstor.org/stable/44429968>

The author describes a research methodology for college course improvement, and applies the results to education courses. In Japan, it is usually difficult to carry out research on college course improvement, because faculty cannot introduce experimental design approaches based on control and treatment groupings of students in actual classroom settings. In this study, however, the author followed the Design-Based Research (DBR) approach proposed by Reeves and other researchers, revising the DBR and then applying it to college course levels with special conditions. The revised DBR was applied to both "Instructional Methodology" and "Educational Technology" courses that are compulsory in teacher-training programs in Japan. This resulted in the identification of effective and ineffective instructional activities, which were then classified into common activities seen in both courses, and particular activities seen in only one course, respectively. The author concludes that this revised DBR is a practical and powerful method for improving existing college courses.

| · Methodology used for College Course Improvement: Revised Design-Based Research  · Aim: Identification of effective and ineffective instructional activities  · Book by author: Fifty Techniques for Effective Classes  · Finding a research method for improving college classes depends on individual class conditions.  · Existing information with practical applications on designing college teaching are sets of guiding procedures, called instructional design, on how to plan a lesson. Each instruction design or case study depends on each individual class.  · The model of the "reflective practitioner" can be applied by each teacher.  · Features of DBR: Pragmatic, Grounded, Interactive, Iterative, Flexible, Integrative and Contextual  · What makes revised DBR different: everything from problem analysis to evaluation are carried out by the practitioner themselves  · This method confirms effectiveness by repetition  · Evaluation is based on the subjective input using data or information from various sources, such as question cards filled out by students, student attitudes during class, observation of talking and napping, and note-taking record |
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**Course Evaluation and Design Optimization: A Conjoint Analysis-Based Application \***

<https://www.jstor.org/stable/25060401>

In order to evaluate and design a new course offering at the University of Southern California, a study was conducted to derive importance measures for alternative course attributes and also to determine the specific design for a course possessing optimal attributes given student preferences. Using a new product evaluation and design approach involving the application of conjoint analysis, useful information was provided for course planning at the University.

| The paper talks of a very scientific approach (Conjoint Analysis) that was used to determine if a newly offered course for MBA students at University of South California was effective. I have only skimmed through this paper as the approach that was being used seems a little out of the scope of our project. |
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**Course Design Principles for Enhancing Student Learning \***

<https://www.jstor.org/stable/24862296>

| This article talks about a framework called “backward design” – (1) establish learning goals, (2) determine what constitutes acceptable evidence of learning, and (3) plan appropriate learning opportunities. Focus is on design of a course, not measurement of its effectiveness. |
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**Instructional Design: Course Revision and Course Re-Design \***

<https://www.jstor.org/stable/44423904>

| Article not directly relevant to our research; discussion of course revision and redesign |
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**Using WISE Materials to Design an Inquiry-Based Curriculum with the 5E Instructional Model \***

<https://www.jstor.org/stable/26411029>

We designed a course based on inquiry learning usingWISE, an online inquiry-based science environment platform, and the 5E instructional model. This article summarizes guidelines used in designing the course, analyses of student needs and school environment, setting of course objectives, modification of materials, and evaluation of student performance. A “Healthy Life” course based on those guidelines was implemented, along with a teacher-training workshop, in two schools, and pretests and posttests were administered to evaluate the achievements of the project participants. The results showed that the participants had constructed scientific concepts and improved their level of cognitive knowledge. An efficiency questionnaire and semistructured interviews demonstrated the effectiveness of the course, thus indicating that we should share the guidelines and features of the Healthy Life course with other course designers and teachers.

| Course in question is a school-based course and the platform used (WISE) is relevant for K-12 students. Irrelevant to our research.  5E learning model is: Engage, Explore, Explain, Elaborate and Evaluate |
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**Using a Multilevel Assessment Scheme in Reforming Science Methods Courses \***

<https://www.jstor.org/stable/43156342>

The development of new courses is strengthened by assessment and a response to the assessment. Two new science methods courses for elementary and secondary preservice teachers were developed, fostered by the Great Salt Lake Project. The preservice teachers designed and performed research projects that they then converted into inquiry-based teaching units. The professors applied a 3-layer assessment scheme to evaluate the courses and the preservice teachers based on changes in student attitudes, student-generated curricula, and internal course evaluations. Each type of assessment effectively informed the reform process, and strengths and weaknesses of the courses were revealed. Strengths of the courses included students learning to see science as a process and comprehending inquiry as a pedagogical approach. Weaknesses observed included a lack of understanding in three areas: the role of assessment, the need to address cultural issues, and the significance of scientific literacy.

| This paper focuses mainly on development of new courses for pre-service courses. Not very relevant to our research |
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**Quality management: an ‘essential attributes' approach. A case study towards a sustainable model of course effectiveness evaluation \*\***

<https://www.tandfonline.com/doi/abs/10.1080/13596740500200203>

Education of potential professional engineers should take account of the type of employment that they will eventually obtain. The quality of an engineering degree course can be judged by assessing whether the correct balance of ‘essential attributes’ has been effectively obtained. This case study is concerned with assessing the balance of ‘essential attributes’ on an existing Bachelor of Engineering degree course in the Mechanical and Manufacturing Engineering Department, Cork Institute of Technology, Ireland. To frame the research, the concepts of ‘fitness for purpose’, ‘standards of excellence’ and a ‘sustainable world’ are used. Improvement of course quality and the development of a model of course effectiveness evaluation that can be applied to most higher education courses is the aim.

| Aim: Improvement of course quality and the development of a model of course effectiveness evaluation that can be applied to most higher education courses.  Conclusion: The quality of information that emerges from interview data, when analysed using the framework of the essential attributes approach, should evaluate a course effectively. (I.e. prefer interviews over questionnaire. |
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**Course evaluation scores: valid measures for teaching effectiveness or rewards for lenient grading? \*\***

<https://www.tandfonline.com/doi/full/10.1080/13562517.2020.1722992>

Course Evaluation Instruments (CEIs) are critical aspects of faculty assessment and evaluation across most higher education institutions, but heated debates surround the value and validity of such instruments. While some argue that CEI scores are valid measures of course and instructor quality, others argue that faculty members can game the system, most notably with lenient grading practices to achieve higher student ratings. This article synthesizes the literature on course evaluation instruments as they relate to student grades to assess the evidence supporting and refuting the major theoretical frameworks (i.e. leniency hypothesis and validity hypothesis), explores the implications of research design and methods and proposes practical recommendations for colleges and universities. This paper also goes beyond the CEI-grade relationship and provides a framework that illustrates the relationships between teaching quality and CEI scores, and the potential confounding factors and omitted variables which may significantly deteriorate the informativeness of the CEI score.

| This paper reviews the various existing literature to determine whether course evaluation scores are a valid measure to determine effective teaching or if other factors come into play affecting the scores. Various factors are talked about and their effect on course evaluation scores is discussed. The authors also explore the leniency hypothesis, which posits that students give higher CEI scores to instructors from whom they receive higher grades, and the validity hypothesis, which posits that instructors who teach more effectively receive better evaluation scores because their students learn more and therefore earn higher grades. A portfolio approach is recommended with a combination of measures, such as student evaluations, peer evaluations, chair evaluations, and self-evaluations to determine teaching effectiveness.  “As examples, Berk (2005) discusses some potential sources of evidence of teaching effectiveness including student ratings, peer ratings, self-evaluation, student interviews, alumni ratings, teaching scholarship, learnings outcome measures, etc.” |
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**Taking stock and effecting change: curriculum evaluation through a review of course syllabi \***

<https://www.tandfonline.com/doi/full/10.1080/02602938.2017.1412397>

A multi-disciplinary academic unit at a Canadian university completed an evaluation of course syllabi used in its undergraduate programmes over the previous five years. This paper examines the reasons for the evaluation, the processes employed to collect and analyse the data, and how the results will be incorporated into the next steps of the overall curricula reform planned within the unit. The evaluation focused on the unit’s adherence to departmental and university policies, course reading materials, experiential learning opportunities, forms of assessments (e.g. types and weighting of assignments), learning outcomes and instructor-specific policies (e.g. group work expectations, late assignments). While a summary of the results of the evaluation are provided herein, these are meant to highlight the administrative and curricular benefits and uses of the data, rather than an analysis and discussion of the results themselves.

| · The main focus is on entire curriculum review for a department at university. The method that was used was syllabi review.  · From lit review conducted they found that alumni career outcomes can help determine effectiveness of curricula. Curriculum mapping against learning outcomes is another valuable source to measure effectiveness. Interviewing stakeholders i.e. students and employers is yet another method.  · Also lists some benefits of syllabi review over other methods listed above.  · Examining syllabi gave the researchers an insight into the teaching/learning cultue within their programme |
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**Dimensions of teaching effectiveness and course evaluation based upon judgments of psychology students \***

<https://www.tandfonline.com/doi/abs/10.1080/00050067208259939>

| Not relevant to research topic |
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**A Method to Evaluate Teaching Effectiveness in an Introductory American Government Course \*\*\*\*\***

<https://www.tandfonline.com/doi/abs/10.1080/00922013.1978.11000117>

| · This paper offers a new approach to measure teaching-effectiveness in a course to be used alongside student evaluations/other approaches  · Other sources for demonstrating teaching effectiveness: classroom visitations by department personnel committees, review of course syllabi, handouts, and class projects, course revisions and grade distributions, other curricular innovation, student advising, and any other evidence deemed pertinent.  · Lists pros and cons of student evaluations using evidence/lit review  · Pros: a fair and valid representation according to some,  · Cons: higher score may be a result of thatre and not intellectual simulation, extraneous factos may influence ratings, focus might be more on improving standing in terms of scores instead of how much students learn,  · Data based studies offer mixed evidence  · There seems to be general concensus that the best teachers those whose students learn the most? So then a measure of how much students learn would be appropriate.  · One approach can be to use student’s final grades as indicators of teaching-effectiveness but there is evidence that grades contaminate student evaluations  · A few other possible instruments such as feedback from alumni discussed with their drawbacks  · The instrument suggested is Edumetric Tests: composed of items which a large propor[1]tion of students get wrong before a course and answer correctly after taking it. As such, the questions, by definition, need to be biased toward those that all students can Jearn. They are, therefore, trivial in that they merely demonstrate mastery of facts.  · Tests administered first and last days of each quarter.  · During classes questions not alluded to directly  · There is general discussion on results wih conclusion that teaching effectiveness can be measured in a relatively efficient and quantitative manner using these tests.  · Advice is to use in conjunction with student evalutions because this like other methods remain at risk of being fallable in that some instructors may teach the content of test itself to obtain better scores. |
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**End-of-Course Evaluations as Indicators of Student Learning and Instructor Effectiveness \*\***

<https://www.tandfonline.com/doi/abs/10.1080/00220485.1980.10844950>

There are two aspects of this article that readers should find particularly interesting. First, Marlin and Niss provide additional data on the question of student evaluations of professors and courses. Second, they suggest the use of canonical correlation as an ideal way of facing the problems confronted in analyzing the educational production function. The authors assert that “canonical correlation would seem to answer many of the problems encountered in previous single-equation models….” Their research suggests that student evaluations can be used as surrogates for direct evaluations and that the former “do indeed measure the level of teacher input.”

| The analysis in the paper attempts to look at student evaluations of teachers as a measure of teacher inputs in the context of an education production function The conclusion is that student evaluations can be used to measure teacher effectiveness. |
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**Curriculum Guidelines for Undergraduate Programs in Computer Science**

<https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf>