

Exams




Exams are important. Exams are powerful educational tools. They help to evaluate the students and see if they are learning the way you intended. Furthermore, exams can help to motivate students and help them structure their academic efforts. Students study in a way that reflects how they think that they will be examined. If you focus on facts in the exam, they will memorize facts, if they expect complex problem solving, they will learn by understanding and applying information. Therefore, it is important that you design exams which effectively motivate, measure and reinforce learning. (Davis, 2009) Formative assessments are ongoing (usually non-graded) checks of student understanding to guide teaching, while summative assessments evaluate learning at the end of an instructional period. In the following section, we focus on summative assessments.

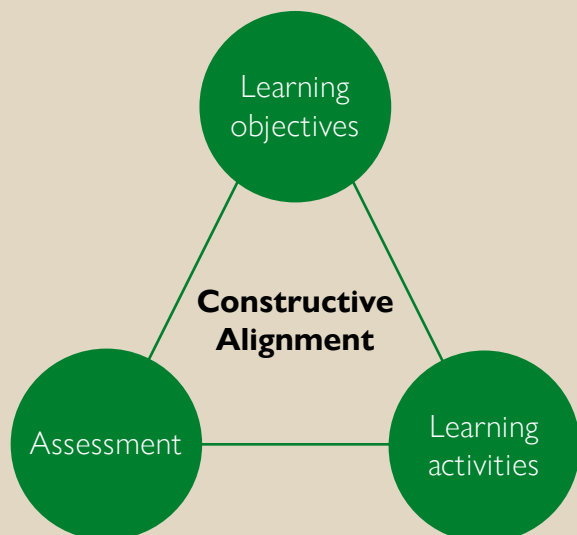
Phase 1: Planning – When you start planning your course, you should also start the planning of your exam. Allocate sufficient time for the development of your exams (Davis, 2009).

Consider:




- Which are the learning goals?
- How can students be best examined to check if they reached the learning goals? Considering the **Constructive Alignment** and **Taxonomy Levels** explained in the next sections.
- How should the exam be conducted?
- Will it be a written, oral, or practical exam?
- Alone or in groups?
- Will it be open or closed book?
- Will it be analogue or digital?

Goals for good exams

-  **Preparation**
Design examinations that take appropriate account of quality criteria
-  **Implementation**
Conduct exams fairly for students
-  **Post-exam**
Use exam results as an evaluation tool for the course



Constructive Alignment is a principle that emphasizes coherence between intended learning outcomes, teaching methods, and assessment strategies. This alignment enhances the effectiveness of teaching and learning by creating a clear path for students to achieve the desired learning objectives. In exams this means ensuring that the content and format of the exam align closely with the intended learning outcomes and teaching methods.

-  Are the exam tasks / questions directly linked to what students were supposed to learn?
-  Do exam criteria match the intended learning outcomes?
-  How do the exam formats and structures align with teaching methods?

(Biggs, 1996)

Krathwohl's taxonomy is a classification of learning objectives organized into a hierarchical structure, ranging from simple cognitive processes to more complex ones. The six levels include remember, understand, apply, analyze, evaluate, and create. This taxonomy helps instructors formulate clear and challenging exam objectives that address various cognitive abilities of learners. By using this taxonomy, instructors can ensure that their exams adequately reflect the intended learning objectives and align with the teaching methods, resulting in effective Constructive Alignment (Krathwohl, 2002). Using several different exam methods help students perform their best, as they vary in preferences. Furthermore, Multiple-choice questions suit for assessing their mastery of details and specific knowledge, while essay questions assess comprehension, their ability to integrate and syntheses and apply knowledge. Krathwohl's taxonomy, a hierarchical classification of learning objectives, spans from simple cognitive processes to more complex ones, encompassing knowledge, comprehension, application, analysis, evaluation, and creation. This taxonomy aids instructors in crafting clear and challenging exam objectives that cater to diverse cognitive abilities. Utilizing a variety of exam methods accommodates students' preferences and optimizes their performance. By leveraging Bloom's taxonomy, educators can ensure that their exams effectively align with intended learning objectives and teaching methods, fostering Constructive Alignment. For example, multiple-choice questions are best suitable for assessing mastery of details and specific knowledge, while essay questions evaluate comprehension, integration, synthesis, and application of knowledge (Davis, 2009; Krathwohl, 2002).

Examination Formats

Written Exam

- Single Choice
- Multiple Choice
- Essay
- Portfolio
- ...



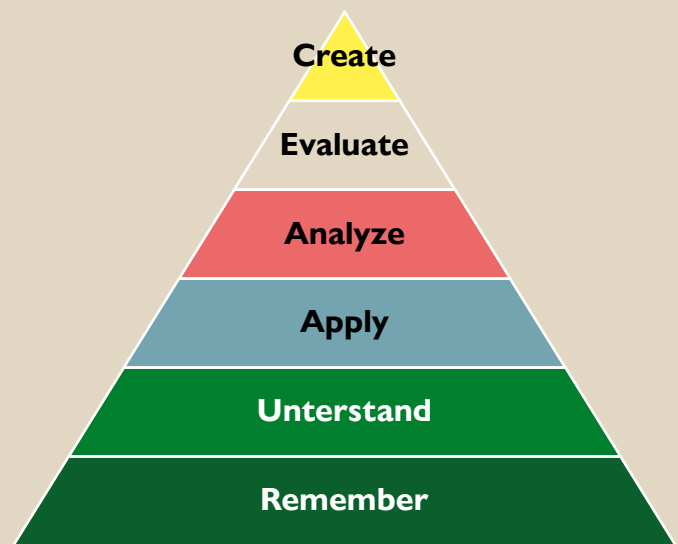
Oral exam

- Exam interview
- Technical discussion
- Disputation
- Presentation
- ...



Practical exam

- Practical projects
- Simulations
- Development of Artifacts
- ...



Phase 2: Construction Phase – In the construction phase, careful planning ensures fair and effective exams. Here is how:

- Structuring: Organize sections logically and start with easy questions to enhance their confidence
- Instructions: You might give students advice on how much time to spend per question / task.
- Timing: Try out how much time it takes to complete the exam – it should be, as a rule of thumb, about four times as long as it takes the instructor to complete it.
- Question Quality: Craft clear, relevant questions aligned with learning objectives (Davies, 2009).

Phase 3: Implementation Phase

During the implementation phase of exams, careful preparation and execution are key to success. Here is what to focus on:

– Availability:

The examination supervisor should be able to contact the instructor in case of questions regarding the exam.

– Communication with Students:

Clearly communicate exam instructions and address any concerns students may have.

– Mock exams:

By distributing practice exams students are better prepared for the actual exam.

(Davis, 2009)



Quality Criteria: Exams must be valid, reliable, fair and economical. However, achieving all these criteria simultaneously often leads to conflicts that necessitate a compromise.



Validity refers to the extent to which a test measures what it intends to measure. It ensures that the test assesses the knowledge or skills it claims to evaluate.



Economy refers to the efficient use of resources, including time, money, and (wo)manpower, in designing, administering, and scoring tests.



Equal opportunities (fairness), ensure that all test-takers have an equal chance to demonstrate their knowledge or skills regardless of factors such as background, socioeconomic status, or disability.



Reliability refers to the consistency and stability of test scores over time and across different administrations.

Phase 4: Analysis Phase – Use the analysis phase to gain insights into student performance and the effectiveness of the assessment process. Here are the key steps in this phase:



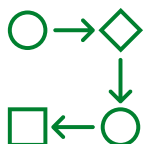
Student performance

- Reviewing Exam Results: Look for trends, patterns, and outliers in student scores to identify students' strengths and weaknesses.
- Comparing Results: Compare exam results with previous years or similar assessments to evaluate performance trends over time.
- Identifying Learning Gaps: Use exam data to identify learning gaps and areas where additional instruction or support may be needed.

Effectiveness of the assessment process

- Gathering Feedback: Collect feedback from students about the exam to identify areas for improvement.
- Assessing Exam Validity and Reliability: Evaluate the validity and reliability of the exam questions and scoring methods used.
- Feedback and Improvement: Provide feedback to students based on their exam performance. Use this feedback to guide future instruction and assessment practices.
- Continuous Improvement: Use the insights gained from the analysis phase to make to improve the exam process such as refining exam questions, adjusting scoring methods, or providing additional support for students.

(Davis, 2009)



Sources

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Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into practice*, 41(4), 212-218.

Further Resources

Walvoord, B. & Anderson, V. (2024). *Grading Student Work*. Vanderbilt University Center for Teaching. [Link](#)

Brame C. J. (2024). *Writing Good Multiple Choice Test Questions*. Vanderbilt University Center for Teaching [Link](#)