

## **EXPERIMENTAL VALIDITY IN EDUCATIONAL RESEARCH**

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### **1. Introduction :**

Educational research relies heavily on experiments to evaluate the effectiveness of new teaching methods, interventions, and technologies. However, the credibility of these experiments' hinges on two crucial aspects: internal validity and external validity.

*'Research validity refers to the correctness or truthfulness of inference that is made from the results of a research study.'* (Christensen, Johnson, Turner, 2014 P. 186)

It is very important to establish the validity of an experiment to maintain the quality of the research study.

Internal validity addresses the question of whether the observed changes in the outcome variable can be definitively attributed to the independent variable, the treatment being tested. It ensures that the experiment is well-designed and controlled, minimizing the influence of extraneous factors that could skew the results.

External validity, on the other hand, focuses on the generalizability of the findings. It asks how well the results can be applied to other educational settings, populations, or contexts. Can the observed benefits of a new teaching method be replicated in different classrooms or with different student demographics

This paper delves into the importance of both internal and external validity in educational experiments. We will explore the potential threats to each type of validity and discuss strategies for strengthening the design and execution of educational experiments to ensure their findings are both trustworthy and broadly applicable.

The paper is based on the research study conducted by the researcher for his Ph.D. study in 2014-15. The title of the study was 'testing the effectiveness of e-content package to acquire certain e-skills prepared for B.Ed. students.' The e-content package was delivered in a computer lab to the students. the paper demonstrates how the researcher taken care of different traits to the internal and external validity of this experiment.

The researcher has taken care of following two types of validity of the experiment.

2. **Internal Validity :** Internal validity refers to a study's ability to determine if a causal relationship exists between one or more independent variables and one or more dependent variable (Pandya, 2010 P. 120)

Internal validity is about establishing the cause-and-effect relationship between independent and dependent variables.

- Independent Variable: E-content package.
- Dependent Variables: Achievement scores of student teachers.
- Confounding Variables: Age, interest, IQ, educational qualifications, socio-economic status and psychological status of the student-teachers of B. Ed. course.

The researcher needs to determine that the achievement scores which would be change only due to e-content package and not by confounding variable. The researcher took following measures to ensure the internal validity of the experiment.

*Table 1 : Internal Validity of the Experiment*

Sr. No.	Type of threat to internal validity	Description of threat	Precaution taken by the researcher
1	History	Because time passes during an experiment, events can occur that influence the result of the experiment.	The total experiment carried for 2 months. Because all the subjects from the group were from same college, all events affected them all similarly.
2	Maturation	<p>Participation in experiments the subjects may become more mature or change.</p> <p>Subjects may become tire, bored, thirsty, hungry etc.</p>	<p>All the students were from same batch and from similar age group. So the maturation may affect similar to all.</p> <p>The timing of experiment was kept in the morning.</p> <p>So subjects were fresh and energetic.</p> <p>The computer lab had A/c and seating arrangement was comfortable which kept subjects way from fatigue were.</p>

			Subject attended the experiment for an hour on alternate date. So the subjects don't get bored.
3	Regression	Subjects having extreme scores may affect the result	Subjects gained extreme scores in the pre test were excluded from the sample for experiment.
4	Mortality	Subjects drop out during an experiment	Researcher conducted orientation for subjects and explained the importance of the experiment and their presence in it.
5	Testing	Better performance in post test due to familiar with pre test	Two tools have been used. The rubrics are assessed by the observer and not by students, so achievement test internal validity can be compensated.  Sequence of some questions was changes in the post test.
6	Instrumentation	If the measuring instruments changes during experiment, scores may be interpreted differently.	The instruments i.e. achievement test and rubrics were having same-content and type so this variable become constant.

### 3. External Validity :

External validity of research refers to which results can be generalized to the other. Group or settings and context (Pandy, 2010, P. 126)

The experiments are conducted in controlled situations and pre-determined settings. External validity refers to make sure that results of study can be applied and generalized.

The external validity of the experiment has been taken cared in the following way –

*Table 2 : External Validity of the Experiment*

Sr. No.	Type of threat to external validity	Description of threat	Precaution taken by the researcher
1	Explicit description of the experimental treatment	If the experiment treatment is not described by the researcher explicitly, other researcher cannot replicate the study.	The details of all procedures and tools development described explicitly in the present study.
2	Multiple treatment interference	When subjects received more than one treatment, the effect of prior	The e-content package was divided into six modules. The schedule was arranged in this way that first module

		treatment can affect with later treatment.	interaction will come again after sixth module. So that the subjects can revised what they learnt is first cycle.
3	Howthorne effect	If someone observes performance, it can affect the performance of the subjects.	The e-content delivered in three modes. Supervisory and self learning mode the experimenter was passive and silent observer which would help to make subjects much natural.
4	pre test sensitization	If some of the subjects, not undergo pre test, their performance would be less than who undergo pre test.	All the subjects from the group undergo the pre test. So it was no discrimination of the basis of pre test sensitization.
5	Measurement of the dependent variable	If the nature of questions not suitable for the nature of the treatment than result may not valid.	The tools which were used in the present study were validated the experts who also validate the e-content package.

As above mentioned tables the internal and external validity of the experiment was addressed. The limitations of tools, research design, sampling and confounding variables were tried to tackle to increase the internal and external validity.

#### 4. Conclusion

This paper has explored the critical roles of internal and external validity in educational experiments. We have seen that achieving a high level of internal validity allows for confident claims about cause-and-effect relationships within the study. However, strong external validity ensures the findings are relevant and applicable to real-world educational settings beyond the specific experiment.

In conclusion, a well-designed educational experiment acknowledges both internal and external validity throughout the research process. By carefully considering potential threats and implementing appropriate safeguards, researchers can produce findings that are not only trustworthy but also have the potential to positively impact educational practices in a broader context.

**Bibliography**

- Christensen, Larry B., Johnson, R. Burke & Turner, Lisa A. (2014). Research methods design and analysis. Dorling Kindersley (India) Pvt. Ltd. New Delhi.*
- Cohen, Louis., Manion, Lawrence & Morrison, Keith.(2013). Research methods in education. Routledge-2 Park Square, Milton Park, Abindon, Oxon.*
- Creswell, John W. (2009).Research design. SAGE Publication Inc. California.*
- Koul Lokesh. (2011). Methodology of educational research in education. Vikas Publishing House Pvt.Ltd. New Delhi.*
- Pandya, Shefali. (2010). Educational research. A.P.H. Publishing Cooperation, New Delhi.*
- Mangal, S.K. & Mangal Shubhra.(2013). Research methodology in behavioral sciences. PHI Learning Private Limited, New Delhi.*