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Semester: Autumn 2026

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ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

Course: Educational Research (837) • Level: MA/MEd Programme

Semester: Autumn 2026

Assignment No. 1 (Units 1–4)

Total Marks: 100 • Pass Marks: 40

SOLVED ASSIGNMENT GUIDE

(For Study & Reference)

Note: This guide is prepared for study and reference purposes. Students are advised to read the relevant units of the course book, understand the concepts, and write their assignments in their own words.

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Question 1: Significance of Different Sources of Knowledge (20 Marks)

Q. No. 1: Explain the significance of different sources of knowledge by giving examples. (20)

Introduction

Knowledge is the foundation of all human progress, and education is essentially the process of acquiring, organising and transmitting knowledge. Before a teacher or a researcher can decide what to teach and how to enquire, he must understand where knowledge comes from and how far each source can be trusted. Philosophers and educationists have identified several sources of knowledge: authority, tradition and custom, personal experience, intuition, revelation, reasoning (rationalism) and sense experience (empiricism), crowned finally by the scientific method, which combines the strengths of reasoning and observation. No single source is complete in itself. Each source has opened a door to truth for mankind, each has educated individuals and societies in a particular way, and each has serious limitations when used alone. This answer explains the meaning and significance of each major source, supported by examples from everyday life and from education, and shows why the modern researcher treats

the scientific method as the most dependable source while still respecting the contribution of the others.

1. Authority as a Source of Knowledge

Authority means accepting something as true because a recognised person, book or institution declares it to be true. A child accepts the words of parents and teachers; a student accepts the statements of the textbook; a citizen accepts the findings of experts and the laws of the state. Authority is significant, first, because it saves time and effort: no individual can personally verify everything, so civilisation advances by standing on the knowledge of others. A medical student, for example, accepts the anatomy described by expert physicians instead of dissecting and discovering everything afresh. Secondly, authority preserves continuity, because the tested wisdom of earlier generations is handed over to new learners in an organised form, as in school curricula and reference books. Thirdly, in professional matters authority protects society from guesswork: we trust the engineer about a bridge and the doctor about a medicine.

Yet authority has limits. Authorities have sometimes resisted new truth, as when the scholars of the age opposed Galileo, and an authority in one field may be ignorant in another. Therefore educational research teaches us to accept authority critically, checking it against evidence wherever possible. Example: a teacher accepts the timetable and syllabus from the head of the institution (authority), but verifies a disputed fact about students' learning through his own classroom observation before changing his method.

2. Tradition and Custom as a Source of Knowledge

Tradition consists of beliefs, values and practices transmitted from generation to generation and accepted because "it has always been so." Customs regarding food, dress, ceremonies,

moral conduct and social relations come to us through this source. Its significance is that it gives a society stability, identity and moral continuity; a child learns honesty, hospitality and respect for elders first through family and social tradition, long before he can reason about them. In Pakistan, for example, respect for teachers, care for parents in old age and generosity towards guests are sustained largely by tradition. Schools themselves preserve useful traditions such as morning assembly, punctuality and examinations. However, tradition can also preserve error and superstition and can block reform: harmful customs survive simply because they are old. The significance of tradition, therefore, is real but conditional — education must refine tradition through reason and evidence, keeping what is valuable and discarding what is harmful.

3. Personal Experience as a Source of Knowledge

Experience is knowledge gained through direct contact with the world: we learn by doing, by trial and error, and by observing the results of our own actions. John Dewey regarded genuine experience as the very centre of education. Its significance is that experiential knowledge is vivid, lasting and personally verified. A student-teacher may read many books on classroom management, but one week of real teaching practice teaches lessons no book can give: when to explain again, how to hold attention and how to handle a restless class. Similarly, a child learns that fire burns not from a lecture but from experience, and a farmer learns the behaviour of his soil through seasons of work. Experience is also the raw material of research, because every enquiry begins with a problem felt in experience. Its limitation is that personal experience is narrow and may mislead: one person's experience is limited to his own small world, and hasty

generalisation from a few cases produces prejudice. Hence experience must be widened, shared and tested scientifically before it becomes reliable knowledge.

4. Intuition as a Source of Knowledge

Intuition is immediate insight: knowing something suddenly, as a whole, without conscious reasoning or observation. A teacher sometimes senses that a silent student is troubled before the student says a word; a mathematician "sees" the solution of a problem in a flash after long struggle; an experienced head teacher intuitively judges the real cause of unrest in a school. The significance of intuition is that it often provides the starting point of discovery: many hypotheses of science and many creative ideas in art and education first appear as intuitions or hunches. It also guides quick decisions where time for analysis is not available. But intuition by itself is not proof, because intuitions may contradict each other and may be coloured by wishes and biases. In research, therefore, an intuition is treated as a tentative idea — a possible hypothesis — which must then be verified by observation and reasoning before it is accepted as knowledge.

5. Revelation as a Source of Knowledge

Revelation means knowledge revealed by the Divine to chosen human beings, preserved in sacred scriptures. For believers, revelation is the highest and most certain source, especially about questions that human reason and senses cannot finally answer: the purpose of life, moral absolutes, and life after death. Its significance for education is profound. Revealed knowledge provides the ultimate aims and values of education — truthfulness, justice, compassion and responsibility — within which all other knowledge is used for the betterment of mankind. In a Muslim society, the Qur'an and Sunnah form the guiding source for character building and for

deciding right and wrong, and educational institutions draw their moral framework from it. Revelation does not compete with science in its own field of empirical facts; rather, it directs the use of empirical knowledge towards good ends and answers the questions of meaning that empirical methods cannot reach.

6. Reasoning (Rationalism) as a Source of Knowledge

Reasoning is the use of the intellect to draw conclusions from known facts or principles. It works in two ways. Deductive reasoning moves from the general to the particular: "All students who practise regularly improve; Ali practises regularly; therefore Ali will improve." Inductive reasoning moves from particular observations to a general conclusion: after observing many schools, a researcher concludes that regular feedback improves achievement. The significance of reasoning is enormous: mathematics and logic are built entirely upon it, and every science uses reasoning to organise observations into laws and theories. In education, reasoning enables teachers to plan logically, to diagnose why a method failed and to argue for reforms on rational grounds. A curriculum developer, for example, reasons from the psychology of child development to the proper sequence of topics. The limitation of pure reasoning is that conclusions are only as true as the premises, and reason alone cannot supply new facts about the world — it must be fed by experience and observation.

7. Sense Experience (Empiricism) as a Source of Knowledge

Empiricism holds that all knowledge ultimately comes through the five senses: we know what we see, hear, touch, taste and smell. Its significance is that it grounds knowledge in the real, observable world and makes verification possible — anyone can repeat the observation. Modern science, and with it modern education, is built on this source: laboratory work, field

observation, surveys and tests all depend on systematic sense experience. Example: instead of merely believing that a new reading method is better, an empiricist teacher gives tests, observes lessons and compares scores; the senses, extended by instruments and records, decide the question. Empiricism also corrects the errors of authority and tradition, because claims can be checked. Its limitation is that the senses can deceive (illusions), and many realities important for education — attitudes, values, intelligence — cannot be observed directly but only inferred from behaviour. Hence empiricism needs reasoning to interpret what the senses report.

8. The Scientific Method: The Most Reliable Source

The scientific method is not a separate rival source but a disciplined combination of experience, observation and reasoning. It proceeds by sensing a problem, defining it, forming a hypothesis, collecting data, analysing the data and drawing and verifying conclusions. Its significance is that it is self-correcting and public: its procedures can be repeated by others, so errors are exposed and knowledge steadily improves. Educational research is nothing but the application of this source to educational problems — for instance, scientifically testing whether activity-based learning raises science achievement in class VIII instead of relying on opinion. For the modern teacher and researcher, the professional attitude is scientific: respect authority, tradition, experience, intuition and revelation in their proper spheres, but for questions of fact submit every claim to evidence and reason.

Table 1: Main sources of knowledge — significance and examples

Source	Basis of acceptance	Example in education	Main limitation
Authority	Statement of experts,	Accepting the prescribed syllabus and	May preserve error;

	books, institutions	textbook	needs verification
Tradition / custom	Practices handed down by generations	Respect for teachers; school customs and values	May block reform and shelter superstition
Personal experience	Direct doing and trial and error	Lessons learnt during teaching practice	Narrow; may lead to hasty generalisation
Intuition	Immediate insight without reasoning	Teacher sensing a student's difficulty at once	Not a proof; may be biased
Revelation	Divine guidance in sacred scriptures	Moral aims and values of education	Deals with ultimate questions beyond empirical tests
Reasoning	Deduction and induction by the intellect	Planning lessons; deriving general principles	Conclusions depend on truth of premises
Empiricism	Observation through the senses	Testing, observing and measuring learning	Senses may deceive; inner states inferred only
Scientific method	Systematic observation + reasoning + verification	Research on methods, achievement and attitudes	Slow and demanding; needs trained researchers

Conclusion

To conclude, each source of knowledge has a genuine and distinct significance. Authority and tradition transmit the accumulated heritage of mankind; experience makes knowledge personal and practical; intuition sparks new ideas; revelation supplies ultimate aims and moral direction; reasoning organises and extends knowledge; empiricism ties it to observable reality; and the scientific method disciplines all of these into the most reliable knowledge available about matters of fact. A wise teacher and a competent educational researcher do not worship one source and reject the rest; they know the strength and the limit of each, use each in its proper

place, and finally test factual claims by the scientific method. That balanced attitude is the true beginning of educational research.

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Question 2: Educational Research and Its Need for Improving Educational Practices (20 Marks)

Q. No. 2: Define educational research. Discuss the need for educational research to improve our educational practices. (20)

Introduction

Every educational system faces problems: students fail or drop out, methods become outdated, curricula fall behind social change, and resources are wasted. Decisions about such matters can be taken by guesswork, habit and opinion, or they can be taken on evidence. Educational research exists to replace guesswork with evidence. It is the systematic, scientific study of educational problems and processes, carried out to discover dependable knowledge that can improve teaching, learning, curriculum, evaluation and administration. This answer first defines educational research and describes its essential characteristics, and then discusses in detail why educational research is needed to improve our educational practices, with particular reference to the conditions of a developing system such as Pakistan's, where large numbers, limited resources and rapid social change make evidence-based decisions especially necessary.

Definitions of Educational Research

John W. Best defines research in education as the systematic and objective analysis and recording of controlled observations that may lead to the development of generalisations, principles or theories, resulting in prediction and possibly ultimate control of events. In simpler words, educational research is a careful, organised and honest enquiry into an educational problem, in which facts are collected and interpreted to reach conclusions that can be trusted and used. Travers describes educational research as an activity directed towards the

development of an organised body of scientific knowledge about the events with which educators are concerned. Mouly similarly emphasises that it is the systematic application of the scientific method to the study of educational problems. From these definitions five characteristics stand out: (1) it is systematic, following planned steps from problem to conclusion; (2) it is objective, based on evidence rather than wishes; (3) it is empirical, resting on data collected from real situations; (4) it is logical, reasoning carefully from data to conclusions; and (5) it is useful, aiming at better understanding, prediction and improvement of educational practice, not at knowledge for its own sake alone.

Need for Educational Research: Improving Teaching and Learning

The most direct need for educational research is to discover which methods of teaching actually work. Teachers daily choose between lecture, discussion, activity-based learning, audio-visual aids and digital tools, often on the basis of habit. Research compares these methods under controlled conditions and tells us, for example, which approach produces better achievement in science, better retention in language learning or better attitudes towards school. Without such findings, the same ineffective practices continue for decades. Research is equally needed to understand the learner: his abilities, interests, individual differences, motivation and problems. Knowledge from research on child development and learning psychology helps the teacher adjust instruction to slow, average and gifted learners, to identify causes of failure and to provide guidance. In short, research improves the two central acts of education — teaching and learning — by showing what happens, why it happens and what change will make it happen better.

Need for Curriculum Development and Evaluation

A curriculum is a plan of what to teach, and it must change as society, knowledge and the needs of learners change. Research is needed to decide what content is worth teaching, in what sequence, at what age and with what balance between subjects. Needs assessments, surveys of employers and communities, and studies of students' difficulties all feed into rational curriculum development. Research is also needed to evaluate the curriculum after it is introduced: did the new mathematics course raise achievement, did the new textbook suit the students' reading level, did the scheme of studies overload the child? Evaluation research prevents both blind change and blind conservatism. Similarly, in the field of examination and evaluation, research produces better tests, fairer marking, useful feedback and valid certification, replacing the memory-testing, once-a-year examination pattern that distorts teaching in our schools.

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Need for Solving Practical Problems of Schools and Administration

Schools face concrete problems every day: absenteeism, dropout, indiscipline, shortage of teachers, overcrowded classes, poor buildings and weak supervision. Educational research is needed because each problem has causes that must be found before it can be cured. A study of dropout, for example, may reveal that distance, child labour, parental attitudes and irrelevant curriculum each contribute in different proportions in different districts, so the remedy must differ accordingly. Administrators likewise need research for planning: how many schools and teachers will a district need in five years, where should a new school be built, how should the budget be divided, which training programme actually improves teachers' performance? Research-based planning replaces political pressure and guesswork with projected enrolments

and measured needs, which is vital where resources are scarce and every rupee wasted is a classroom not built.

Need for Teacher Professionalism and Policy Making

Teaching becomes a profession, rather than a mere job, when its practice rests on a body of researched knowledge and when practitioners themselves enquire into their own work. Research is needed to train teachers who can read studies critically, test new ideas in their classrooms through action research and keep growing throughout their careers. At the national level, policy makers need research before launching reforms: universal primary education, single national curriculum, mother tongue instruction, teacher education reform and the introduction of technology all succeed or fail according to whether they are based on evidence about local conditions. International experience shows that reforms imported without local research often fail, while modest reforms grounded in classroom studies succeed. Research also creates accountability: it shows the public and the government what results the system is producing — literacy rates, learning outcomes, equity between regions and sexes — and where urgent action is required. Finally, research is needed simply to extend knowledge: to build educational theories suited to our own culture and conditions instead of permanently borrowing theories developed for other societies.

- Improves teaching methods by comparing their real effects on achievement and attitudes.
- Helps understand learners — abilities, motivation, individual differences and problems.
- Guides curriculum development, textbook selection and reform of examinations.
- Finds the causes and remedies of dropout, absenteeism, indiscipline and wastage.
- Supports educational planning, budgeting and administration with reliable data.

- Raises the professional status and continuous growth of teachers.
- Provides evidence for sound policy making and for evaluating reforms.
- Builds indigenous educational theory suited to our own society and culture.

Conclusion

To conclude, educational research is the systematic and scientific study of educational problems aimed at dependable knowledge and better practice. It is needed at every level of the system: in the classroom, where it improves teaching and learning; in curriculum and evaluation, where it keeps content and assessment relevant and fair; in administration and planning, where it directs scarce resources wisely; and in policy, where it protects reforms from guesswork and fashion. A system that does not research its own practices repeats its mistakes blindly, while a system that enquires, tests and learns from evidence improves steadily. For a country striving to raise the quality and reach of education with limited means, educational research is not a luxury of universities — it is a practical necessity for every teacher, head, administrator and policy maker.

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Question 3: Applied Research, Action Research and the Action Research Cycle (20 Marks)

Q. No. 3: What is applied research? How is it different from action research? Describe the steps / cycle of action research. (20)

Introduction

Research is commonly classified by its purpose into basic (fundamental) research, applied research and action research. Basic research seeks new knowledge and theory for its own sake; applied research and action research both turn towards practice, but they differ in scale, purpose and generalisation. This answer first explains applied research with examples, then distinguishes it carefully from action research in a comparative discussion and a table, and finally describes the steps of action research, which form a continuing cycle or spiral of planning, acting, observing and reflecting, illustrated by a diagram and a classroom example. Understanding this classification matters for the teacher, because the kind of research he chooses must match the kind of problem he faces: a national problem of method needs applied research, while his own classroom problem needs action research.

What is Applied Research?

Applied research is research carried out to find a practical solution to a present-day problem, or to apply existing theories and principles to real-life situations. Its aim is not to build new theory but to use knowledge for improvement: it takes the findings of basic research and tests and adapts them in the field. John W. Best describes applied research as research directed towards the solution of immediate practical problems, in which the findings are evaluated in terms of local applicability rather than universal validity. For example, psychologists established general

principles of learning through basic research; an applied study then tests whether programmed learning material based on those principles raises achievement in class IX biology in government schools. Other examples include developing and trying out a new curriculum package, testing the effectiveness of in-service training on teachers' classroom performance, evaluating a school feeding programme, or finding which remedial programme best improves reading in primary schools. Applied research uses the same scientific steps as basic research — problem, hypothesis, data, analysis and conclusions — but its success is judged by whether the solution works in practice and whether it can guide similar situations elsewhere.

What is Action Research?

Action research is a form of enquiry carried out by practitioners themselves — teachers, heads and administrators — into their own immediate practical problems, with the sole aim of improving their own practice on the spot. The term was introduced by Kurt Lewin, and Stephen Corey promoted it for education, defining it as the process by which practitioners study their own problems scientifically in order to guide, correct and evaluate their decisions and actions. A teacher who finds that her class VII students make persistent spelling errors, plans a new drill programme, tries it out, observes the results and modifies her teaching accordingly is doing action research. Its problem is local and immediate, its researcher is the practitioner, its sample is his own class or school, and its result is a better decision for that situation, not a universal law. Action research thus democratises research: it turns the teacher from a consumer of other people's findings into a producer of knowledge about his own classroom.

How Applied Research Differs from Action Research

Applied and action research resemble each other because both are problem-centred and practical, and action research is sometimes described as a small, local form of applied research. Nevertheless, they differ in important ways. In purpose, applied research seeks a solution that can be applied beyond the immediate setting, whereas action research seeks improvement of the very situation in which the research is done. In scope, applied research covers a wider population and uses a representative sample, while action research is confined to one class, school or office. In personnel, applied research is usually conducted by trained research workers and specialists, while action research is conducted by the practitioner himself without special research training. In generalisation, applied research aims at conclusions valid for the larger population from which the sample was drawn; action research claims validity only for the local situation, and its findings are not meant to be generalised. In rigour and design, applied research follows strict controls, standardised tools and statistical analysis; action research uses simpler designs, teacher-made tests, observation and checklists, and it values immediate usefulness over technical perfection. Finally, in time and result, applied research is comparatively lengthy and ends in a report and recommendations for others, while action research is quick, cyclical and ends in a changed practice which itself becomes the starting point of the next cycle.

Table 1: Applied research compared with action research

Basis	Applied research	Action research
Purpose	To solve a practical problem with wider applicability	To improve one's own immediate practice
Scope / population	Wide: many schools, districts or a whole programme	Narrow: one class, one school, one office

Researcher	Trained researcher or specialist team	Practitioner himself (teacher, head, administrator)
Sample	Representative sample of the population	Own group; no sampling as such
Generalisation	Findings generalised to the population	Findings valid for the local situation only
Design and tools	Rigorous design, standardised tools, statistics	Simple design, teacher-made tests, observation, checklists
Time and product	Longer; ends in report and recommendations	Short and cyclical; ends in improved action
Example	Testing a new science curriculum in 40 schools of a province	A teacher improving spelling in her own class VII

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Steps / Cycle of Action Research

Action research does not proceed in a straight line that ends once and for all; it proceeds in a cycle or spiral. One cycle improves the situation, reflection on it reveals a further problem or a refinement, and the next cycle begins. The widely used model (Lewin; Kemmis and McTaggart) has four moments in each cycle: planning, acting, observing and reflecting, preceded by identifying and analysing the problem. The steps are as follows.

- Step 1 — Identifying and analysing the problem: The practitioner notices a difficulty in his own situation and defines it precisely, e.g. “Most students of my class VIII score below 40% in English spelling tests.” He analyses possible causes through observation, records and discussion.
- Step 2 — Forming a tentative hypothesis / action plan: He proposes a workable remedy as an action hypothesis, e.g. “If ten minutes of daily dictation and word-game practice are

given for six weeks, spelling scores will improve." Objectives, activities, materials and the success criterion are specified.

- Step 3 — Planning (Plan): A detailed plan is prepared — what will be done, by whom, in what sequence, for how long, and what evidence (tests, observation checklist, students' work) will be collected to judge the effect.
- Step 4 — Acting (Act): The plan is put into action in the real situation. The teacher carries out the new programme faithfully, keeping the conditions as planned so that the effect can be judged.
- Step 5 — Observing (Observe): Evidence is systematically collected during and after the action — pre- and post-test scores, observations of participation, samples of students' work and the teacher's own diary notes.
- Step 6 — Reflecting (Reflect): The evidence is analysed and compared with the criterion. Did spelling improve, for whom, and why? The practitioner evaluates his own action honestly, shares the reflection with colleagues, and draws lessons.
- Step 7 — Re-planning and the next cycle: On the basis of reflection, the plan is revised — weak points are corrected, successful elements are retained — and a second cycle of plan–act–observe–reflect begins. The spiral continues until the problem is satisfactorily solved and practice has genuinely improved.

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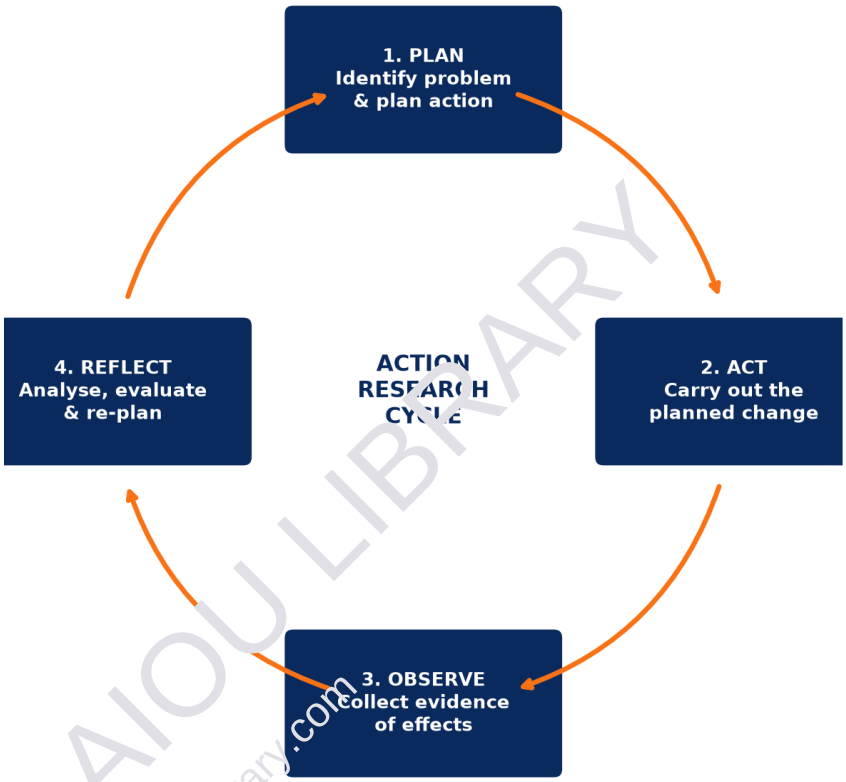

Figure 1: The action research cycle — plan, act, observe, reflect, and then re-plan in a continuing spiral.

Classroom illustration: A mathematics teacher finds that class VI students fear fractions. Cycle 1: she plans lessons using paper folding and sharing of real objects (plan), teaches for three weeks (act), gives a short test and notes students' confidence (observe), and finds that achievement improved but word problems are still weak (reflect). Cycle 2: she re-plans with more practice on word problems, acts, observes and reflects again. Each cycle leaves her teaching better than before, which is precisely the purpose of action research.

Conclusion

To conclude, applied research applies existing knowledge to solve practical problems of wider scope, with representative samples and generalisable findings, usually through trained

researchers. Action research is its smaller, practitioner-led relative: local in scope, immediate in purpose, modest in design and cyclical in procedure, aiming not at generalisations but at the improvement of the researcher's own practice. Its cycle — identify the problem, plan, act, observe, reflect and re-plan — makes improvement a continuous habit rather than a one-time event. For teachers who cannot wait for large studies to solve their daily problems, action research is the most direct and empowering form of educational research.

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Question 4: Descriptive Research — A Detailed Note (20 Marks)

Q. No. 4: Write a detailed note on descriptive research. (20)

Introduction

Descriptive research is the most widely used type of educational research, because before we can explain, predict or improve any educational phenomenon we must first know accurately what it is like at present. Descriptive research describes and interprets "what is": it records, analyses and reports the existing conditions, practices, attitudes, trends and relationships in a situation, without manipulating any variable. A survey of teachers' qualifications in a district, a study of parents' attitudes towards girls' education, or an account of how enrolment has grown over twenty years are all descriptive studies. This note explains the meaning and definitions of descriptive research, its characteristics and purposes, its main types, the steps followed in conducting it, the tools it uses, and its advantages and limitations, with examples from education.

Meaning and Definitions

John W. Best defines descriptive research as research that describes and interprets what is; it is concerned with conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident, or trends that are developing. In other words, the descriptive researcher goes into the field as things are, collects systematic information about them and presents an accurate, organised picture. He does not introduce a treatment, does not control variables and does not, by design alone, prove cause and effect; his task is faithful description based on evidence, from which explanation and action may follow. Descriptive research is sometimes called survey research, normative survey or status study, because it often

establishes what is normal or typical in a population. In education it answers questions such as: What is the present achievement level of class X students? What facilities do rural schools possess? What do teachers think of the new curriculum? How do successful heads spend their time? Such questions form the factual basis of planning and reform.

Characteristics and Purposes of Descriptive Research

- It studies phenomena in their natural setting, exactly as they exist, without manipulation or control by the researcher.
- It is concerned with the present status of things, although records of the past and trends pointing to the future may also be described.
- It collects data from relatively large samples or whole populations, using questionnaires, interviews, tests, observation and records, so that a general picture emerges.
- It goes beyond mere collection of facts: the data are organised, analysed (often with percentages, averages and correlations) and interpreted to reveal meaning, patterns and relationships.
- Its purposes include: describing existing conditions and needs; comparing conditions with accepted standards or norms; discovering relationships among variables as a basis for later experimental work; identifying problems for reform; and providing factual data for planning, policy and evaluation.

A good descriptive study, therefore, is not a careless collection of opinions. It demands a clearly defined problem and population, a representative sample, valid and reliable tools, careful fieldwork and honest interpretation which does not claim more than the data allow. When

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these conditions are met, descriptive research produces the dependable "map" of the educational situation on which all wise decisions depend.

Main Types of Descriptive Research

Descriptive research takes several forms according to its purpose. (1) Survey studies describe the present status of a relatively large population: school surveys, job analyses, public-opinion and attitude surveys belong here — for example, a province-wide survey of physical facilities in primary schools. (2) Interrelationship studies examine connections among variables as they naturally occur. They include case studies, which describe one unit (a child, a school) intensively and in depth; causal-comparative (ex post facto) studies, which compare groups that already differ in some condition to explore possible causes of an existing effect, such as comparing the achievement of students from single-teacher and multi-teacher schools; and correlational studies, which measure the degree of relationship between two variables, such as intelligence and achievement, expressed by a coefficient of correlation. (3) Developmental studies describe change and growth over time, either by following the same individuals for years (longitudinal method) or by comparing different age groups at one time (cross-sectional method), as in studies of children's language development. Each type answers a different descriptive question, and together they cover the status, relationships and growth of educational phenomena.

Table 1: Main types of descriptive research with examples

Type	What it describes	Example
School / status survey	Present conditions of a large population	Survey of facilities and teacher qualifications in all primary schools of a district
Attitude / opinion survey	Beliefs and opinions held by a group	Parents' attitudes towards co-education or girls' schooling

Case study	One unit in intensive depth	A detailed study of a persistently failing student or of one model school
Causal-comparative	Possible causes of an existing difference	Comparing achievement of day scholars and hostel students
Correlational study	Degree of relationship between variables	Relationship between study habits and examination achievement
Developmental study	Growth and change over time	Growth of enrolment, or of reading ability, from class I to class X

Steps in Conducting Descriptive Research

- Defining the problem and objectives: state precisely what is to be described, in which population and for what purpose.
- Reviewing related literature and records to refine the problem and to learn what is already known.
- Deciding the design: type of descriptive study, population, sample and sampling technique so that the sample truly represents the population.
- Selecting or constructing tools — questionnaire, interview schedule, observation checklist, test or rating scale — and establishing their validity and reliability through pilot work.
- Collecting the data systematically from the sample, with proper permission, instructions and follow-up to secure an adequate response.
- Organising and analysing the data with suitable statistics (frequencies, percentages, means, correlation) and presenting them in tables and graphs.

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- Interpreting the findings, drawing conclusions strictly from the evidence, and making recommendations for practice and for further research.

Advantages and Limitations

The advantages of descriptive research are considerable. It studies real problems in real settings, covers large populations economically, and provides the factual base without which planning is blind. It is often the necessary first step: relationships discovered descriptively become hypotheses for experimental research, and problems revealed descriptively become the targets of action research. It also uses many tools and both quantitative and qualitative data, so it can describe attitudes and processes as well as numbers. Its limitations must be honestly recognised. Because variables are not controlled, descriptive research can show that two things are related but cannot by itself prove that one causes the other; correlation between homework and achievement, for instance, does not prove that homework alone produced the achievement. Findings depend heavily on the honesty of respondents and the quality of tools; a biased sample or a careless questionnaire yields a false picture presented with false confidence. Description also ages quickly as conditions change. The wise researcher therefore treats descriptive findings as an accurate account of what is, and as a starting point for deeper explanation, not as final proof of causes.

Conclusion

To conclude, descriptive research is the systematic description and interpretation of existing educational conditions, relationships and trends, conducted without manipulating variables, through surveys, interrelationship studies and developmental studies, using carefully chosen samples and tools. It tells the educator where he stands: what facilities exist, what learners

achieve, what teachers and parents think, and how things are changing. No reform, experiment or policy can be sound without this knowledge. Its inability to prove causation is not a defect to hide but a boundary to respect. Properly conducted and honestly interpreted, descriptive research is the indispensable foundation of educational enquiry and the most frequently used research approach in education.

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Question 5: Experimental Research and the Process of Conducting It (20 Marks)

Q. No. 5: Define experimental research. Explain the process of conducting experimental research. (20)

Introduction

Among all types of research, experimental research occupies a special place because it alone can answer the question "what causes what?" Descriptive research tells us what is; experimental research goes further and tests, under controlled conditions, whether a particular change produces a particular effect — whether, for example, a new method of teaching actually causes better learning. It is the most rigorous and the most demanding approach, and its findings carry the greatest confidence for decisions about methods, materials and treatments. This answer defines experimental research, explains its essential characteristics and key concepts, and then describes, step by step, the complete process of conducting an educational experiment, supported by a flowchart and a worked example, concluding with the main threats to validity that the experimenter must control.

Definition and Essential Characteristics

Experimental research is a systematic and controlled investigation in which the researcher manipulates one or more variables, controls the other relevant variables, and observes the effect of the manipulation on an outcome. In the words of John W. Best, experimental research describes what will be when certain variables are carefully controlled or manipulated; it is the only type of research that can truly test hypotheses of cause-and-effect relationships. Four characteristics define a true experiment. First, manipulation: the researcher deliberately

introduces a treatment, called the independent variable (for example, activity-based teaching). Secondly, measurement of effect: the outcome, called the dependent variable (for example, achievement scores), is carefully measured after the treatment. Thirdly, control: all other factors that could affect the outcome — previous knowledge, teacher quality, time, materials — are held constant or neutralised, usually by using a control group that receives the ordinary treatment. Fourthly, randomisation: subjects are assigned to experimental and control groups by chance, so the groups are equivalent at the start and any later difference can be attributed to the treatment rather than to pre-existing differences. Variables that might disturb the result although they are not the focus of study are called extraneous variables, and a good design is essentially a plan for controlling them.

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Common Experimental Designs

Experiments are described by their designs. In the pre-test–post-test control group design, both groups are tested before and after; the experimental group receives the new treatment and the control group the usual one; if the experimental group gains significantly more, the treatment is judged effective. The post-test-only control group design omits the pre-test where groups are randomly formed and therefore equivalent. The Solomon four-group design combines both to check the effect of pre-testing itself. Where random assignment of individuals is impossible — as with intact school classes — the researcher uses quasi-experimental designs such as the non-equivalent control group design, matching groups as carefully as possible. Weaker pre-experimental designs (one-group pre-test–post-test, one-shot case study) lack proper control and their results must be interpreted cautiously. The choice of design is a balance between rigour and the practical realities of schools.

Table 1: Notation of the pre-test–post-test control group design (R = random assignment)

Group	Pre-test	Treatment	Post-test
Experimental group (R)	O1 (achievement test)	X — new activity-based method	O2 (achievement test)
Control group (R)	O3 (same achievement test)	Usual lecture method	O4 (same achievement test)

Comparison of (O2 − O1) with (O4 − O3), tested for statistical significance, shows whether the new method caused a greater improvement than the usual method.

The Process of Conducting Experimental Research

Conducting an experiment is an orderly process in which each step prepares the next. The steps are as follows.

- Step 1 — Selecting and defining the problem: The researcher identifies a precise cause-and-effect question from classroom experience or literature, e.g. “Does activity-based learning improve science achievement of class VIII students as compared with the lecture method?” The problem is delimited to a definite population, subject and period.
- Step 2 — Reviewing literature and formulating hypotheses: Related studies are reviewed to learn what is already known and which variables matter. A clear, testable hypothesis is then stated, e.g. “Students taught science through activity-based learning will score significantly higher on the achievement test than students taught through the lecture method,” together with its null form for statistical testing.
- Step 3 — Planning the experiment (design): The researcher defines the independent, dependent and extraneous variables; selects the design (for example, pre-test–post-test

control group); decides the sample and its random assignment; and plans how extraneous variables — teacher, time-table, duration, syllabus coverage — will be controlled.

- Step 4 — Preparing tools and materials: The treatment materials (lesson plans, activities, worksheets) are fully prepared, and valid and reliable measuring instruments — usually an achievement test — are constructed or selected, their validity and reliability established, and the whole procedure pilot-tested on a small group to remove defects.
- Step 5 — Conducting the experiment: The pre-test is given to both groups; the treatment is administered to the experimental group for the planned period while the control group receives the usual instruction; conditions are monitored so that the plan is followed faithfully and no outside event disturbs one group only.
- Step 6 — Collecting and analysing the data: The post-test is administered under the same conditions; scores are tabulated and compared using appropriate statistics (means, standard deviations, t-test or analysis of covariance) to determine whether the difference between groups is statistically significant or could have arisen by chance.
- Step 7 — Interpreting results and drawing conclusions: The hypothesis is accepted or rejected in the light of the analysis. The researcher interprets the size and meaning of the effect, relates it to previous studies, states the limits of generalisation and suggests practical implications for teachers and administrators.
- Step 8 — Reporting the experiment: A complete report is written — problem, literature, design, tools, procedure, data, analysis and conclusions — so that other researchers can judge the study and, if they wish, replicate it to verify the findings.

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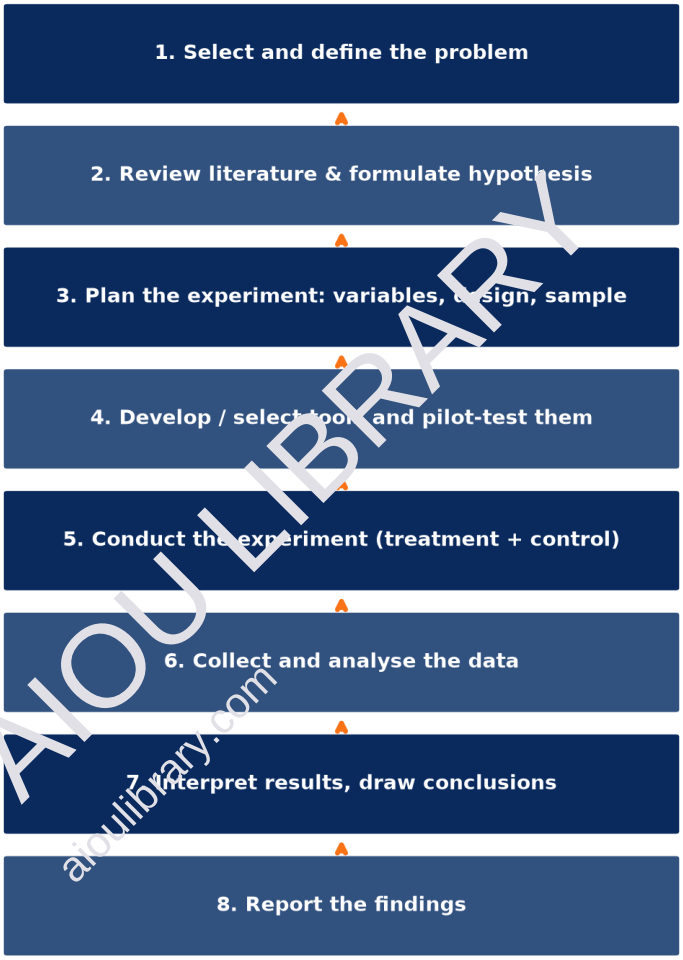

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Figure 1: The process of conducting experimental research, from problem selection to reporting.

Threats to Validity and Their Control

The strength of an experiment is its validity. Internal validity asks whether the treatment, and not something else, produced the effect. Its common threats include: history (an outside event during the experiment), maturation (students simply growing older and abler), the effect of pre-testing, differences in how groups were selected, and loss of subjects. A control group, randomisation and careful monitoring neutralise most of these threats, because whatever affects the experimental group equally affects the control group. External validity asks to whom

and to what situations the result can be generalised; an experiment on one small, unusual sample may not apply elsewhere, so the population and conditions must be described honestly and replications encouraged. The researcher must also observe research ethics: no group should be permanently denied a beneficial treatment, participation in sensitive studies requires consent, and results must be reported truthfully whether or not they favour the hypothesis.

Conclusion

To conclude, experimental research is the controlled manipulation of an independent variable, with randomisation and a control group, to observe its causal effect on a dependent variable. The process of conducting it moves through problem selection, literature review and hypothesis, design and planning, preparation and piloting of tools, faithful administration of the treatment, statistical analysis, interpretation and full reporting. Because it controls rival explanations, it yields the most trustworthy evidence about cause and effect available to education, and it is therefore the final testing ground for new methods, materials and policies. Its demands in time, skill and control are heavy, and in schools it often must be used in quasi-experimental form, but no other approach can replace it when the question is truly “does this work?”

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