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Comprehensive Study of Theethics With Respect to Science and Research

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ABSTRACTS
Ethics are a set of moral principles and values a civilized society follows. Doing science with principles of ethics is the bedrock of scientific activity. The society trusts that the results and the projected outcome of any scientific activity is based on an honest and conscientious attempt by the scientific community. The evaluation parameters have evolved a lot and are based on impact factors, h-index and citations. The scientific research and academics has been disfigured by the temptation to falsify and fabricate data, plagiarism and other unethical practices. Misconduct in Indian academics and science is also under a lot of focus. The whole thing research and academic institution must have the Office of Ethics for information, guidelines, training and professional oversight of conduct of research with the ethos and ethics of research.

Keywords: Ethics, Science, Misconduct, Responsible Conduct of Research,Morals, Laws.

I. INTRODUCTION

The word ethics in English refers to several things.[1] It can refer to philosophical ethics or moral philosophy a project that attemptsto use reason to answer various kinds of ethical questions. Ethics are a set of moral principles and values a civilizedsociety follows. Such does and don'ts make the human interactions and overall social life pleasant, smooth and livable. The kindergarten for learning ethics is parents, teachers,mentors and religious institutions.[2]Albert Camus (French philosopher and Nobel Laureate) rightly said: 'A man without ethics is a wild beast loosed upon this world''. Scientific pursuit is built on trust [3]. Scientists trust that the results reported by their predecessors and peers are based on sound protocols and the conclusions drawn are valid in the light of current knowledge.[4]Access any information including the publications of competitors with just a ''click''. The evaluation parameters have evolved a lot and are based on impact factors, h index and citations [5, 6]. Overall, it looks like a rat-race and there is a sense of publish or perish [7, 8]. There is a cut throat competition for publishing in journals with maximum visibility and winning grants.[9,10] There is a general feeling that the scientific community is under a lot of pressure for fulfilling the norms and criteria for upward growth and even retention of the positions held.[11, 12]The larger issue of ethics in science goes much beyond falsification, fabrication of data and plagiarism and has relevance for each stage of scientific activity . The steps in doing science are:

- Conceiving an idea.
- Planning an experiment.
- Bench Work (usually more than one worker).
- Discussion and intellectual inputs (extent of contribution).
- Submission of work to conferences.
- Credit in written or oral form.
- Submission of research paper or patent.

The publication of ''Office of Research Integrity (ORI) of the Department of Health and Human Services of the USA'' and ''Committee on Publication Ethics (COPE)'' give full description of the does and don'ts on the issues listed above for any research and academic institution.[13] The bench work should be with established and internationally acceptable protocols and safety standards, and data records should be meticulous. In publications, conferences, seminars and interaction with media the claims should be confined to hard data, no soap bubbles for early publicity. Publications of research data is the most solemn part of a research activity. Authorship should go to only those who contributed by way of bench work and/or intellectually. Giving authorship for patronizing or considerations other than science (gift or honorary authorship) is unethical.[14, 15] Similarly, expecting authorship by virtue of being a senior scientist/head without contribution in any form, most importantly intellectual is highly unethical. The accepted norm for the order of authorship is the bench worker who performs the experiments and makes maximum contribution has the claim as first author. Mentors and principal investigators have a claim for the first authorship in reviews or book chapters where the work done by

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the group is reported. Mentoring is an integral part of scientific activity for rising the next generation of scientists, teachers, and innovators [16, 17]. The ethics encompass the whole hog of day to day interactions of senior faculty, juniors, scholars, students and the support staff in research and academics.

Broadly speaking, the breach of ethics involves:

- Plagiarism.
- Falsification of data.
- Drawing far-fetched conclusions without hard data, forearly publicity.
- Gift authorship (receiving as well as giving).
- Not giving sufficient attention and consideration to scholars and post-docs as per the norms.
- Self-promotion at the cost of team-members.
- Treating colleagues (overall all juniors) in a feudal way.
- Machiavellianism (Cunningness and duplicity in general conduct and push to positions of power and pelf).

Scientific activity being the bedrock of human development, there has been an intense effort and debate globally to do and publish scientific research with ethics and established norms so that data reported are sound and suitable for use for translational research and follow up.[18,19] The ‘‘Responsible and ethical Conduct of Research (RCR)’’ is of pivotal importance for excellence in science as well as public trust in outcome of scientific activity and utilization of public funds. National Science Foundation (NSF) of the USA provides ‘‘sources for RCR for implementation of Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act”. NSF requires RCR training for all researchers who conduct research supported by NSF funds.[20]There have been some suggestions to put in place mechanisms to check the menace and have corrective measures. However, it seems that the status quo continues.It is important and urgent that science, engineering, and health departments and institutions in our country have:

- Plagiarism check software like “Turnitin”[21]in allinstitutions engaged in academics and research. Anyacademic and research assignment and manuscript mustbe vetted by such software for acceptability andsubmission.
- Systems like Office of Research Integrity foreducation and training in pursuit of science with ethicsby sound and professional courses in RCR.
- All research and academic institution must have theOffice of Ethics for information, guidelines, trainingand professional oversight of conduct of research withthe ethos and ethics of research.[22]

1.1 Science as a Culture and Philosophy

Every organized society has a set of myths or beliefs that are carried asnarratives and mythological stories (carried by bards- the professionalstory tellers) and these give rise to customs, traditions and rituals. Thesetogether are called ‘Culture’. Science gave another culturewhich was in conflict with the existing cultures all over. Further, in the 19th and 20th centuries, Science and Technology practically dictated thedevelopment plans for different Nations (Mohan Ram and Tandon, 2010)and this tradition continues till date. Increasing share of national budgetearmarked for Science & Technology and related activities attracted a socialauditing of this enterprise called Science (Viswanathan, 2018; Sarukkai,2018; Mukhi, 2018). Society in general and sociologists in particular werein apparent conflict with Science as a Culture and as a Philosophy..[23]

1.2 Morals, Ethics and Laws

As per the Cambridge University Dictionary of English, the word Ethicsimplies a system of accepted beliefs that control behavior, especially asystem that is based on morals. The word Morality implies a set of personal or social standards for good or bad behavior and character or the qualityof being right, honest, or acceptable. All ‘civilized Nations’ guaranteeliberty, equality and individual freedom to their citizens. In our daily life and activities, each of us, occupy ‘personal space’ (otherwise calledprivacy) and ‘public space’ to varying degrees. Our behavior (i.e. conduct)and attitude, as individuals’, is regulated by ‘individual conscience’ or asense of morality. Morality is based on an individual’s mindset and is a basichuman instinct (Hauser, 2007). The Sanskrit word ‘SwabhavikaDharma ‘comes closest to morality.With the passage of time, human societies and political nation solved, and have clearly stated ‘Laws’ (oral/written) regulating expected social conduct in public space. These Laws are covered under a systematic ‘Crime & Punishment’ framework. The government of the land enforcesthese laws to regulate social behavior to establish social order.[24]

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1.3 Evolution of Social Ethics

As stated above, the idea of ethics in behavior is a human social construct.The biological basis of ethics can be traced to many animal groups (ants,wasps, tigers etc.) who exhibit sociality the highest level of organization of animal sociality defined by cooperative brood care (including care ofoffspring from other individuals), overlapping generations within a colonyof adults, and a division of labor into reproductive and non-reproductivegroups. Societal good takes precedence over individual benefit. It is also to be admitted that there are no universally accepted ethicalnorms across different societies and across different situations within onesociety. Statements like 'everything is fair in love and war' or that 'endsdo not justify means' have only added to the confusion in debates aboutethics.While swabhavika dharma should dictate human behavioral norms andjudgments,[25]Science, being an organized activity in search of 'TRUTH',has a mandatory set of norms. First, the science is practiced in structured departments, centers, professional societies etc and only occasionally byan individual in isolation. Second that Science, especially experimentalscience is carried out largely using public and private funds throughprojects.[26]

1.4 Ethical Issues in Indian Science

In 1938, the physicist MN Saha requested Subhas Chandra Bose, the then President of the Congress, to set up a National Planning Committee in Science and Culture with Jawaharlal Nehru as its Chairman (Anderson,2010, Habib, 2014). Over the last five decades, Science has grown enormously in India. Prime Minister Pundit Jawaharlal Nehru saw a link between practice of quality science by its people and solutions to many of India's then existing social, economic and developmental problems. India continues to face these problems even now though to a lesser degree. The Government of India has identified the grand central challenges that India needs to cope with. These align with Sustainable Development Goals of the United Nations and include areas such as safe drinking water, nutrition and food security, eradication of poverty and hunger, ensuring public health and private hygiene, management of Natural resources, unemployment and underemployment among youth, ensuring fundamental rights enshrined in the Constitution including the right to education, resolving sectarian strife and ensuring energy security. Even a superficial analysis would suggest that Science and appropriate Technology are the only vehicles to resolve these issues. Innovation and the use of innovation at the grass root level will be an essential ingredient to in all strategies and solutions to these vexing problems.[27]

1.5 Ethics and Higher Education

It is in this context that the consideration of ethical aspect in education needs to be addressed. Very significantly, in the modern era, advocacy of quality education is going on, worldwide. Quality education is a dynamic concept. It evolves with time and is subject to social, economic and environmental conditions. Article 26 of the Universal Declaration of Human Rights (1948) and the main treaties that guarantee the right to education – have defined the aims of education which impact on the content of education, teaching and learning processes and materials,the learning environment and learning outcomes. In such a domain, thequality is assessed in the sphere of quality of teaching and learning but parallel concerns on ethical issues is being addressed now to enhance the quality of education with proper orientation to ethics and values.As a discipline, unlike morals, 'Ethics', deals with what is correct and what is wrong. For generations, cultures and societies across the world, established a moral code for social conduct for their members'. This code is to be adhered to and practiced at all times. Each cultural environment comprises certain institutions and forces which affect and shape the values, beliefs and behaviors of the society, (Kotleret al., 2010).

1.6 Ethics in Academic Research

The Radha Krishnan Commission (1948-49) highlighted the importance and the need to include spiritual training in the curriculum of educational institutions. The Mudaliar Commission (1952-53) stressed that student's character and the behavior would depend on religious and moral instruction. The Ramamurthy Committee (1990) reviewed that the essential quality of education is that, it must develop a set of values like love, compassion, social order based on truth and non-violence and integrating the science with spirituality. Considering the fact that students spend a significant part of their early and impressionable life with teachers who, contribute significantly into overall 'quality of student's lives'. This can only happen if teachers themselves are aware of their responsibilities in shaping the moral and ethical values of student. When discourse is in terms of ethics or moral aspects, we demarcate it with wrong and right, or desirable vs. unacceptable behavior. Ethics are the principles

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that allow us to uphold the things we value. David (2015) defines 'ethics' is the study which focuses on the disciplines that study standards of conduct, such as philosophy, theology, law, psychology, or sociology. One may also define ethics as a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues. The learner imbibes ethical values from family, friends, fellow graduates, professional organization, mentors or other social settings. Although most people attain their perception of right and wrong during childhood, moral development materializes throughout life and human beings progress through different juncture of growth as they age. People acknowledge some common ethical norms but they infer, apply, and balance them in different ways in light of their own values and life experiences.[28]

1.7 Issues in Research Ethics

Numerous institutions and organizations have a set of their code of ethics for their researchers; ethics itself is not a black and white subject. Perhaps, ethics is something that is inferred. Its understanding varies enormously from person to person. For this reason, there are controversies and disputes within the communities and society at large on certain issues. For researches in humanities and social science, different kinds of ethical issues arise. New and evolving methods of conducting research, such as auto-ethnography and participatory action research raise important but strikingly different ethical issues and obligations for researchers. New trend on researches on social media are coming up especially in the use of big data analytics. Participants here are from popular platforms of social media or forums based on the web. Respondents may post queries or respond in public place without comprehending that their conversation may be used for a critical research purpose without obtaining informed consent from them for the use of personal dialogues.[29] On the contrary from the ethical viewpoint this creates a new challenge for the researchers. Research encompassing vulnerable persons; include children, persons with developmental or cognitive disabilities, persons who areinstitutionalized, the homeless or those without legal status. These alsoraise unique issues in any research context. Walton (2018) observed that in the contemporary era, research ethicists everywhere are dealing with issues that reflect Global concerns such as the conduct of research in developing countries, the ethical limits of research involving genetic material and the protection of privacy in light of advances in technology and internet capabilities.[30]

II. POSTULATES FOR MAINTAINING ETHICAL STANDARDS IN HIGHEREDUCATION

Smith (2003) suggests that one of the best ways researchers can avoid and resolve ethical dilemmas is to know both what their ethical obligations are and what resources are available to them. "Researchers can help themselves make ethical issues salient by reminding themselves of the basic underpinnings of research and professional ethics," as per Bullock and Smith (2003). Based on the forgoing, the following postulates are noteworthy:

2.1 Reliability and Integrity

Research project must be honest and diligent work of the scholar. This applies to the methods employed for the project (what you did), data collection, analysis of results, and whether it has been previously published. One should not make up any data, including extrapolating unreasonably from some of their results, or do anything which could be construed as trying to mislead anyone. It is better to undersell than over-exaggerate your findings. When working with others, one should always keep to any agreements, and act sincerely.

2.2 Objectivity

One should focus to avoid bias in any aspect of their research, including design, data analysis, interpretation, and peer review. For example, researcher should never recommend as a peer reviewer someone he know, or who he has worked with, and he should try to ensure that no groups are inadvertently excluded from your research. This also means that there is a need to disclose any personal or financial interests that may affect the research proposal.

2.3 Genuineness

Researcher should always be prepared to share data and results, along with any new tools that have been developed, when he/she publishes his findings. This helps to further knowledge and advance science. One should also be open to the criticism and new ideas. Work must be reviewed carefully and critically to ensure that the results are credible. It becomes curial to keep full records of your research. If you are asked to act as a peer reviewer, you should take the time to do the job effectively and fully.

2.4 Respects for Intellectual Property

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One should never plagiarize, or copy, other people's work and try to pass it off as their own. Scholars ought to seek permission before using other people's tools or methods, unpublished data or results. Not doing so is plagiarism. Obviously, one needs to respect copyrights and patents, together with other forms of intellectual property, and always acknowledge contributions to the present research. If in doubt, acknowledge, to circumvent any risk of charge of plagiarism. There is need to show respect for anything data/suggestion/idea that has been provided in confidence. Caution should be taken to follow guidelines on protection of sensitive information such as patient records.

2.5 Novelty in Publication

Publication should be done to advance the state of research and knowledge, and not just to advance the career. This means, that one should not publish anything that is not new, or that duplicates someone else's work.

2.6 Protection of Subjects: Human/Animal

If research involves people, researcher should make sure that he/she minimizes any possible physical harm to the subject, and maximizes the benefits both to participants and other people. Thus, the researcher should not expose people to more tests than are strictly necessary to fulfill the research aims. One should always respect human/animal rights, including the right to privacy and autonomy. For Humans, the researcher may need to take particular care in the case of vulnerable groups, which include, but are not limited to, children, older people, and those with learning difficulties. Sometimes, researchers may need to take special care in the manner in which they ask individuals to participate in their research, when dealing with a sensitive and fragile segment of group and are seeking personal data.

2.7 Agreement for Consent

Researchers must consider whether respondents are competent to give consent and free to volunteer it. In the case of minor (anyone under the age of 18), the consent of parents/guardian must be secure and, if possible and appropriate, the children's assent should also be sought. According to the Indian constitution, children under 18 cannot provide consent as being minors; therefore their parents or legitimate guardians must give consent on their behalf. Children may volunteer their participation for the research project at ground level but this should be done only after due written consent. Audio clipping of conversation with respondent should only be recorded if prior consent is given by them and they fully understand the manner recording will be used. If the researcher plans to use the same setting of recording for the new experiment, he would again require a fresh written consent of the participant giving him the detail description about new study. However, when recording from electronic mass media devices such as television and radio are deployed for the non-profit research, one need to ascertain if a prior consent of the produce/publisher is needed.

2.8 Confidentiality and Anonymity

Researchers, with authorization from the respondent about their personal details need to exercise due caution that this data in any form (textual, audio or video records) does not accidentally allow them to be accessible. Confidentiality needs to be maintained sensustricto, where researcher need to protect the identity of the participant; Anonymity is when the scholar himself is not aware about the particulars of the people being involved in the process of research for example; web survey, questionnaire. If the names of individuals are traceable (for instance, by appealing them to undersign), the study will no longer be qualified as an anonymous study.

The following suggestions can be implemented:

Include moral and ethical values in the curriculum.

- Provide value orientation in the curriculum.
- Demystify excessive focus on materialism and money.
- Teach innovatively.
- Conduct programs on values such as Personal Values, Social Values, Cultural Values, Spiritual Values, National values, Familyvalues, Universal Values.
- Council students based on their individual persona.
- Develop community oriented activities and discuss social issues andtheir solutions.
- Moral science be introduced as a subject even at the higher educationlevels.
- Teacher is provided appropriate respect by the society in terms offacilities and remuneration and in turn they should serve as inspirersand guiding person.
- Training in social conduct, inculcate the values in daily life, control of emotions, compassion leading to responsible, socially acceptable citizen be a part of curriculum.

To achieve the above, a strong intervention is needed so that the entire system of higher education may also carry cultural, ethical components. Necessary pre-service and in-service

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intervention at university level may help. While preparing the students, mere focus to cognitive domain should be accompanied by balanced view of the value system. Gandhi advocated development of heart along with nurturing a mind that is full of cognitive abilities. A higher education system with such a wholesome template is the need.

III. TOPIC OF RESEARCH

Research topic is starts with defining the question for which one seeks an answer. However, to get a satisfactory and meaningful answer(s), researcher needs to have the required competence and capability to pursue the question effectively. The next requirement is the act of carrying out the actual research, which in the domain of science and may involve the use of theoretical and/or experimental approaches. The results with due interpretation and contextualization generate new knowledge/understanding. The final stage is dissemination of the outcome of research through sharing the new knowledge with others and its validation by other independent experts. At each of these steps, Ethics related issues are involved. These are discussed below.

Ideally, one selects a question for further research because of the curiosity about some specific aspect where the researcher feels that the available information for a given phenomenon/process/observation does not provide a satisfactory answer or explanation and/or provide an appropriate or optimal process/method. However, in reality, the choice of specific topic selected for research is determined by a variety of factors suchas the place of work and the research mandate of the institution/group. In other instances, like in universities and colleges, the researcher may have some more freedom in selection of the topic of research. Many journals and reviewers also place undue importance on the use of 'latest' and 'high-end' techniques and equipment, which is also indirectly or directly promoted by industry. It is unethical to install or create a mega-facility with tax-payer's money only to 'show', while the actual utilization remains very limited. Further, the use of such a facility, without a valid reason, but only to 'impress' reviewers and readers, is also equally unethical.[31]

3.1 Research Supervisor-Student Relationship

The relationship between a supervisor and Ph.D. scholar is markedly different from a typical teacher-student relationship. It requires a continuous dialogue so that the actual research work gets better synergized and the research student gets really involved in planning and execution of the plan, rather than working only as a technical help to the supervisor. Since the doctoral degree is generally the last step in formal learning, a good foundation in ethical practices is essential to prepare quality researchers who can be effective leaders in times to come.

The research plan should be discussed by both the student and the supervisor so that the research student understands why a given strategy is being followed as also the modus operandi on data collection, recording of observations and interpretations. Research supervisor should guide and steer progress of the student's research efforts so that the work to be embodied in the doctoral thesis can generally be completed within the stipulated time-frame available to the Ph.D. scholars. Supervisor needs to ensure adequate training of research students on safe, ethical and appropriate usages of the various research methods and equipment. While they learn the technique, they should also be trained to understand their operative principles. Students should be encouraged to read widely, to participate in seminars and discussion meetings and to periodically present their own data and/or data from other publications to improve their ability to effectively communicate. They should beencourage to share their ideas and it is the responsibility of the seniors to create an ambience of trust.

IV. RESPONSIBILITIES OF THE EDITORS

Most journals appoint a chief-editor and several sub- or section-editors and members of editorial board. Generally, the chief-editor, being the pointof reference for most correspondence relating to a submitted manuscript, has the major share of responsibilities in all matters relating to processing of submitted manuscripts till their rejection/publication as well as to deal with any post-publication/rejection activities. In majority cases, the editorial positions in journals are honorary and, therefore, the editorial job is done more for the love of labor and prestige associated with it. Editors (all categories) and their decisions play important roles in ensuring the quality of published material and thus the overall prestige of the journal. The following general ethical aspects need to be followed by editors (Galipeauet al., 2016).

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- Editor of a journal must be academically competent in the givendomain of the journal and must have a liking for editorial activities to be able to discharge the responsibilities with effectiveness and authority.
- Prior to accepting the appointment as chief-editor or editor of a journal,the person should find out not only the nature of responsibilities, butalso the quality-policies of the journal and its publishers.
- All editors must agree to devote the required time for dischargingtheir editorial duties so that the editorial work does not get delayed/postponed.
- An active researcher may perform better as an editor since he/she isexpected to understand the nature of research and expectations ofauthors. All submissions should be submitted by the editor to check forplagiarism, quality of illustration materials.
- Most journals receive many more manuscripts than can be published.In many cases, editors can outright reject/return a submission becauseof obvious poor-quality or its being outside the scope of the journal.Policies for such rejections should be well-defined and available topotential authors.
- Editor should promptly select peer-reviewers with due care about theirexpertise and experience in the field.
- Due confidentiality of the review process, where single- or doubleblindreview system is adopted, has to be maintained. Even when thereviewer names and comments are subsequently made public, dueconfidentiality needs to be maintained at early stages of the single- ordouble-blind review system.
- Many journals ask authors to suggest potential reviewers while someothers also ask names of those whom they may not like to be reviewerfor possible conflict of interest. In either case, editor must apply his/her own knowledge, experience and judgment to agree or disagreewith authors or act otherwise. If the reviewer name/s suggested by author/s turn out being fictitious, editor must decline the submissionbesides also reporting the ethical misconduct to the institution towhich the author belongs.
- Editors need to ensure timely receipt of comments on the manuscriptfrom reviewers. Most online submission software used by differentjournals provide for automatic reminders to reviewers. Undue delayscan adversely affect author and also to the prestige of the journal.
- Editor should also personally evaluate the reviewers' reports andauthors' responses to take an informed judgment rather than merelyacting as postman between the two parties.
- If an editor happens to be an author in a submission to the samejournal, which follows blind or double-blind review process, themanuscript should be processed by someone else in the editorial teamin a manner which precludes the editor-cum-author in this case to have any access to the review process.Editor has to ensure appropriate copy-editing of the manuscript to take care of linguistic issues and formatting of references, figures, tables etc. and to get timely proof corrections and subsequent publication.
- Editor's responsibilities continue post-publication as well, especiallywhen questions of priority, plagiarism, unethical manipulation of dataetc arise. In such cases, proactive and informed action and decisionneed to be taken.

The published articles should carry information about the dates of original and revised submission, if applicable, and date of acceptance. All efforts should also be made to publish online version as 'ahead of print' soon after the manuscript is accepted.

V. RESPONSIBILITIES OF REVIEWER

Reviewers play a major role in publication of a manuscript in a journal. Inmost cases, the act of reviewing of scholarly publications is an honorary work rather than a paid service. The quality of peer-reviewing shapes the prestige of a journal in the discipline since they act as watch-dogs for ethical conduct of research and correct presentation of data and the claims made thereon. The different models of pre-publication peer-review, which are currently in practice, vary in several features as noted below:

- **Timing:**Pre-publication in case of all peer-reviewed journals while forPre-Prints, it is Post-publication.
- **Identifiability:**in pre-publication double blind peer-review, neither theauthors nor reviewers know each other's identity; in single blind modethe reviewers know author identity but authors do not know who thereviewers are. In pre-publication open review, each knows identityand reviewers' identity may also be

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made known to readers when thearticle is published. Reviewers' comments and author replies may alsobe published in some cases with or without divulging reviewer identity.In the post-publication review of published pre-prints, identity of peerswho make a comment is known.

- **Mediation**: In most cases of double- or single-blind review, editorsmediate between reviewers and authors. In some cases, reviewer's caninteract openly with each other, but not with authors. In the fully openreview system, reviewers, author/s and editors openly interact withone another.

To be fair to editors and authors, peer-reviewers should follow the general ethical practices (Moore, 2012; Lakhotia, 2013b).

- A reviewer should accept the given responsibility only if adequatelycompetent and knowledgeable in the field and should follow thetimeline provided by the journal for submitting comments. One should be willing to accept the responsibility of peer-reviewing as part ofprofessional requirements. If for some reason one is not able to acceptthe reviewer responsibility, the editor must be promptly informed.
- Any possibility of a conflict of interest should be immediately reportedto the editor.
- Reviewers should remain conscious that as active researchers, theythemselves are or may have been authors and thus should provideadequate 'space' to authors to express their interpretation of thedata, especially if that is not in full agreement with the current views(Lakhotia, 2013b). It is an established fact that only those publicationsthat show inadequacy of the existing models/theories etc. and,which come out with newer ideas, often make a real advance in the understanding.
- Reviewers should check for originality in the question/s addressed andsome novelty in findings that permit some advance in understandingusing valid methods/materials/experimental designs etc.
- Reviewers should also examine any possible unethical practices thatmay have been used by authors and inform the editor/journal aboutthe same.
- Reviewers should also be conscious of the fact that the authors whodecided to undertake the given study did so with certain context andproceeded in the way they did because of their own reasons and thatthey wrote the manuscript in the way they did.
- Reviewer should not try to impose their own preferred hypothesis /theory or experimental designs etc. Review should be constructive incritique of the work and the manuscript so that even if it is rejected,authors can make use of the reviewer's comments and suggestions inimproving the future research output.
- Information in the article available to the reviewer as part of prepublicationreview is confidential and privileged, and, therefore,reviewer should not use such information for one's own or someoneelse's advantage. Involving someone else (e.g., a junior colleague) inthe review process should not be practiced without permission of the journal. If involved, their identity should be made known to the editorfor record and for giving due credit for the effort.Editor expects an honest and unbiased assessment of the strengths andweaknesses of the article under review. Reviewers are usually requiredto provide confidential comments to the editor and more detailedcomments to be read by the authors. Most journals also require aclear recommendation to accept/revise/reject. Such recommendationshould be supported by the comments to editor and author.
- Reviewers should be willing to re-review a revised version, if sorequested. They should generally refrain from raising new issues,unless arising from the revised content, for the sake of rejection.
- If an editor has to also review the submitted manuscript, it should bedone transparently, rather than as an anonymous reviewer.
- Confidentiality of the review process in single- or double-blindsystem has to be maintained following the journal's policy and thisresponsibility continues even after publication/rejection of themanuscript that was reviewed.

VI. ETHICS OF RETRACTION

Publishers, editors and reviewers of all scholarly publications have to be vigilant to avoid any possible unethical miss-conduct on their part or on part of authors. Yet, there would be cases when instances of diverse categories un-ethical practices in published work are noticed after publication by reader, author, reviewer or editor. Any such situation must be immediately brought to the notice of Editor/Publisher who then has to initiate proper

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enquiry, which would also involve seeking clarifications from the author/s. The course of action to be followed should be as suggested by the COPE guidelines, which the scholarly journals and publishers are required/expected to adhere to. Depending upon the seriousness of the unethical misconduct, authors may publish an 'apology' note, or editors may publish 'expression of concern' or retract the paper. In more serious cases, the editor is expected to inform the authors and the concerned host institution about the miss-conduct. Besides the intentional or un-intentional unethical practices, cases of errors in judgment/interpretation of data may also be noticed by author'sreaders. Such cases need to be dealt with differently by author/s, editor and the journal. They may agree to publish an erratum or even a new paper to clarify the earlier error/ misjudgment.[32]

VII. CONFLICT OF INTEREST

Cambridge Dictionary defines conflict of interest (CoI) as a situation in which someone's private interests are opposed to that person's responsibilities to other people i. e. a situation in which someone cannot make a fair decision because they will be personally affected by the result. Transparency is an essential ingredient of any governance process and the conflict of interest then becomes a serious component of this process, though often overlooked, either through deliberate design or through sheer ignorance. Both have detrimental effect on the fairness of any process of evaluation. Conflict of interest can arise from personal issue when one sits in judgment of his kith and kin and colleagues with a prospect of providing them undue favor. This can also arise from institutional affiliations where one could favor his institution or colleagues for some gains or for an eventual quid pro quo. It could also arise from similarity of research problems being pursued by two groups and one holds back the review of the other to gain time for his work to be first published. These acts give rise to nepotism and compromises on the aspects of scientific integrity. Normally under such cases, it will be desirable to opt out of evaluation process, when even a minor conflict of interest is seen. In many committee meetings overseas and now often in India, all the members do make a formal statement on possible conflicts of interests and it is up to the wisdom of the Chair and the committee to take a call on such statements.[33] The CoI applies of all cases where a selection or a choice is to be made.These include all aspects ranging from election of fellows in the academicsto the selection committees, purchase process, promotions, peer reviewprocess and everything. One needs to be conscientious in these matters and use his/her judgment in each situation.

Categories of Ethical Principles

Category	Description of Category	Ethical Principle
Ethical scientific inquiry	The research inquiry itself must benefit society.	• Duty to society
Ethical conduct and behaviors of researchers	Researchers should conduct themselves in certain manners, and they are responsible for their knowledge and awareness of ethics and appropriate research methods.	• Conflict of interest • Integrity • Nondiscrimination • Professional competence • Professional discipline
Ethical treatment of research participants	Research participants should be treated according to certain guidelines and treated humanely, and the environmental or secondary effects of the research should be considered.	• Informed consent • Beneficence • Nondiscrimination • Nonexploitation • Privacy and confidentiality

VIII. ETHICAL PRINCIPLES FOR SCIENTIFIC RESEARCH

8.1 Duty to Society

Duty to society is a well-documented element of ethics across our literature review, and yet it differs slightly between disciplines and countries. International differences will be discussed in Chapter Three. The primary premise

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of duty to society is that research must not be undertaken if it produces no benefit to society.[34]Such benefit is judged by the researchers, their institution, and their sponsors, rather than by society as a whole or by historians in future decades, leading to lapses between what researchers and the research community believe is a benefit to society and what other members of society might believe. Some unethical activities conducted in the name of medical research involved the inhumane treatment of research participants without a broader benefit to society or with benefits that could not have been foreseen at the time. In some cases, duty to society comes in conflict with beneficence, as when society may benefit from research that may knowingly and intentionally harm research participants. Historical examples provide cases where society has benefited from research that was inhumane to its participants, and scientists still grapple today with whether it is ethical to use the results of such research. One researcher calculated that by 2010, "the data from Nazi experiments have been used and/or cited on over fifty occasions," particularly "data from hypothermia experiments."[35]In modern ethics, both beneficence and duty to society are simultaneously required: Research must benefit or aim to do no harm to both the research subjects and society.[36] There is no universal equilibrium, since some cultures place more emphasis on the well-being of a community over that of the individual.[37]Involving members of any community can help in designing research that achieves an appropriate balance.

Ethical Principles for Scientific Research

Ethical Principle	Definition
Duty to society	Researchers and research must contribute to the well-being of society.
Beneficence	Researchers should have the welfare of the research participant in mind as a goal and strive for the benefits of the research to outweigh the risks.
Conflict of interest	Researchers should minimize financial and other influences on their research and on research participants that could bias research results. Conflict of interest is more frequently directed at the researcher, but it may also involve the research participants if they are provided with a financial or nonfinancial incentive to participate.
Informed consent	All research participants must voluntarily agree to participate in research, without pressure from financial gain or other coercion, and their agreement must include an understanding of the research and its risks. When participants are unable to consent or when vulnerable groups are involved in research, specific actions must be taken by researchers and their institutions to protect the participants.
Integrity	Researchers should demonstrate honesty and truthfulness. They should not fabricate data, falsify results, or omit relevant data. They should report findings fully, minimize or eliminate bias in their methods, and disclose underlying assumptions.
Nondiscrimination	Researchers should minimize attempts to reduce the benefits of research on specific groups and to deny benefits from other groups.
Nonexploitation	Researchers should not exploit or take unfair advantage of research participants.
Privacy and confidentiality	**Privacy:** Research participants have the right to control access to their personal information and to their bodies in the collection of biological specimens. Participants may control how others see, touch, or obtain their information. **Confidentiality:** Researchers will protect the private information provided by participants from release. Confidentiality is an extension of the concept of privacy; it refers to the participant's understanding of, and agreement to, the ways identifiable information will be stored and shared.

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8.2 Conflict of Interest

Researchers should minimize financial and other influences on their research and on research participants that could bias research results. Conflict of interest is more frequently directed at the researcher, but it may also involve the research participants if they are provided with a financial or nonfinancial incentive to participate.

Many journals require such disclosure of support for their research from authors prior to accepting articles for publication. For research participants who are paid for their participation, the payment itself, as well as any nonmonetary benefits of participating, can create a conflict in preventing the participant from accurately weighing the risks and benefits of the research. In this sense, a financial or nonfinancial benefit for participating (including free medical exams, free medical tests, free vaccinations, and so on), can influence whether a research participant provides an un-coerced consent to participate. In this sense, any financial or nonfinancial benefits to research participants should be evaluated by IRBs or other oversight boards, as both the research participant and researcher may be unable to assess the potential coercive effect of the benefit without bias. Undisclosed conflicts of interest could cast doubt on the validity of the data, the analysis, the selection of research participants, the public's trust in research, and other factors.[38]

IX. PRIVACY AND CONFIDENTIALITY

9.1 Privacy: Research participants have the right to control access to their personal information and to their bodies in the collection of biological specimens. Participants may control how others see, touch, or obtain their information.

9.2 Confidentiality: Researchers will protect the private information provided by participants from release. Confidentiality is an extension of the concept of privacy; it refers to the participant's understanding of, and agreement to, the ways identifiable information will be stored and shared.

According to the Declaration of Helsinki, very precaution must be taken to protect the privacy of research subjects and the confidentiality of their personal information."80 Privacy and confidentiality apply to research that uses human participants or data about humans.The privacy issues are raised in the literature center on the management of research participants' information. It begins with the protocols that the scientific community should follow to ensure against the disclosure of personal or confidential information. These include de-identifying personal data, encrypting it (along with the codes used to link identities), limiting access to a minimum number of people, and planning for how confidentiality will be maintained when information is shared among sponsors, collaborators, or coinvestigators. The unconsented disclosure of information can take place if all of the following conditions are simultaneously satisfied:

- The information that has been collected is important.[39]
- Consent is difficult or impossible to obtain.
- Objection by a reasonable individual to publication seems unlikely.

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- The identity of the source of information or data is protected.[40]

The responsibility of respecting privacy applies to computing professionals in a particularly profound way. Technology enables the collection, monitoring, and exchange of personal information quickly, inexpensively, and often without the knowledge of the people affected. Therefore, a computing professional should become conversant in the various definitions and forms of privacy and should understand the rights and responsibilities associated with the collection and use of personal information. Computing professionals should only use personal information for legitimate ends and without violating the rights of individuals and groups. This requires taking precautions to prevent re-identification of annymized data or unauthorized data collection, ensuring the accuracy of data, understanding the provenance of the data, and protecting it from unauthorized access and accidental disclosure.

9.3 Codebook

This codebook was used to identify relevant excerpts from each of the documents in our literature review. Each "code" is provided with its definition. These coding definitions do not necessarily match the ethical principle definitions (in Chapter Two) because the results of our analysis informed that chapter.

9.4 Training

The obligation falls on the researcher to be knowledgeable about ethical, legal, and regulatory requirements in their own country and international requirements for their discipline.

9.5 Monitoring

Includes IRBs and other types of monitoring bodies and the protocols they follow includes grievance mechanisms.

9.6 Compliance

This category includes names of specific laws, regulations, treaties, etc. includes that publications (journals) have an obligation to not publish research that does not comply with codes of ethics.Includes legal compliance.

9.7 Remediation

Discussion of how ethical incidents should be responded to.

9.8 History

This includes history of how codes came to be developed, such as discussion of significant events that led to changes to ethics in research.

9.9 Beneficence and Non-malfeasance

Beneficence is a concept in research ethics that in any research study, researchers should have the welfare of the research participant in mind as a goal. It often appears in tandem with non-malfeasance. Malfeasance is considered the antonym of beneficence it describes practices that decrease the welfare of the research participant. Non-malfeasanceis not harming or inflicting the least harm possible, to reach a beneficial outcome. Also includes the discussion of beneficence and non-malfeasancefor humans, animalsand for the environment or ecosystem.

X. DATA MANAGEMENT

Includes discussion about sharing data (and data transparency) so other researchers can assess or reproduce the research; data handling; and how researchers choose which software tools to use.

10.1 Duty to Society

A general principle that all those covered by the code "have the responsibility to contribute from their sphere of professional competence to the general well-being of society.

10.2 Informed Consent

Informed consent is a voluntary agreement to participate in research. It is the process in which the subject has an understanding of the research and its risks and voluntarily agrees to participate.

10.3 Report Results Accurately

Researchers are obligated to report results and data accurately.

10.4 Nondiscrimination

This principle ensures a zero-tolerance policy for discrimination based on race, gender, religion, and other demographics or group characteristics.

10.5 Non-exploitation

This principle prohibits personal gain or using research unfairly for one's own advantage.

10.6 Privacy and Confidentiality

Privacy refers to an individual's right to control access to their personal information, but it also includes access to their body (such as collection of biological specimens). Privacy is a subject's ability to control how other people see, touch, or obtain information about the subject. "Confidentiality' refers to how private information provided by individuals will be protected by the researcher from release. Describing just how the confidentiality of research information will be maintained is an important aspect of the consent process. Confidentiality is an extension of the concept of privacy; it refers to the subject's understanding of, and agreement to, the ways

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identifiable information will be stored and shared. Identifiable information can be printed information, electronic information, or visual information such as photographs.

XI. CONCLUSIONS

The present study is directed towards investigateprinciples exist that will remain relevant in uncharted scientific territories. Those principles fall into three broad categories: ethical scientific inquiry; ethical conduct and behavior of researchers; and ethical treatment of research participants. Culturally appropriate formulation of research, with input from affected communities, cuts across all three. Together, ethical principles are intended to foster responsible and reliable research, while avoiding exploitation either of people who do not understand the situation, who lack resources and are more willing to do things that individuals who can afford other options would be unlikely to do, or who have no knowledge that their information may be used for research or of the environment. Questions about the ethics of a given choice or how to apply these ethical principles in new research situations can be answered with help from knowledge that has been accumulating about research ethics and from a variety of institutional resources. Researchers can lean on an array of key pillars: education and training; professional societies and communities that promulgate and advocate for codes of ethics; and governance mechanisms that range from institutional oversight (e.g., focused committees) to formal laws and regulations.

Teachers are the role models of students and in most rural communities, they are the most educated and respected personalities. Teacher absenteeism is one of the most serious causes of ethical declining of education. In the present digital era, there is wide opportunity to make students aware of the moral values and ethical values. It is time appropriate to take necessary actions to explicitly inculcate moral and ethical values in their curriculum and have a practice of formal and informal discussions on daily routine in all aspects from personal to career.

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