

The Nature of Research

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The Nature of Research

Research is

- ❑ creative work
- ❑ original investigation
- ❑ exploration
- ❑ innovative study
- ❑ interactive team work
- ❑ intense laboratory work and experimentation
- ❑ back-and-forth exchange of ideas and trials
- ❑ never ending!

Skills Needed for Research

- ❑ Advanced knowledge in the chosen area
- ❑ Curiosity and intense desire to learn more
- ❑ Persistence and perseverance
- ❑ Honesty, integrity, and mutual trust
- ❑ Openness and broad framework of thinking and operation
- ❑ Problem-solving techniques
- ❑ Willingness to accept a negative outcome and move on



Personal Traits Desired for Research

- ❑ Recognize your personal strengths and limitations
- ❑ Be prepared to explain and defend your work
- ❑ Be open for collaborative team work:
to be a part of the whole
- ❑ Be open to asking questions and
replying directly in simple and clear terms
- ❑ Appreciate the contributions of coworkers
- ❑ Develop good interpersonal skills
- ❑ Respect professional boundaries



Communication Skills Needed for Research

- ❑ Efficient reading, studying, and comprehension
- ❑ Grasp of the terminology and jargon
- ❑ Reviewing and interpretation of relevant literature and results of other works
- ❑ Accurate recording and bookkeeping
- ❑ Ability to explain specialized notions to other researchers and the general public
- ❑ Precise writing style
- ❑ Efficient oral communication



Essential Elements of a Research Work

- ❑ Clear statement of the research problem or issue
- ❑ Thorough review of the state of the art
- ❑ Demonstration of need for the proposed work
- ❑ Positioning the proposed work in the context of current knowledge
- ❑ Detailed documentation of the materials used and methods developed
- ❑ Objective analysis of the results obtained
- ❑ Discussion of relevance, benefits, limitations, potential use, and future work



Essential Elements of a Research Work

- ❑ Clear and error-free writing in formal language
- ❑ Completeness
- ❑ Accuracy
- ❑ Robustness, repeatability, and reproducibility
- ❑ Objective and quantitative analysis
- ❑ Comparative analysis
- ❑ Cost – benefit analysis
- ❑ **Innovation and originality!**



Authorship of a Research Work

- ❑ Each author must have contributed to the work in terms of ideas, implementation, data collection, analysis, writing, or supervision
- ❑ Each author must review the paper and be aware of submission of the paper for publication
- ❑ Authors are usually listed in the order of their relative contribution to the work
- ❑ In some areas, the senior author is placed at the end of the list
- ❑ **Write in your own words: beware of plagiarism!**



Benefits of Research

- ❑ Advanced learning
- ❑ Improved teaching
- ❑ Higher levels of understanding and knowledge
- ❑ Research publications and books
- ❑ Innovative solutions to problems
- ❑ New and improved devices, tools, and systems
- ❑ Improved wellbeing
- ❑ Improved quality of life and environment



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Thank you!

Wish you success and all the best in your studies and research!

See also

<http://people.ucalgary.ca/~ranga/BMEOpportunitiesChallenges.pdf>

- ❑ Natural Sciences and Engineering Research Council of Canada
- ❑ Alberta Heritage Foundation for Medical Research
- ❑ Alberta/ Canadian Breast Cancer Foundation
- ❑ University Technologies International Inc.
- ❑ Alberta Cancer Board
- ❑ Screen Test: Alberta Program for the Early Detection of Breast Cancer
- ❑ Arthritis Society of Canada
- ❑ Kids Cancer Care Foundation of Alberta
- ❑ My students, colleagues, and collaborators