Ethical, Power and Technological Issues in Quantitative Research

OVERVIEW

Nursing research usually involves human participants which necessitates careful attention to legal rights to safety, protection, privacy, and confidentiality; ethical rights as well as consideration of any power issues that might emerge within the research study design and implementation. As prescribed in the Canadian Nurses Association (CNA) Code of Ethics for Registered Nurses, "Nurses support, use and engage in research and other activities that promote safe, competent, compassionate and ethical care, and they use guidelines for ethical research that are in keeping with nursing values" (2017, p. 9).

Legal and ethical considerations are quite straightforward: health researchers must adhere to and respect the principles of respect, beneficence, and justice. Power issues may not be so visible yet are equally important in any nursing or health related research. Far too often, vulnerable people, including our clients, community members, students, and minority group members may feel they MUST participate in research proposed by their caregivers, teachers, government, and others in positions of societal power. They fear that their care, education, citizen rights, and so on will be compromised if they do not cooperate. Nurses must be vocal and proactive in assuring people of their rights in any research study, and in protecting their rights if others are not showing respect for them.

Power issues also arise in the context of research funding. Although times have changed, it was not too long ago when nurses hardly ever received viable research funding from major funding agencies. Nurses do receive funding now, but the discrepancies between nursing funding and medical/pharmaceutical funding are still staggering. Since nurses promote health and support well-being, it only makes sense that more money and resources should be dedicated to funding a higher rate of nursing research in Canada.

Research with Indigenous People

To ensure cultural integrity, a framework developed to guide research done with First Nations, Inuit and Metis people called the Ownership, Control, Access and Possession (OCAP) Guide should be applied in any proposed research done with Aboriginal people. This framework was developed by the National Aboriginal Health Organization and sanctioned by the First Nations Information Governance Committee of the Assembly of First Nations in 2007.

It is a well-respected, Canadian based guide developed to help researchers plan, organize and implement research that demonstrates appropriate respect for the rights, knowledge, and preferences of Aboriginal people. “The principles represent a comprehensive framework developed by First Nations to bring self-determination into the realm of research and information management” (p. 8).

The OCAP principles of Ownership, Control, Access, and Possession can be defined as:

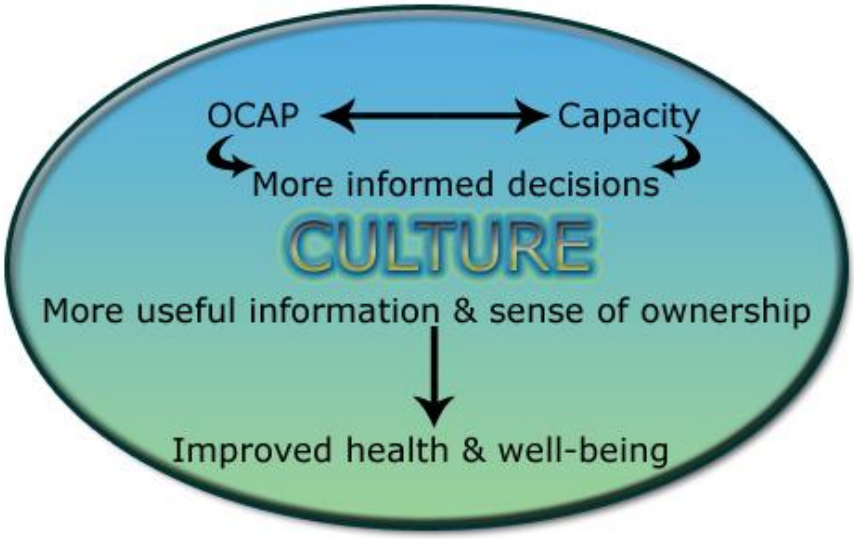
- **Ownership**: shows respect for an Aboriginal community’s collective ownership of its cultural knowledge, data, and information. This is similar to the belief that each individual person owns their personal information, but in this case, the ownership is at a community level.

- **Control:** shows respect for the Aboriginal right to control all research and data/information management processes that relate to them. This includes all of the steps and processes of any research done with Aboriginal people, from conception to dissemination of the final results.

- **Access:** shows respect for the Aboriginal people’s right for full access to any and all data, information or research that relates to themselves and their communities. This principle also means that Aboriginal people can determine who else has access to this information.

- **Possession:** shows respect for the Aboriginal right to physically possess the data, information, and research that relates to their communities. This principle addresses the potential risk of breach or misuse of Aboriginal data, information and research findings.

The following diagram illustrates the OCAP framework which shows that culture is a part of every aspect of research done with Indigenous communities. It shows that the use of the OCAP principles is mutually reinforcing with a community’s capacity, which can result in more relevant research findings. This can inform Indigenous communities and support decisions to improve community health and well-being. It also demonstrates profound respect for Indigenous culture, and their ability to control research to enhance community well-being.



Ownership, Control, Access, Possession (OCAP) Principles in Action
(adapted from National Aboriginal Health Organization, 2007, p. 10).

Use of Technology

The use of technology has facilitated the research process. Before the advent of personal computers (PCs), undertaking research studies in any discipline, was an extremely time-consuming and challenging task. Mainframe computers, if any, were used for data analysis. Typewriters were used to present finished documents. Everything else was done by hand. With the development of personal computers with large memory storage, and user-friendly software, the research process has become far more manageable for researchers in all fields of study. Both quantitative and qualitative studies are facilitated with various computer applications and programs. However, technology use also brings additional legal and ethical considerations around such concerns as data storage on personal computers or commercial servers.

Some examples of computer applications that support nursing research are:

a) **Topic identification:** through online literature searches, email and discussion groups, and visiting websites.

b) **Literature searches:** Once a topic is chosen, the literature review can be greatly enhanced from current research available on the Web, in databases, and on CD-ROMs, often with full text retrieval.

c) **Resource Files:** Historically, index cards and paper were used to keep notes of various research searches and observations. Computers can now be used for these clerical tasks.

d) **Data collection tools**: can be retrieved through online searches or created using various graph, spreadsheet, word processing and database applications.

e) **Proposal preparation**: Word processing programs greatly facilitate the editing and writing.

f) **Budgets**: Both the preparation and management of research budgets are made easier with spreadsheet programs.

g) **Data collection**: Various programs can be used to sort and actually collect data, including hospital information systems, spreadsheets, databases, and word processing.

h) **Data Analysis**: Statistical and thematic software can greatly reduce the time and stress of processing both quantitative and qualitative data.

i) **Final report:** Word processing, charts and tables, and statistical graphs can all be easily and quickly done on a computer.

j) **Sharing of results**: Current research findings can be shared with the public at large far quicker using the web and other electronic venues. Print reports often take one to five years to be circulated.

LEARNING OUTCOMES

This learning activity is intended to provide learners with the opportunity to:

1. Describe the historical background that led to the development of ethical guidelines for the use of human subjects in research.
2. Evaluate the adequacy of an informed consent form.
3. Describe the research ethics board's role in the research review process.
4. Identify populations of subjects and animals who require special legal and ethical research considerations.
5. Describe the nurse's role as client advocate in research situations.

6. Outline the principles and rationale for the Ownership, Control, Access, and Possession (OCAP) framework for research conducted with Indigenous people.

7. Appreciate the utility of computers and the Internet for the Nursing Research process.

8. Explore various applications available on the Internet that can be used for distinct aspects of the research process.

9. Gain awareness of the assorted research studies and findings available through online literature searches.

PREPARATION

READ: Chapter 6: Legal and Ethical Issues in your LoBiondo-Wood et al textbook.

READ: First Nations Information Governance. (2011). *OCAP: Ownership, Control, Access, and Possession.* Ottawa: FNIG. https://fnigc.ca/ocap

READ: and explore the links on the Use of Technology in Research Guide (can be downloaded from Moodle site or viewed at the end of this Learning Activity).

Online Resources

EXPLORE: Sigma Theta Tau Honor Society Nursing Research Resources. https://www.sigmanursing.org/advance-elevate/research

EXPLORE: U.S. National Institute of Nursing Research at https://www.ninr.nih.gov/

EXPLORE: Trochim, W. (2020). *Research Methods Knowledge Base Web Center for Social Research Methods.* https://conjointly.com/kb/

EXPLORE: the Canadian Journal of Nursing Informatics at https://cjni.net/

EXPLORE: Evolve site Resources for the Chapter Six content.

VIEW VIDEOS: on Legal, Ethical and Power Issues (embedded in Moodle workspace)

ONLINE ACTIVITIES

TRI-COUNCIL POLICY TUTORIAL (TCPS 2: CORE)

Complete the Tutorial online on the Government of Canada – Panel on Research Ethics at: https://tcps2core.ca/welcome

Be sure to read the CORE User Guide and FAQs before beginning.
Upload a copy of your Certificate of Completion in the Moodle workspace and in your PebblePad ePortfolio.

PROPOSAL INFORMED CONSENT FORM

Your Assignment 3 Proposal Group should do this activity together - make sure all of your full names are at the top of the assignment. Only one group member needs to upload it to Moodle.

Create a brief informed consent form (1 page) that you could give to potential subjects if you were really going to conduct the research you are describing in your Assignment 3: Quantitative Research Proposal assignment. Upload your final form in the Moodle workspace and your PebblePad ePortfolio page.

REFLECTION

1. Reflect on how computer advances will help you in your nursing career in the future.

2. Consider the following emerging and predicted technologies:

   a) Voice activated recording of data and information.
   b) Video-picture email programs.
   c) Virtual reality and 3D website materials.
   d) Multimedia patient education materials.
   e) Downloadable research databases for searching directly from your own hard drive.

3. How would you modify your research proposal if you were recruiting Indigenous research subjects in your Assignment 3: Quantitative Research Proposal assignment?

REFERENCES

Canadian Nurses Association. (2008). *Code of Ethics for Registered Nurses*. CNA.

First Nations Information Governance. (2011). *OCAP: Ownership, Control, Access, and Possession.* FNIG. https://fnigc.ca/ocap

Nursing 3540 The Use of Technology in Nursing Research

PART 1:

Applying Technology and Informatics to the Nursing Research Process

A. Research Problem, Purpose, Main Question or Hypothesis

- The Internet and Electronic Research Databases provide access to a large portion of the existing Quantitative and Qualitative literature. This provides foundational data, theory, and research findings to help shape your Research Purpose and investigate your selected Problem in depth. By examining the literature, you can begin to identify the gaps in the literature which can help you to formulate your primary research question(s) and/or hypotheses.

- **Exploring Online Research Methods in a Virtual Training Environment**
  http://www.researchcatalogue.esrc.ac.uk/grants/RES-333-25-0001/read
  Excellent step by step overview of the process of using the online environment for research.

B. Literature Review

- The Literature Review phase of the research process is also facilitated by this initial search, since a large amount of full text research papers and articles are available through these Electronic Research Databases. Access through these databases is usually achieved through academic and health organizations or through personal or group subscriptions. Examples include CINAHL, Academic Search Premier, EBSCO, MEDLINE, PsychINFO. And JSTOR.

- There are also some open access databases available on the Internet such as the DOAJ – Directory of Open Access Journals at http://www.doaj.org/

C. Conceptual Framework

- Visual display software and apps can be used to create a visual representation in the form of concept maps, flow charts, or visual models of your research conceptual framework (either qualitative or quantitative). This helps you to accomplish three results: a) to visually represent your main concepts and sub-concepts to organize and guide the research process planning b) to visually explain your research proposal to reviewers and funding agencies and c) to illustrate the conceptual framework that emerges from your data, especially in qualitative research.

Visual Software for Concept Mapping

- **CmapTools version 4.03 for Windows -** Open source software for concept mapping and knowledge sharing, available at http://cmap.ihmc.us/download/index.php?myPlat=Win

- **Freemind –** Open source JAVA powered software for mind mapping. Maps can also be published freely online through the site's WIKI.
  http://freemind.sourceforge.net/wiki/index.php/Main_Page

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- **Conzilla – The Concept Browser**
  http://www.conzilla.org/wiki/Overview/Main
  This JAVA based, open source, versatile knowledge management tool allows you to create context maps to brainstorm conceptual frameworks, organize and share work and other brainstorming activities.

- **DeepaMehta -** http://www.deepamehta.de/
  Another JAVA based, open source knowledge management system that allows you to organize pieces of your research as concept maps, share files with others, and supports various phases of the research process.

- **Inspiration** – http://www.inspiration.com
  An easy to use concept mapping and visual display software (cost is about $50).

- **Smart Draw** – http://www.smartdraw.com/
  This software creates complex visual displays of all kinds, including concept and mind maps, brainstorming displays, flow charts, and network diagrams (cost is about $10/month).

D. Research Design

QUANTITATIVE

Computer programs, new technologies, and the Internet can be used both to facilitate research design planning and data collection, as well as provide the context for a research study. Wordprocessing, spreadsheet and database programs can all be applied to plan the study. Examples of how technology can supply the context for a study are outlined below.

Experimental – An experimental and control group can be randomly selected to participate in a study focused on the effectiveness of a relaxation multimedia program on learner retention. The control group would view an alternate multimedia program that was not designed to promote relaxation. Both groups could then be tested using the same identical learning tool to test retention.

Quasi-Experimental – A group of students could be selected to participate in a videoconference that outlined the principles of health promotion. The group would be selected using convenience sampling, and given a pretest before the videoconference, and a post-test after they had participated in the conference. The before and after scores could then be analysed for changes in the class' retention of the content.

Non-Experimental – An exploratory survey design could be used to investigate nursing faculty's experiences with teaching online courses. The survey could be uploaded to a web server so that participants could complete it online.

Applying Technology and Informatics to the Nursing Research Process

QUALITATIVE

Phenomenology - An educator could plan to conduct individual interviews with a small cluster of peer participants to explore their personal experience of integrating technology into their teaching.

Grounded Theory - A researcher could plan a study to develop theory about the communication processes that emerge during asynchronous discussion forums between instructors and students.

Ethnography – A researcher could join an online community to study the cybercultural patterns of interaction and relationship building.

Feminist – A researcher could explore the experiences of women who are launching web design businesses.

Action Research – A student could plan an initiative to explore the needs of single mothers, using both a face-to-face meeting and online support community approach to planning and action decisions.

E. Sample Type, Description, Selection

QUANTITATIVE SAMPLING

Random Sampling- Cryptographically secure random number generators such as Fortuna or Math Goodies can be used to generate true random number selection to facilitate an unbiased random sample selection for experimental and quasi-experimental studies.

Fortuna: http://www.seehuhn.de/pages/fortuna

Math Goodles: http://www.mathgoodies.com/calculators/random_no_custom.html

QUANTITATIVE OR QUALITATIVE SAMPLING

Non-probability Techniques

Purposive Sampling – An educator could apply their own discretion or judgment to invite particular students to participate in an online focus group to discuss their Web Quest experiences.

Convenience Sampling – A nurse could ask clinic patients to participate in a web based eMonitor study to assess their monthly blood pressure from their home.

Snowball Sampling - Forms to petition online survey participants to invite a friend to also participate in the study could be designed to increase the sample size.

Applying Technology and Informatics to the Nursing Research Process

F. Research instruments and Data Collection

Computer programs, the Internet and other technologies can also be used to both create and/or implement a research instrument in both quantitative and qualitative research.

Surveys – E-mailed or online surveys can be mounted online using web forms or other software so that participants can complete them and send them to the researcher instantly. This often elicits a much higher return rate than mailed-out surveys. Software can also be used to create surveys that are completed in person or printed for mail-out.

- **Zoho** - https://www.zoho.com/survey/
  This is an online survey development and data collection tool that helps professionals easily design email, web-based, and poll types of surveys for research purposes.

- **Toluno's Quick Survey** - https://www.quicksurveys.com
  Create online surveys with real time data analytics. Offers a standard free version and prime versions with deep analytical abilities.

- **PhpESP – Easy Survey Package** http://sourceforge.net/projects/phpesp/
  This is an open source PHP script that can be uploaded to a web server to provide online survey development capabilities.

- **LimeSurvey** - http://www.limesurvey.org/
  This is another open source PHP script based survey development software that can be freely used to develop web based surveys for research and viewer input.

- **Likert Scaling** - http://www.socialresearchmethods.net/kb/scallik.htm
  An easy to understand overview on how to create likert-scale surveys for paper or web based nonexperimental designs.

Physiological Monitors

- **Patient eCare eMonitor Interface** http://www.patientecare.com
  This web based interface helps connect patients and caregivers by setting up home based eMonitor equipment (via the serial port of the patient's computer) such as Blood Pressure, Weight, Peak Flow, or Glucose eMonitors. Readings from the monitors are then recorded into the software, which could be used in research focused on client experiences or the effectiveness of telenursing, etc.

- **Biofeedback Devices** http://www.bio-medical.com/
  Biomed.com profiles a number of technical monitors and software that can be used in research focused on various physiological and psychological data measures.

- **WHMS – Wearable Health Monitoring Systems** http://www.ece.uah.edu/~jovanov/whrms/
  A thorough introduction to these new technologies that promise to become invaluable ways to monitor physiological measures, and provide data for research.

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Interviews

The use of computers to facilitate interviews is becoming quite common, through the use of chat rooms, forum like settings, "talking" computers that use Flash based, narrative led interviews, and web video recorded sessions. Researchers find these types of interviews very suitable when exploring sensitive issues such as violence, sexual behavior, maltreatment, and interpersonal interactions.

- **Snap PDA Interviewer** - http://www.snapsurveys.com/software
  This mobile interviewing software facilitates face-to-face interviews by allowing the researcher to unobtrusively use the PDA as a research instrument to collect answers to the interview questions.

G. Legal and ethical considerations

Informed Consent

All research, including computer assisted or focused research must include the means to provide enough information to research participants to agree to give informed consent before being involved in the study. The actual consent form can be created on a computer using a wordprocessing program. It can also be included as a downloadable file through email or the Internet.

- **Office for Health and Human Services, Office for Human Research Protections**
  http://www.hhs.gov/ohrp/
  This site provides comprehensive information on how to acquire properly informed consent from research subjects and participants.

- **Sample Consent Form for a Web-Based Study**
  http://www.socialpsychology.org/consentform.htm
  Social Psychology Network provides a sample form to help demonstrate the critical elements and techniques to use to gather informed consent from participants who partake in online surveys, interviews or other research studies.

- **Ethical and Legal Aspects of Human Subjects Research on the Internet**
  https://www.aaas.org/page/ethical-and-legal-aspects-human-subjects-research-cyberspace
  This report is a compilation of the discussions from a conference workshop held in Washington, DC and sponsored by the U.S. Office for Protection from Research Risks.

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Confidentiality and Data Security

A key consideration of all research studies is the issue of participant confidentiality and security of all collected data, both demographic and study related. When computers are used to collect the data, this issue becomes even more critical, since potential illegal access to the information becomes more likely.

- **Improving Access to and Confidentiality of Research Data: Report of a Workshop**
  http://www.nap.edu/catalog/9958.html#toc
  The National Academies Press offers this online book free for viewing and download.

- **eHealth Code of Ethics -** http://www.ihealthcoalition.org/ehealth-code-of-ethics/
  Designed by the eHealth Ethics Initiative, this International Code of Ethics was created to guide researchers and eHealth providers in the process of ensuring confidentiality and data security.

H. Data Analysis methods

One of the most profound influences that technology has had on research is in data analysis applications. Literally hundreds of hours can be saved by using the appropriate analysis software in both quantitative and qualitative research. More rigorous testing can be achieved plus a huge reduction in analyst error.

QUANTITATIVE STATISTICS

- **IBM SPSS** – http://www.spss.com/spss/
  This software has been considered the premier non/parametric data analysis software for several decades. Once available only by main frame computer, PC versions are now available. Examples of statistics that can easily be calculated: Chi Squares, Correlation, T Tests, and Analysis of Variance (ANOVA).

- **Web based Calculators – Vassar Stats** http://vassarstats.net/
  A variety of web based programs are now available on the Internet for calculating various quantitative data sets. Vassar Stats, created by Richard Lowry, a psychology professor at Vassar College in New York. Robust java based calculators quickly analyze Chi Squares, T Tests, Correlation, Z tests, and ANOVA tests from anywhere that web access is possible.

QUALITATIVE ANALYSIS

- **QSR's NVitro -**
  http://www.qsrinternational.com/product

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QSR, an Australian company offers elite qualitative analysis software packages particularly suited to analyzing phenomenological, action, grounded theory, and mixed methods data.

- **AtlasTi -** http://atlasti.com
  This "knowledge workbench" software is excellent for analyzing text, video, and audio and other multimedia qualitative data.

- **Researchware -** http://www.researchware.com/
  This qualitative software also analyzes both text and multimedia data, enabling the researcher to code, retrieve, theorize, and conduct data analyses.

I. Discussion of Findings, Recommendations, Implications, Limitations, Summary

Preparing Tables and Visual Data Displays, Publishing, Presentations

Word processing software like Microsoft Office or the open source software, Open Office can be used to create text documents, spreadsheets, tables, graphs and charts as well as Powerpoint presentations for preparing tables and visual displays of the research study findings.

- **Open Office** - http://www.openoffice.org/
  This robust, free, office suite includes all of the features of other more expensive office suites, plus is compatible with all of them (e.g. Can export files as a Word document) and allows you to publish your files as PDFs without buying a PDF converter.

- **Writer's Block** - http://www.writersblocks.com/wb4trialdownload.htm
  This software is meant to help researchers organize their findings into blocks of text to help with the final writing in a clear and logical way.

J. Budget

An important part of any research proposal is an accurate and easy to follow budget, especially when the researcher is seeking funding. Various spreadsheet software can help with this, including the spreadsheet available in Open Office (listed above) or Microsoft Excel that comes with MS Office. As well, budget software such as Quicken can also be useful for this part of the research process.

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Online Resources

- **NSF Budget Calculation Sheet** for Excel or Open Office
  http://www.units.muohio.edu/oars/forms/NSF_Budget_Template_2010.xls
  This worksheet can be downloaded and imported into either Excel or Open Office to assist researchers to calculate the proposed research budget.

- **CIHR Peer Review Guide** http://www.cihr-irsc.gc.ca/e/4656.html
  Research funding guide that includes budget preparation guidelines. .

K. References and Bibliography

Researchers often use style and databased software to help them to organize their reference resources and to format their reference and bibliography lists correctly using the common citation styles such as APA or Chicago Style.

- **End Note** http://www.endnote.com/
  This popular bibliographic software is used by many academic institutions and researchers to provide a robust reference database. Also helps you to import citations into Microsoft Word when writing the research paper or proposal.

- **Biblioscape Research Information Manager** http://www.biblioscape.com/
  Another software package for organizing research and paper citations and reference data.

Style Guide Aids

- **Microsoft Office APA document template**
  https://templates.office.com/en-us/APA-styles-TM00002099
  This downloadable Word document (doc) can be imported to Word to guide the researcher in writing a research report using APA 6th edition style.

- **MLAGEN - MLA Auto-Generator** http://mlagen.sourceforge.net/
  This freeware bibliographic program helps to apply the MLA Style to documents and references.

References

Canadian Nursing Informatics Association (2003). *Educating tomorrow's nurses: Where is Nursing*

Informatics? Retrieved from the World Wide Web 07/18/05 from http://cnia.ca/OHIHfinaltoc.htm

Canadian Nurses Association. (2000). *Vision 2020 Workshop on Information and Communications Technologies in health care from the perspective of the nursing profession.* Ottawa: Author.

College of Registered Nurses of British Columbia. (2006). *Entry-level Registered Nursing practice: Competencies and Context.* Vancouver: Author.

Dick, B. (1997). *A naive philosophy of action research*. http://www.scu.edu.au/schools/gcm/ar/arp/naive.html

Staggers, N., & Bagley Thompson, C. (2002). The evolution of definitions for nursing informatics: A critical analysis and revised definition. *Journal of the American Medical Informatics Association, 9*(3), 255 – 262.

Streubert Speziale, H. & Carpenter, D. (2003*). Qualitative Research in Nursing: Advancing the Human Imperative.* Philadelphia: Lippincott.