Making it All Line Up
Alignment of Research Design to Theory and RQs

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Alignment of Research Design

- Lit Review
- Theories
- RQs
- Research Paradigms
- Research Methods
- Data Analysis
- Findings
Research Paradigms

- Quantitative
- Qualitative
- Single Subject
Research Paradigms

- Deductive approaches?
- Inductive approaches?
Quantitative research is DEDUCTIVE & generally uses scientific methods which can include:

- The generation of models, theories and hypotheses
- The development of instruments and methods for measurement of hypotheses
- Experimental control and manipulation of variables
- Collection of empirical data
- Modeling and analysis of data
- Deductive evaluation of results tied to theory, models or hypotheses
- Goal of generalizing findings to other populations
HOT TOPIC

Promoting motor skill competence in preschool children who are developmentally delayed & from disadvantaged environments

NASPE, 2009
Dynamic Systems Theory

Motor performance results from a dynamic process that is the product of the influence of multiple subsystems operating within a person (e.g. motivation, balance, strength).

When examining movement output the investigator should consider the influence of individual (person), environmental & task constraints that shape performance.
Quantitative Research Questions

- What is the influence of the SKIP motor skill program on the motor skill competence of disadvantaged preschoolers?

- Are there gender differences in motor skill competence prior to and following the SKIP motor skill program?

- Tie back to theory:
  - Task – FMS Competence
  - SKIP program provides an environmental constraint
  - Consider the learner characteristics in developing the SKIP program (e.g. delay, cognitive development, etc.)
What is the influence of the SKIP motor skill program on the motor skill competence of disadvantaged preschoolers?

Hypotheses – directional – based on literature

- H₁ - No group differences at pretest
- H² - SKIP group significantly better than Control group across the intervention (from pretest to posttest)
- H³ - Group differences at posttest – SKIP group better than Control group
- H⁴ - Control group will not change from pretest to posttest
Quantitative RQs - Hypotheses

- Are there gender differences in motor skill competence prior to and following the SKIP motor skill program?

- **Hypotheses: - Directional**
  - H¹ - There will be no gender differences in locomotor skills prior to the SKIP intervention.
  - H² – There will be gender differences in the OC skills prior to the SKIP intervention.
  - H³ – Gender differences in the intervention group present at the pretest will not be present at the posttest.
Quantitative Methods

- **Context** - Disadvantaged community – describe the community in detail to help situate the reader’s understanding of the context of the study.

- **Participants**
  - Randomly assigned to 2 groups:
    - SKIP
    - Comparison
    - Age, Gender, Ethnicity
    - Where were the participants recruited? At risk preschool
    - Other factors - # of risk factors, family unit, income level of mother, education level of mother etc.
Quantitative Methods

- **Variables** (go back to RQs)
  - **Dependent Variable** – motor competence
  - **Independent Variable** – SKIP intervention

- **Design**
  - Pretest-Posttest experimental design

- **Measuring your DV**
  - Select an instrument that best helps you answer your RQs for the population you have selected to study.
Selecting Your Instrument

Selecting an instrument is like hiring someone for a job. There are many possibilities but you need to decide who is the best applicant (which is the best instrument for the job).
What to Consider

✔️ What job are you hiring the instrument to do?

➢ Consider the kinds of characteristics that your instrument will need to possess in order to be valuable for you.

➢ Think about your theoretical orientation and how this might influence selection of an instrument?
Considering Your Applicants

- Identify a list of potential candidates (different kinds of instruments) from:
  - Literature review

- Consider their strengths & weakness for the job:
  - What is helpful?
  - What is a problem?

- Select an applicant (instrument) who provides the best overall value.

Know other instruments & be able to provide a rationale as to why you selected yours.
Quantitative Methods

- Dependent Variable - motor competence

- **Why Test of Gross Motor Development 2**
  - Age range 3-11 years
  - Normed over a national sample in USA
  - Measures FMS competence that uses skills that have direct relationship to PE curriculum
  - Easy to administer
  - Does not require specialized equipment
  - Can be done in the school site
Quantitative Methods

- **Independent Variable**
  - Describe in detail so the reader knows what the experimental manipulation is:
    - Preschool program + SKIP program vs. preschool program alone
    - Describe factors like time, duration, intensity
  - Establish *intervention efficacy* – a process measure (assessment) that convinces the reader that the intervention was delivered as it was described.
Quantitative Methods

- Procedures Considerations
  - Ethics - Human subjects consent
  - Chronological timeline of what happened in study
  - **Inter-rater** reliability of assessing DV (rating between 2 different raters – also called inter-observer agreement)
  - **Intra-rater** of assessing DV (rating within 1 assessor over the timeline of the study – inter-rater drift)
Quantitative Methods

- **Statistical analysis**
  - Select the statistical approaches that allow you to answer your RQs – look to the literature for how other people have done this.
  - Consider the type of data you have (ratio, ordinal, nominal)
  - Power analysis – is your N big enough to run the analysis
  - Statistical assumptions – check your data meets the statistical assumptions
  - 2 Group (SKIP, Comparison) X 2 Time (pretest, posstest) X 2 Gender (girls, boy) ANOVA with repeated measures – look for **Group X Time & Group X Time X Gender interaction**
Qualitative researchers aim to gather an in-depth understanding of human behavior and the reasons that govern such behavior.

Often smaller, but focused, samples are selected rather than large samples. Qualitative methods rarely claim to generalize findings to other populations. It produces IN DEPTH information on the particular cases studied. After reading the research the reader is left to determine the ways in which the findings generalize to his/her research.
Qualitative Research - Inductive

- Cases (participants) selected *purposefully*, according to whether or not they typify certain characteristics/contextual locations.
- **Researcher lens** - researchers reflect on their role in the research process & make this clear in the analysis.
- **Interpretive** - Make meaning of the data collected
- **Holistic & contextual analysis of data** rather than being reductionistic and isolationist. Nevertheless, systematic & transparent approaches to analysis are almost always regarded as essential for rigor.
- **Inductive analysis** – data drives modification of the Research Questions, the assertions developed, & conclusions made.
Theory for My Hot Topic

- Social Constructivism

- Constructivism is a theory of knowledge (epistemology) that argues humans generate knowledge and meaning from an interaction between their experiences and their ideas.

  - Each learner is unique, complex, & multidimensional with unique needs and backgrounds. This view of the learner promoted & supported in learning environment.

  - Encourages the learner to arrive at his or her version of the truth, influenced by his or her background, culture or embedded worldview.
Qualitative Research Questions

- How do children make individual meaning as they participate in the SKIP motor skill program and how do individual characteristics influence their understandings?
- What is children’s understanding of their changing motor skill competence across the SKIP motor skill program?
- How does the SKIP program influence children's motivation to be physically active?
- Tie back to theory:
  - Children are unique and their understandings will be different.
  - Focused on how children “see” their own motor competence not actual motor competence.
Single Subject Research

• Group of research methods often used with behavioral theory & applied behavior analysis in the experimental analysis of behavior.
• Focus on the **conditions surrounding the change in a specific behavior**.
• Behavior analysis is data driven and typically inductive
• Focus on the observable relationship of behavior to the environment
• By functionally assessing the relationship between a **target behavior** and the **environment**, the methods of Applied Behavior Analysis can be used to change that behavior.
• Chart the behavior & visual examination of findings
Single Subject Research

- Four principal designs in this type of research are:
  - **Changing criterion** – change level of reinforcer & see what happens to behavior – develop a functional relationship between level of reinforcer & behavior change.
  - **Reversal ("ABA")** – Baseline=A, Treatment=B (observe how behavior changes) return to Baseline=A (behavior should go back to baseline)
  - **Alternating treatments** – change treatment rapidly & see effect on behavior
  - **Multiple baseline** – Grp 1-Baseline then apply treatment & see how behavior changes. Grp 2-baseline is longer & then apply treatment. Grp 3-longer baseline etc. Controls for learning effects.
Chart Example

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*Words Read Correctly by Billy Under Two Conditions*

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Theory for My Hot Topic

- BEHAVIORISM
  - The research paradigm of single subject research and the theory of behaviorism are linked closely.
  - Looks at the reinforcers (conditions) surrounding a behavior being produced.
  - Reinforcement processes shape behavior.
  - Behavior change results from application or removal of specific conditions of reinforcement.
Single Subject Research Questions

- Examine the effects of the SKIP instructional approach on low skilled male and female students opportunities to respond (OTR) in performance of the overhand throw for force.
  - Will OTR increase under the SKIP condition as compared to baseline?
  - Will there be gender differences in the way students respond to SKIP condition?
- Tie back to theory:
  - A (baseline=traditional approach) – B (SKIP approach) – A (baseline) – how do OTRs change
  - Conditions influence behavior - the application and then removal of the SKIP condition shows relationship between SKIP and OTR
What Have We Learned?

• A hot topic can be looked at from many different perspectives
• There is often a relationship between research paradigm and the theory selected
• There should be STRONG relationship between THEORY and RESEARCH QUESTIONS – these two aspects should align
• The design of the study will come from the way the RQs are framed and the theoretical perspective
TASK

• Read your article and identify:
  – Theory
  – Purpose statement
  – Research Questions
  – Headings and subheadings from the methods
• Report back to the large group
• Well things well laid out in the article?
• What have you learned from this exercise?