

**USING ‘*PARTICIPATORY ERGONOMICS*’
APPROACHES TO DEVELOP APPLIED
WORKPLACE RESEARCH AND EFFECTIVE
WORKPLACE INTERVENTIONS.**

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ERGONOMICS RESEARCH

- An 'expert' approach
 - Traditionally a mixture of quantitative experimental studies in both lab and field settings
 - Occupational Biomechanics
 - Work Physiology
 - Cognitive Processing
 - Etc.
 - Fitting a task to a worker
 - An overabundance of analyzing 'human factors' issues and standards
- Injuries are multifactored: physical, psychosocial and organizational
Theberge et al. (2006)
- Laboratory studies are not consistent with needs of industry
Buckle et al. (2011)
- Quantitative field studies do not account for organizational context and employee issues



ERGONOMICS RESEARCH & PRACTICE

○ Poor knowledge exchange?

- Ergonomics research is most often funded through health research initiatives
 - Knowledge for reducing musculoskeletal disorders, accidents, etc.
- Employers and OHS practitioners are now ignoring most ergonomics research
 - Laboratory results are not relative to industrial situations or problems, but rather reflect a measureable outcome the researcher is interested in.
For Example: balance and back pain
 - Research knowledge often isn't shared outside academia

Buckle (2011)

○ An example of 'helicopter research'?

- Employers, employees and unions see no benefit to quantitative studies that collect data, analyze, and provide 'physical' solutions and leave.
 - Scientifically valid, but do not take into account reality of the work, production needs and employee interactions
 - 'Side-effects'

Carrivick, Lee, Yau, & Stevenson, 2005



Conditions and methods used

- Machinery available
- workstation layout
- environment
- techniques used (posture)

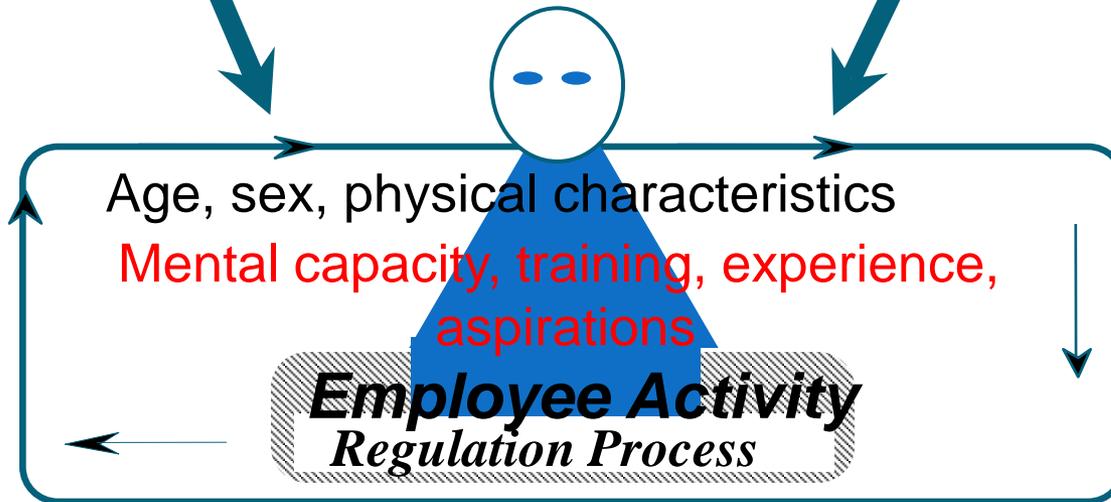
Factors from other individuals

- co-workers
- managers/supervisors
- clients

Production Factors

- Quantity and quality

Items dealt with in traditional consultancy, and even then not fully understood



~~Equilibrium~~

Health

Production



THE REVOLUTION IN ERGONOMICS APPROACHES

- Perspective on multiple factors requires social interaction and knowledge exchange between ergonomists and key stakeholders

Vézina et al., 2003; Laville et al., n.d.; Guerin et al., 2006

- Adapting approaches:



PARTICIPATORY ERGONOMICS (PE)

- Participatory ergonomics (PE)
 - “The **involvement** of people in planning and controlling of their work activities, because they have sufficient knowledge and power to influence both **processes** and **outcomes** in order to achieve desirable goals.”
 - Wilson & Haines (1997)
- PE requires key company stakeholders to be involved during all phases of the intervention
 - Managers, employees, maintenance, etc.
 - Involvement includes
 - Education
 - Selection of intervention areas
 - Assessment
 - Development of solution
- Uses stakeholder knowledge of social and organizational factors to identify issues and develop effective solutions



PARTICIPATORY ERGONOMICS (PE)

- Stakeholders help us to understand organizational requirements and employee psychosocial factors; solutions are then more consistent with reality of work
- Stakeholders are more likely to accept ergonomics programs and changes if they were involved in the process
- Train employees to understand some ergonomics principles; work with them
- Leave behind a team that has knowledge and capacity - sustainability

Laing, et al., 2005; Saleem, Kleiner, & Nussbaum, 2003; St Vincent, Kuorinka, Chicoine, Beaugrand, & Fernandez, 1997; Rivilis et al., 2008; Zalk et al. (2001); Rivilis et al., (2008)





- PE has shown positive health outcomes in:

- Construction, health care, home care, offices, food processing, etc.
- Bohr, Evanoff & Wolf, 1997; Evanoff, Bohr & Wolf, 1999; Pohjonen, Punakallio & Louhevaara, 1998; Udo, Kobayashi, Udo & Branlund, 2006; Hess, Hecker, Weinstein & Lunger, 2004; Moore & Garg, 1998; Vezina et al., 2000

- Systematic reviews on PE have shown that it results in positive improvement to workplace factors and employee health

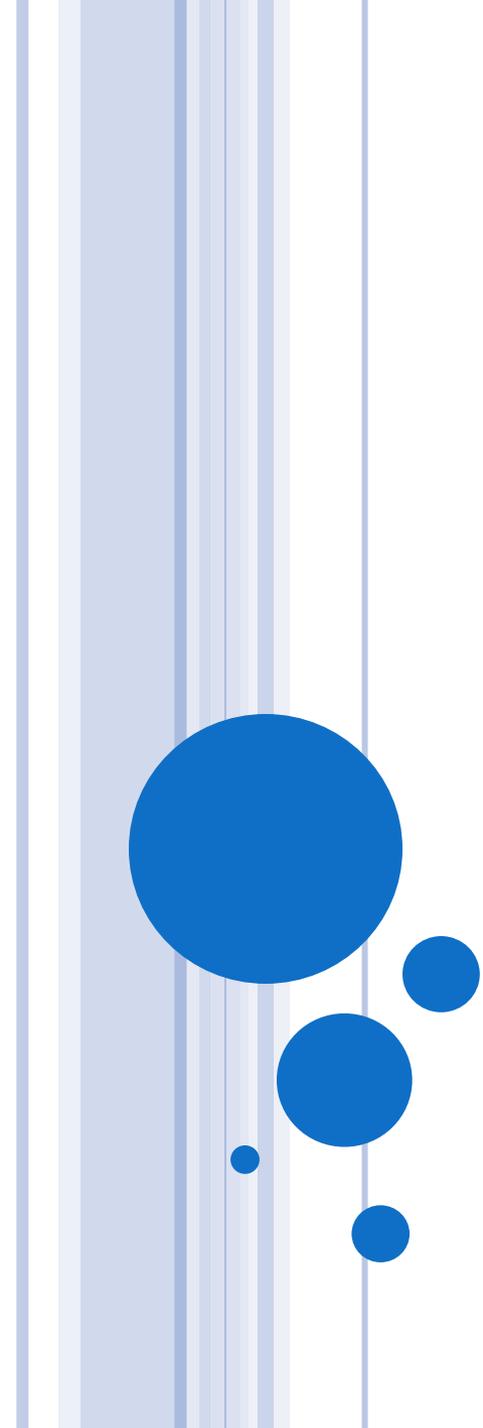
- Rivilis et al., 2008



WHY PE RESEARCH IS NEEDED:

- This is a relatively new field
 - Need better knowledge of how to develop partnerships, train stakeholders, gather knowledge, apply solutions, evaluate, etc.
- There are many different industries, and situations that need to be evaluated to provide guides for PE interventions
- PE is often criticised by quantitative scientists studying physical ergonomics principles
 - They claim we need to better formalize the process and evaluation to show quantitative, physical, benefit.
- Provide information to OHS practitioners and ergonomists to help them run PE interventions
 - More effective changes for worker health than 'expert' approach





**DEVELOPMENT OF PARTICIPATORY
ERGONOMICS APPROACHES FOR RURAL
AND REMOTE SEAFOOD PROCESSING
FACILITIES IN NEWFOUNDLAND AND
LABRADOR**

BACKGROUND

- ▣ Rural Newfoundland and Labrador
 - Reliance on fish processing as the main resource
 - 'Boom or bust' production
 - Older population of workers
 - High incidence of work-related musculoskeletal disorders (WMSD)



- ▣ Repetitive work in food processing, leads to WMSD.

Madeleine, Voigt, & Mathiassen, 2008; Marsot, Claudon, & Jacqmin, 2007

- ▣ Lack of resources to hire external help
- ▣ Public resources are limited; unable to reach rural communities regularly



ERGONOMICS TEAMS AS A MEANS OF HELPING RURAL SEAFOOD PROCESSING PLANTS

- A common PE approach is the Ergonomics Team model
 - places the Ergonomist in the role of expert facilitator guiding development of a *Ergonomics Team*, or *Ergo-Team* made up of representatives from employee, management and OHS levels of the company
 - The team selects issues to deal with, conducts analysis and interviews with their peers, synthesizes information and propose solutions

(Rivilis, et al., 2008)

- Strengths
 - Enhanced communication
 - Improved employee buy-in
 - Added contextual knowledge
 - Enhanced sustainability



KNOWLEDGE TRANSFER TO ACTION PROJECT (2006-2009)

- CIHR funding - KTA grant
 - Two goals:
 1. Train NL researchers to do PE research through interactions with established PE researchers from Quebec
 2. Development of ergonomics capacity within rural and remote fish processing plants by training Ergonomics Teams to deal with WMSD
- Dr. Nicole Vézina (UQAM) worked with NL researchers to start the process and train the researchers/ergonomists to run the program
- Recorded experiences, lessons learned, processes, etc
- The full approach to making an Ergo-Team had never been captured and codified



SAFETYNET'S ERGO-TEAM APPROACH

- Worked with a plant that had previously had research projects involving SafetyNet – participatory, but analysis was driven by researchers
- Development of a Ergo-Team with representatives from:
 - Middle management (supervisors, technicians, maintenance staff)
 - Employees from production line
- Upper management decision makers form an external steering committee for the Ergo-Team to report to
- Trained by ergonomist
- Team members complete interviews with peers, analysis, developing solution
 - Peers more comfortable talking with the team, analysis and solution development includes worker and management concerns and viewpoint
- Ergonomist provides advice, facilitate conversation, adds expertise



MEMBERS ARE TRAINED IN:

- Ethical concerns for the ET members
- Selecting areas for intervention
- Developing interview skills; using interview tools
- Training in traditional ergonomics
- Video recording and analysis
- Reviewing results
- Brainstorming solutions
- Preparing reports
- Implementing changes
- Evaluating and following up with those changes



THE *ERGO-TEAM*

Included on team

○ Management:

- One line supervisor
- One representative from the maintenance department
- OHS Representative

○ Employees

- 4 total employees
- 2 were Union executive members.



TIMELINE OF ERGOTEAM'S PROGRESS

- Training occurred over six 8-hour sessions, over a period of 2 months
 - Intermittent visits by researchers from St. John's

May and June of 2007

- An area for intervention was selected
 - Employees of the area were interviewed, had their work analyzed, asked to offer information about work organization and psychosocial factors, and offer suggestions for improvement

July, 2007



TIMELINE OF ERGOTEAM'S PROGRESS

- The information gathered by employee members of the ErgoTeam is taken to the full ErgoTeam
 - Brainstormed solutions to meet the needs of each group (management, maintenance, employees)
 - Solutions were ranked and discussed
 - The top solutions were presented to management and the OHS committee

August of 2007

- Changes were later implemented for the 2008 season





PROJECT OUTCOMES: AT THE PLANT

- Evidence of ergonomics capacity?
 - The creation of Ergonomics Team led to:
 - Members accurately analyzing tasks and describing anatomical movements and ergonomics risk
 - Formalized involvement of the Ergo-Team in OHS activities
 - Budget items provided for team's materials
 - Effective changes to workstation designs in 'crab butchering' stations that led to lower reports of MSD symptoms among workers, maintained production standards; satisfaction with changes

(Antle et al., 2008; MacKinnon, Molgaard, Antle, Vézina, McCarthy, Neis., in preparation)
- However, the team did not stay together following the off-season
 - Sustainability was absent without continued ergonomic facilitators/researchers
 - Recommend public health and WHSCC find a PE-trained ergonomist to work with plant – providing periodic visits to maintain momentum
 - Less expensive than full consultancy approach, once Ergo-Team is set



PROJECT OUTCOMES: FOR RESEARCHERS

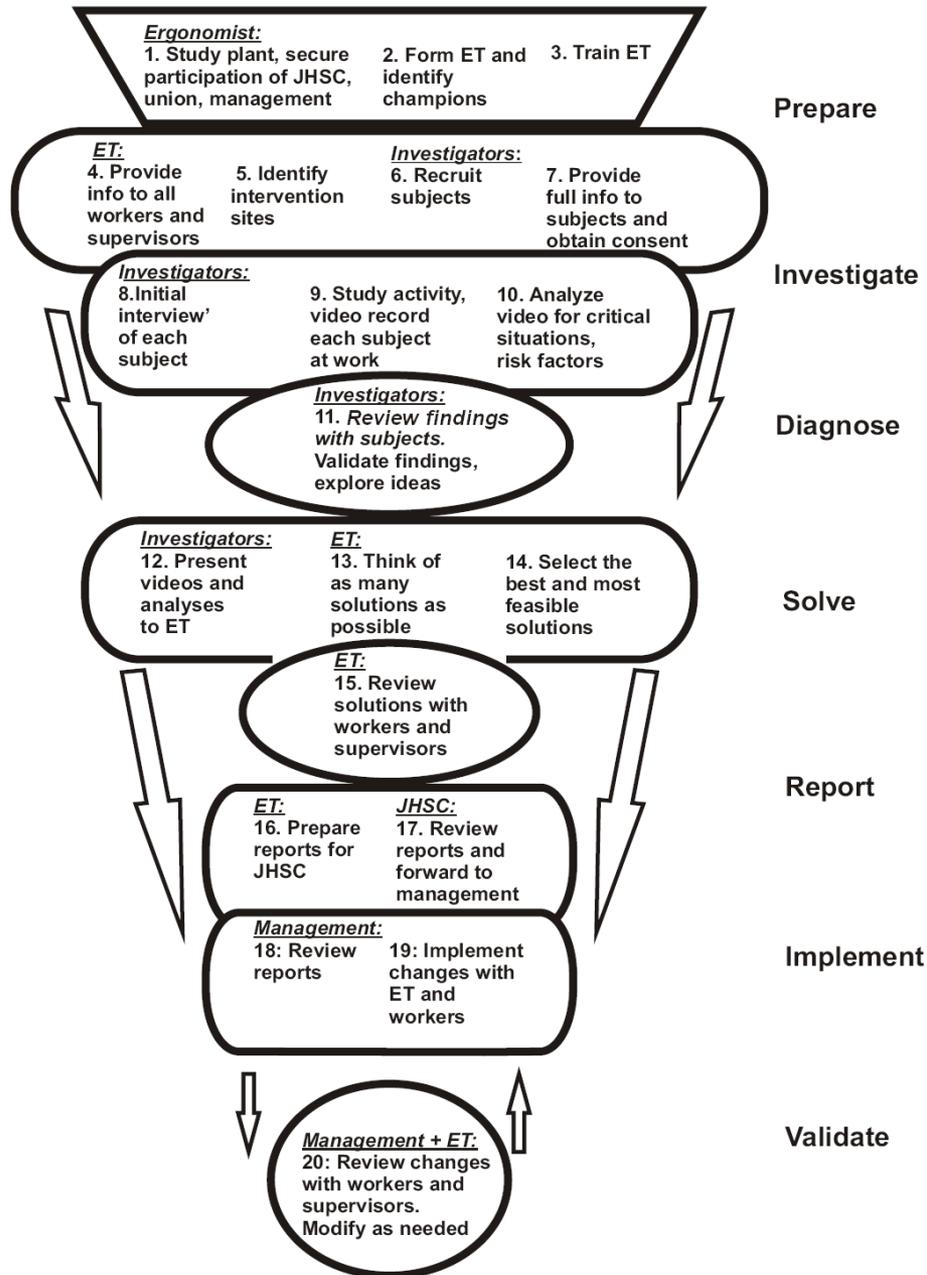
- The process was very time consuming – more than expected
 - Dr. Vézina was unable to stay in the province long term
 - Negotiating participation without her expertise was sometimes hard
 - Interview and analysis tools were adapted to fish processing
 - The idea of empowering employees to this level was new.
 - Added tools for ethics training, training on ergonomic analysis, case studies, developed affordable video analysis
 - We had to gain experience
- A practicing ergonomist, or another researcher group, would likely require resources to apply this Ergonomics Team approach
 - Otherwise, PE Ergonomics Team approaches would not be cost-effective



OUR GOAL:

- Develop a resource package for Ergonomists
 - Captured the approach taken by Dr. Vézina
 - Supplemented with key literature
 - Added our own model and key factors that contributed to success
 - Held a workshop with key PE researchers in Boston in 2007
 - Ran the Ergo-Team program at a second seafood processing plant in rural NL





THE PACKAGE:

A Team Approach: A guide to implementing Participatory Ergonomics in a workplace

- A promotional video
- An ergonomist's guide
- A training manual



THE VIDEO

A Team Approach: Participatory Ergonomics and Your Workplace

- Promotional video
 - Mixture of local actors and narration
 - Explains the process, key stakeholder roles and requirements
 - Key elements of the SafetyNet approach
 - Helps enterprise stakeholders decide if this approach will work for them



THE GUIDE

An Ergonomists guide to implementing an Ergonomics Team approach to Participatory Ergonomics

- Steps by step guide
 - Summarizes key literature
 - Outlines role of ergonomist, stakeholders
 - Success factors; potential issues
 - Outlines each step of the model

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An Ergonomist's Guide to Implementing an Ergo-Team Approach to Participatory Ergonomics

Prepared by
David M. Antle, Dr. Barbara Neis, Dr. Scott N. MacKinnon,
Margaret Ann McCarthy, Dr. John Molgaard, and
Dr. Nicole Vézina



TRAINING WORKBOOK

- This workbook contains modules on:
 - Ethical concerns for the ET members
 - Selecting areas for intervention
 - Developing interview skills
 - Training in traditional ergonomics
 - Video recording and analysis
 - Reviewing results
 - Brainstorming solutions
 - Preparing reports
 - Implementing changes
 - Evaluating and following up with those changes



TRAINING WORKBOOK

- Each section is divided into training modules
 - Including attached training tools (PowerPoints, training videos, analysis tables, etc.)
 - Outlines of specific learning objectives
 - Activities and discussion questions

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An Ergonomist's Training Workbook for Developing an Ergo-Team Approach to Participatory Ergonomics

Prepared by

David M. Antle, Dr. Barbara Neis, Dr. Scott N. MacKinnon,
Margaret Ann McCarthy McCarthy, Dr. John Molgaard, and
Dr. Nicole Vézina



STRENGTHS OF THE PACKAGE:

- Inclusion of French and English views on Participatory Ergonomics
- All materials are located in one place; free of charge
- Good mixture of academic literature and practical experience
 - Sounds theory and practice



LIMITATION OF THE PACKAGE

- First hand experience of the authors includes enterprises in a `rural and remote context` only
- Only two `research` plants



FOLLOW-UP PROJECT

- The 2nd plant we applied the program in:
 - Team was able to finish the training and successfully identify ergonomic risk factors during video analysis
 - However:
 - They did not complete interventions
 - Very reluctant to share information within the team and with researchers.
 - Lack of 'buy-in' from management and union.
 - We theorized that the process worked better at the 1st plant because of previously developed ergonomics research relationships before taking on an Ergo-Team project.
 - We started with some 'trust' before entering into a major project
 - Might previous relationships help foster participation?



ONGOING RESEARCH

- The tools are intended for use in any work context but we need to capture these experiences
- Currently, applying the tools as part of my PhD work at a granola bar plant here in Montreal
- Learning about:
 - Share laboratory research and quantitative analysis
 - Establishing trust and partnerships
 - Variable structure to the team – smaller group, more interaction
 - Importance of new actors in the process – ie: Human resources managers
 - An ‘urban’, non-seasonal context
 - Power of consistent contact between researcher and the team
 - Adapting and adding tools for new types of work analysis
- Looking to apply other participatory research ideas about tracking capacity building, establishing sustainability
- A full report next year at PRAM?





COMMUNITY-BASED PARTICIPATORY- ACTION RESEARCH AND PARTICIPATORY ERGONOMICS:

**A review of knowledge exchange opportunities
between two fields of participatory research**

PARTICIPATORY RESEARCH

- Community based Participatory Action Research (PAR) is common in many fields of health research
 - medicine, population health, community health, health promotion, etc.
- In ergonomics, participatory models are a common strategy to run interventions
 - work-related injuries, accidents and other workplace health comes;
 - *In English literature, termed Participatory Ergonomics (PE) approaches*



SIMILAR FIELDS WITH DIFFERENT STARTING
POINTS ????



PAR

- Enhances comprehension of the social and cultural dynamics
- Integrates the knowledge gained into the intervention to improve the health and well-being of community members
- Develops knowledge and capacity of community stakeholders
- Develops sustainability so community can continue intervention and improve their health

Israel, Schulz, Parker, & Becker, 1998; Tandon, et al., 2007; Cargo & Mercer, 2008.

PE

- Stakeholders help us to understand organizational requirements and employee psychosocial factors; solutions are then more consistent with reality of work
- Stakeholders are more likely to accept ergonomics programs and changes if they were involved in the process
- Train employees to understand some ergonomics principles; work with them
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Laing, et al., 2005; Saleem, Kleiner, & Nussbaum, 2003; St Vincent, Kuorinka, Chicoine, Beaugrand, & Fernandez, 1997; Rivilis et al., 2008

GIVEN THE SIMILAR CONCEPTS AND GOALS.....

- Why is there limited sharing between the two fields?
- Some PE works have noted the use of PAR (Rivilis, et al., 2008; Bohr, et al., 1997),
 - But, in general PE authors cite only other PE authors
- It also seems PE is not normally included in PAR reviews



GIVEN THE SIMILAR CONCEPTS AND GOALS.....

- Through a comparison of literature in these fields, I noted:
 - There are several PAR concepts that would serve PE well
 - There are several PE approaches that would serve PAR well





LESSONS FROM PAR FOR PE:



GAINING PARTNERSHIP

- Researchers and practitioners of ergonomics often struggle to develop the socially-constructed partnership

Vézina & Baril, 2009

- There are models and guidelines available in PE literature
 - But no specific information on fostering initial partnerships
- In health research several reviews have covered this topic, and several steps are offered as a guide:

Bradbury & Reason, 2003; Cargo & Mercer, 2008; Isreal et al, 1998

- 1) an agreement over operating norms
 - 2) identification of common goals and objectives
 - 3) democratic leadership and representation,
 - 4) the presence of a community organizer
 - 5) involvement of a support staff
 - 6) opportunities for the researchers to explain their roles, skills and competencies to participants
 - 7) opportunities to investigate any prior community involvement with research
 - 8) opportunities to identify the key members of the community who must be involved.
- 

ETHICAL CONSIDERATIONS

- Ergonomists have an excellent code of ethics about the general practice of ergonomics (**Association of Canadian Ergonomists**)
- BUT – it would be pertinent to have an expanded knowledge of ethical obligations.
- Macaulay et al. (1999) noted that in PAR:
 - Strong ethical practices allow high quality training, development of infrastructure, and data collection and storage.
- In 2004, Minkler provided a review of key ethical issues in PAR:



- “Community-driven issue selection”
 - Are projects and research questions coming from researchers or community members?

 - “Insider-outsider tensions”
 - Are community members fearful of researchers? Are researchers willing to allow community members to have influence? Are there pressures on the groups to take part?

 - “Racism and cultural humility”
 - Are there various subgroups in the community that are not being heard? Isolated? Discriminated?

 - “Participation and its limitations”
 - Is the participation straining normal activities of the community or participants? Longer work hours?

 - “Sharing findings and getting to action”
 - How much consideration is given to who will own data, how it will be published and disseminated, and what can/cannot be shared?
- 

PRINCIPLES OF CAPACITY BUILDING:

- Workplace interventions strive to leave behind knowledge, develop capacity
- This is implied in ergonomics, but theory behind enhancing capacity building is limited
 - We also lack ways of tracking it
- In PAR, this is a more defined concept in some ways



- In terms of theory – we can learn from these summarized theories of capacity building :

Crisp et al., 2000

1. **Bottom-up organizational approach**
2. **Top-down organizational approach**
3. **Partnerships**
4. **Community organizing approach**

- Often 1, 2 and 3 are needed throughout life of project so that 4 can be attained
- Hawe et al. (1997) suggested analyzing several categories to evaluate capacity building





LESSONS FROM PE FOR PAR:



- Tandon et al. (2007) noted to improve PAR they needed:
“Training for community partners “ and “resources/tools to develop community partners’ skills”

- This is something ergonomics has become very good at:

- Strategies to overcome time management issues in busy occupational settings

Bohr, Evanoff, & Wolf, 1997; Evanoff, Bohr, & Wolf, 1999

- Training strategies such as “train-the-trainer” and “peer-to-peer” training

Vézina et al., 2000; Antle et al., 2011

- ‘Ergo-Team’ resources that outline the steps required to train individuals, set up organizational support structures, and develop learning culture

Wells et al., 2001; Rivilis et al., 2008; Haines et al., 2002

- Isreal et al. (1998) “conducting community assessments/diagnostics is a key factor to facilitate successful PAR”

- No models or structure to do this are outlined in PAR literature

- In ergonomics, there are defined sets of tools and approaches for this



CONCLUSIONS

"You say you want a revolution....."



- There are lessons and guidelines PAR and PE can share. We can add to our approaches
- Ergonomics work is valuable to PAR— but we need to communicate better
 - Or, at least have expanded justification of our approaches
- Could PE frameworks be part of the larger participatory research revolution?
ergonomics training? Or, vice-versa?...
- Together, PAR and PE have larger body of evidence and lessons that can overcome criticisms



THANK YOU!

- All questions, comments and feedback are welcomed
- Follow this and many other topics on my ergonomics research website:

www.cafeergo.com

www.twitter.com/cafeergo



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