

THE LIMITS OF EMPOWERMENT IN ANTI-NUCLEAR ADVOCACY: A CASE STUDY OF ADULT EDUCATION FOR TECHNOLOGICAL LITERACY

Robert Regnier and Phillip Penna

Inter-Church Uranium Committee Education Cooperative

Abstract

This paper identifies limits to empowerment in critical adult education through the work of the Inter-Church Uranium Committee Education Cooperative (ICUCEC) that organized public participation in the environmental impact assessment hearings for three uranium mine projects in Saskatchewan, Canada. This account locates its analysis within the work of critical adult education theorists particularly M. Collins, H. Giroux, P. Freire, and K. Fleming, who recommend emancipatory possibilities for social and political development. As a form of self-critical analysis, however, this account brings to bear Jennifer Gore's caution about empowerment rhetoric as ideology in critical theorizing. More specifically, this analysis identifies limitations to development of citizen empowerment within a project to oppose uranium mining. The article reviews the educational politics of public hearings, where citizen groups scrutinize environmental impact statements prepared by corporate experts in submissions to environmental assessment panels. To analyze the politics of empowerment, the authors use Fleming's theory of technological literacy. They examine ICUCEC's work to access technical expertise, develop resource packages, facilitate educational tours, conduct workshops, arrange for special presentations to the panel, and provide public information to support public participation in these hearings.

Résumé

Cet article signale qu'il existe des limites à l'appropriation de pouvoir à travers les activités d'éducation des adultes. Le groupe Inter-Church Uranium Committee Education Cooperative (ICUCEC) encadra la participation du public lors d'audiences sur l'évaluation d'impact minier de trois projets d'extraction d'uranium en Saskatchewan. Notre analyse puise ses sources dans les travaux de théoriciens critiques en éducation des adultes, notamment de M. Collins, H. Giroux, P. Freire, et K. Fleming, qui recommandent une approche émancipatrice au développement social et politique. Or dans une perspective d'autocritique, il faudrait rappeler la mise en garde de Jennifer Gore qui soutient que la rhétorique de l'appropriation peut devenir une idéologie en théorie critique. Plus spécifiquement, la présente analyse circonscrit les limites de l'appropriation chez les citoyens engagés dans un projet d'opposition à l'extraction d'uranium. Cet article propose un survol de la politique éducative des audiences publiques, où des groupes de citoyens examinent les études d'impact environnemental préparées par les experts de la grande entreprise et soumises aux comités d'évaluation environnementale. Afin d'analyser la politique de l'appropriation, les auteurs s'appuient sur la théorie de l'alphabétisme technologique de Fleming. Ils examinent les efforts déployés par ICUCEC pour avoir développer l'expertise technique, mettre sur pied des ressources, animer des tournées éducatives et des ateliers, organiser des présentations spéciales,

et diffuser des renseignements susceptibles d'améliorer la participation du public lors d'audiences semblables.

As the new millennium approaches, many citizen groups continue to challenge nuclear industry expansion as a technology that dominates humankind. This paper analyzes one citizen group's work to educate a technologically literate citizenry capable of challenging uranium mine development. It reviews how a critical pedagogy approach was used in a project to support the development of adult technological literacy, how the recommendations of a government panel were influenced by participants in the project and how the use of critical pedagogy was limited in bringing about desired changes. This study is critical about the claims of critical pedagogy in regard to empowerment and transformation. It shows that although critical pedagogy assumptions were the basis of a project to stop the opening of uranium mines by empowering citizen participation, this participation could not stop the project. Citizen participation was unable to prevent corporate and state initiatives to open uranium mines.

In 1992 and 1993 the ICUCEC undertook to assist citizens prepare and present submissions to a federal-provincial review panel which considered proposals to open seven uranium mines at three sites in Saskatchewan, Canada. ICUCEC was established in 1980 after church and citizens' groups opposed construction of a uranium hexafluoride refinery near Saskatoon, Saskatchewan, Canada. Its membership, based ecumenically in Christian churches, continues to engage in research, education and political lobbying to establish a moratorium on uranium mining. Over the years, it has organized conferences on, and campaigned on, issues related to uranium mining; participated in public hearings on uranium mining projects; and published materials to contest and oppose the development of uranium mining in Saskatchewan.

The cooperative spearheaded the formation of a Coalition of provincial groups to construct a support infrastructure. The Coalition invited speakers to provide international perspectives on issues related to uranium mining, contracted expert assistance to analyze technical issues in the industry's Environmental Impact Statements (EIS), problematized issues and formulated critical themes for citizen consideration that were distributed through resource packages, and provided logistical support for citizens to present submissions to an assessment panel.

Critical Adult Education: Engagement in the World

Critical practice calls for direct engagement in definable projects for social change without which talk of justice, emancipation, and equality becomes hollow rhetoric. Adult educators, as the primary agents of a transformative pedagogy, need to follow,

...the examples of those who implement strategies for change and resistance justifiable in terms of their understanding and analysis. (Collins, 1991, p. 119)

The work of ICUCEC and the Coalition provides an example of adult educators who use transformative pedagogy to directly challenge "compliance with the ideology of technique" (Collins, 1991, p. 118). The ideology of technique is no more evident than in proposals to expand uranium mining. In these proposals, proponents advance their justifications for mine development in environmental impact studies that calibrate public, environmental, and worker risk; and safety in technical studies. Government appointed panels consider these proposals within the broader public belief in progress, the profitability of uranium sales, and the vested interests of nation states and transnational corporations. Panels that consider these environmental impact studies in public hearings are essentially concerned with *how* uranium should be mined safely not whether it should be mined. Public interest groups that claim commitment to justice, emancipation and equality participate in public hearings processes to ensure that issues which might be excluded from more thoughtful considerations are included, to ensure that hearings processes are in fact public and include "significant" and "informed" rather than token participation, and to move toward notions of equity in power relations where corporate initiative and authority dominate.

This paper is framed within the call for a grounding of adult education within a commitment to emancipatory moral aspirations. While these aspirations have been formulated in various versions, Michael Collins offers a view which reflects and affirms the work of ICUCEC.

What remains vital for a critical practice of adult education is not so much the theoretical graspings towards an assured rationality, but their actual expression in a thoughtful pedagogy with aspirations to justice, emancipation and equality. More than ever these historical aspirations need to be sustained in a way that releases pedagogical possibilities of forming collective consciousness. (Collins, 1991, p. 119)

The work of ICUCEC is informed by various theological and philosophical considerations about justice, emancipation and equality manifest in 15 years of action to oppose uranium mining and nuclear expansion. While its membership sustains a continuing discourse about its purposes and foundations, it is not dependent upon a single certain rationality for action. Within the rigors of constant critical self-reflection, its members have criticized the industry for links to nuclear weapons production, radioactive pollution of the environment, corporate and government domination, and health hazards it presents to workers. Since its formation in 1980, it has researched industry claims, engaged in education projects and lobbied governments to provide a public interest education on nuclear issues. Through this critical education practice ICUCEC members have researched and re-created their own commitments to shaping public consciousness.

Collins' notion of adult education as vocation also characterizes the ethical framework of many anti-nuclear activists who challenge the expansion of uranium mining and other nuclear developments.

Vocation refers to a calling and entails firm commitment to the performance of worthwhile activities that are not merely calculated to advance personal career aspirations or fulfil minimum job expectations. It incorporates a strong ethical dimension, emphasizing an unavoidable necessity to make judgements about what should or should not be done and a readiness to take sides on significant issues. (Collins, 1991, p. 42)

Collins' characterization of adult education as vocation encompasses a "passionate devotion" of many antinuclear activists who oppose uranium mine expansion because of the unacceptable risks they see it poses for just and equitable human development. There is certainly no career advancement to be found in opposing this expansion, as this opposition leads to no direct economic rewards, and in a society where pronuclear ideology dominates, activists may jeopardize their prospects for employment and advancement by publicly opposing the industry.

While the work of critical theorists of adult education such as that by Michael Collins provide a broad framework for this work, we comment on the Committee's project through Fleming's theory of technological literacy. In his theory, he suggests that persons can become empowered by examining the costs, benefits, and social forces which drive technological developments (Fleming, 1989, p. 394), and he argues that human possibilities can be generated through written literacy. He proposes that this literacy, in which imagination discloses realities and offers alternatives, is distinct from the literacy of reading that copies and reproduces. Furthermore, Fleming views technologies as sociotechnical systems of manufacture and use, well beyond the worn notions of technology as hardware and know how. Technological literacy, in this view, consists of creating critical and imaginative understandings of sociotechnical systems of manufacture and use through writing. From his theory, Fleming recommends three educational implications for teaching technological literacy. First, education must allow participants to view technologies as sociotechnical systems of manufacture and use. Second, education must allow learners to understand what technological knowing is. Third, to overcome citizens' impotence in democratic societies where technological developments are proposed, education must advance the citizen as "decision maker."

This examination of ICUCEC's work is constructed through the observation and critical reflection of its authors, who worked for and assisted ICUCEC in its educational strategy to foster public participation in the hearings and who made presentations to the panels. Phillip Penna was the Coordinator of ICUCEC during the hearings process and Robert Regnier, a founder of ICUCEC, also made presentations to the hearings. The commentary provided is constructed, therefore, from the perspective of participation and observation. Offering a critical commentary on the work of the Committee as it relates to considerations about critical adult education. While this commentary provides a critical reflection on the

elements of critical theory, it is not intended nor designed to be an evaluation or assessment constructed within an empirical or positivistic model to offer verifiable proof. The value of this work is in showing how two participants in a critical adult education project have come to see the limitations of "empowerment" of participants.

While citizen empowerment through technological literacy in this project may be significant, it is, nevertheless, limited. While education for technological literacy in this project empowered citizens to prepare and submit papers to an environmental assessment hearing which significantly affected the assessment panel's recommendations, government decisions in response to the panel only partially reflected citizens' views. Within the overall federal-provincial government framework for assessing proposals to mine uranium, uranium mining companies can keep returning with proposals to advance projects. The public can comment to shape and stop particular proposals, but they can not stop uranium mining. Citizen empowerment supports the contention that within a democracy where transnational corporations have a considerable power of advocacy in relation to political parties, civil society, and state interests, the empowerment of citizens' groups through technological literacy may forward critical understanding and generate oppositional possibilities, but it does not fundamentally alter the corporate power structure nor the technologies they challenge.

Uranium Mining in Saskatchewan: Public Consent

Uranium mining began in Saskatchewan in 1953, and shipments for weapons purposes in the United States continued from that time until the late 1960s. Few people, including those who had opposed nuclear weapons testing at that time, understood the relationship between uranium mining in Saskatchewan and nuclear weapons production. Only in the 1970s did uranium mining have to be publicly defended. With growing public awareness of the relationship between the harmful effects of nuclear radiation and health, particularly after the Three Mile Island accident in 1978, nuclear expansion could not be taken for granted. Instead, the nuclear industry has worked to make uranium mining politically secure. In Saskatchewan, the industry has established important relationships with Saskatchewan's educational institutions as part of a much broader set of public relations strategies, which includes garnering the support of political parties as well as sectors of civil society (Regnier, 1987, 1989, 1993a, 1993b). New uranium projects require broad-based and long-term public support to sustain nuclear expansion strategies and to ensure that government will design and construct favorable environmental regulations, and provide economic and political support. In Saskatchewan, governments have used public inquiries and hearings to advance mining projects and assure the public that potentially unsafe and uneconomical projects do not proceed.

Saskatchewan is currently the largest producer of uranium in the world. Uranium companies plan a significant expansion of production in Saskatchewan.

They have proposed to develop twelve mine sites through six separate project proposals.¹ This expansion will maintain the mining of uranium in Saskatchewan as the current mines run out and will bring into production large reserves of uranium on a continuing basis for the next several years. In 1992 and 1993, uranium mining companies presented Environmental Impact Statements (EIS) for four projects to two environmental assessment review panels. The first EIS (Cameco and Uranerz, 1992) was examined by a federally appointed panel to consider a proposal for an expansion of the Rabbit Lake mine in northern Saskatchewan. A panel appointed jointly by the governments of Canada and of Saskatchewan considered three separate EISs (Amok Ltd., 1992; Midwest Joint Venture, 1991; Minatco Ltd., 1991) for an addition of one mine site to the Cluff Lake Uranium mine, five new mine sites at McLean Lake, and the development of a new mine site at South McMahan Lake. As a result of these reviews, the panels recommended approval of only two of ten sites considered and rejected eight for immediate development.² The provincial government then approved nine of the ten sites. In the approval process, several concerns raised by the panels were reflected in the government's stated requirements for mining to proceed. However, there were major differences between the panels and government on matters of decommissioning and revenue sharing with northern communities.

Citizen challenges to uranium mining proposals from transnational corporations are not just challenges to the simple opening of a mine. They are challenges to the profitability of corporations; corporations that may be regulated to implement high-cost health and safety, or decommissioning requirements, or which may have their security of supply disrupted. They challenge all sectors of the economy and society that have become dependent upon nuclear development or that benefit from it. They challenge, for example, charitable, arts, and sports organizations that receive grants from uranium mining companies, schools that receive scholarships, joint projects generated by mine development and maintenance, contractors interested in mine construction, workers who want employment, and governments that seek taxes and royalties. Furthermore, citizen challenges to mine expansion are challenges to the national security of countries such as France that are dependent on security of uranium supply for military purposes and power production. Compared to citizen groups such as the ICUCEC with little or no money to hire technical experts to prepare interventions, transnational corporations are able to

¹ The six separate project proposals are for: (a) Rabbit Lake Uranium Mine Expansion, (b) Dominique-Janine Extension at the Cluff Lake Uranium Mine, (c) McLean Lake Uranium Project, (d) Midwest Uranium Project, (e) Cigar Lake Uranium Mine, and (f) McArthur River Project.

² The first panel (responsible only to the federal government) that considered Cameco corporation's proposals for three mines at Eagle Point, and Collins Bay A and D zone mines, approved only one. The federal-provincial panel recommended approval of the Dominique-Janine Extension at Cluff Lake, that the mine of the Midwest Joint Venture was "not acceptable" and that development of the JEB and Sue A, B and C deposits of McLean Lake be delayed for five years. The provincial government approved all the proposed mine sites except Midwest Joint Venture.

fund proposals and plans for mining development, as well as public relations and for lobbying expertise directed toward securing that development.

The Politics of Environmental Impact Assessment Hearings

Before a company can begin mining a particular site in Saskatchewan, each mine project must be scrutinized by a provincial, federal, or joint provincial-federal review panel which examines its environmental impact statements. An EIS is prepared by, or for, the proponent of each project considered by a panel. Each EIS describes and shows need for the proposal. It describes the environment and use, the social pattern in the area, and predicts how potential adverse impacts will be reduced or avoided. EISs are submitted to panels that prepare recommendations for the provincial and federal governments.

The EIS states where the proposed development will occur, how long it will last, how it can be carried out, and the preferred way to do this. The EIS also describes how adverse impacts can be avoided and minimized. The EIS is submitted to the panel and made public. Indeed all submissions to a panel during this, or any other part of the review, become public information and are maintained on a public file. The panel also allows sufficient time—usually a minimum of 60 days—for review participants to examine and comment on the information it receives before the public hearings. If the information in the EIS is adequate, the panel proceeds to hold public hearings. If the EIS is deficient, the panel requests more information and the hearings are delayed until the material is received and reviewed. (ICUCEC, 1992)

The panel could recommend that the mines should not be constricted. It could recommend that mining proceed but only under certain conditions. Or, it could recommend that the mining proceed as planned (ICUCEC, 1992). After the recommendations are made public in a report to the government, the government decides whether to permit the company to mine the proposed site and under what conditions.

Government decisions may follow panel recommendations or ignore them (ICUCEC, 1992). If the Government approves a project, it must then determine the terms of the lease agreement required by the company to mine. The conditions for mining included in the terms of the lease agreement can bear upon health and safety for both workers and the general public, and are formulated within a political measure of public tolerance and support. Public support for uranium mining makes it easier for governments to permit uranium mining projects to proceed, to impose lower standards and fewer requirements, and to regulate mines less stringently. Public scrutiny of proposals can be occasions to organize opposition to particular projects and to provide sharper criticisms which may be reflected in panel recommendations for higher standards and increased monitoring, in government decisions not to allow mines to proceed, and in the terms of the lease agreement and other regulations.

The decision of ICUCEC to assist citizens to participate in the federal-provincial environmental assessment hearings for the Cluff Lake, Midwest Joint Venture, and McLean Lake uranium mines was made with the clear understanding that citizen participation in environmental impact assessment hearings have serious limitations. By participating, citizen groups fall within parameters of participation set out by regulations governing the hearings process. For example, in controlling public meetings, the chairperson may exclude questions the panel considers are outside the terms of reference or are needlessly repetitive. Citizen participation is circumscribed by decisions of particular panels to interpret their guidelines, assess interventions and make judgments from which to construct recommendations. Citizen groups take into account the will of governments which select panel members, set out the broad terms of reference and time lines for hearings, and make decisions about projects in light of panel recommendations.

Many environmental and antinuclear groups reject participation in EIS hearings and undertake other forms of education about and opposition to nuclear development. In Saskatchewan, many environmental groups boycotted the first major government inquiry into the future of uranium mining conducted in 1977. They argued that the government did not provide adequate time and financial resources to make participation worthwhile, and the fact that lakes were being drained for mine construction during the inquiry was already evidence that the hearings were a facade of public participation (Gunn, 1983, p. 17-18; Gruending, 1980, p. 15-18). Many Saskatchewan environmental and public interest groups also boycotted a major inquiry into a mine proposal in 1980 because the terms of reference were too narrow, and to participate would have legitimated a hearings process that would not consider questions about the relation of uranium mining to weapons production, corporate domination, aboriginal land rights, and pollution and the whole nuclear fuel cycle. However, antinuclear and concerned citizen groups participated in hearings undertaken by FEARO in 1979 that stopped the construction of a uranium refinery near Saskatoon. On this occasion, 300 presentations were made by citizens and groups who opposed its construction.

Although it recognized many limitations to the hearings process, ICUCEC decided to participate in federal-provincial hearings in 1992 that would consider three mine proposals. As Phillip Penna, the coordinator of ICUCEC at the time and an author of this paper recalls, ICUCEC members agreed to participate for four reasons articulated in discussions at its regular meetings prior to the hearings. First, to decide not to participate in the hearings would have isolated ICUCEC and other public interest groups from the current discourse on uranium mining in the province. Hearings are a learning process for antinuclear and advocacy groups where their participation requires them to become informed about proposed technologies, and about how to criticize these technologies. One becomes knowledgeable by reading documentation and criticisms, formulating criticism into coherent written form, and defending submissions to the assessment panel in the presence of a panel of industry representatives. In this process and by questioning and challenging industry representatives on their proposals and presentations,

participants learn how the industry frames and defends its positions, and how it constructs discourse rules and patterns to justify and advance its interests.

Second, ICUCEC wanted to create alliances with citizen groups locally, nationally and internationally which could be sustained after the assessment panel made its recommendation and the government made its decisions. Although influencing the final report of the panel and the government's decision were immediate goals of participating in the assessment process, building continuing resistance to uranium mining and other nuclear developments was the long-term goal. While ICUCEC could continue to address uranium mining issues through other activities, the hearings provided an occasion to revitalize support and to reach groups it had not previously contacted.

Third, the hearings were an educational resource. With the funding it received from the FEARO intervener funding program, ICUCEC could employ an expert to analyze the EIS and interpret it so it would be comprehensible and consequently more widely open to analysis and criticism. From this analysis, resource materials could be created for citizen education, and citizens could be assisted to critically assess industry proposals, as well as assisted to research, prepare, present, and defend their submissions to the panel. Through these activities, citizens concerned but uninformed about issues could learn more and become more articulate and politically forceful about their concerns.

Fourth, the hearings could be used to expose federal and provincial government complicity in nuclear weapons proliferation. Since its *Atoms for War* Conference in 1980, ICUCEC had worked to trace connections between uranium mined in Saskatchewan and Canada and nuclear weapons production and testing programs in the United States, United Kingdom, France, India, and other countries. With Cogema, a French government corporation, dominating uranium mining expansion in Saskatchewan, the hearings would provide a forum and an occasion to address concerns about linkages between Saskatchewan uranium mining, French nuclear weapons testing in the South Pacific, and French nuclear weapons production.

Technological Literacy as Education for Empowerment

Much critical adult education theory regards empowerment as making possible practical action that resists, contests, disrupts, opposes and transforms dominating processes while generating possibilities for alternatives that contribute toward human emancipation (Apple; 1979, Fleming, 1989; Freire, 1971, Giroux, 1983; Weiler, 1988;). Fleming (1989) recommends technological literacy to empower citizens to increase democratic participation in technological societies. According to Fleming, social change in these societies is driven by political and economic elites who advance technologies that serve their own interests. While the creation of these sociotechnologies serve elites, they may not serve the best interests of many other socioeconomic groups nor the broad interests of humankind. In contrast to viewing literacy as reading to understand text where one takes on meanings formulated by

others, Fleming advances literacy as writing. He views writing as moving from the external copying to authoring, an original act of synthesis and revision of "inner speech" (Fleming, 1989, p. 392). Within this framework, it is possible to view writing as a means for reflection on values and knowledge through which one is freed from the singularity of ideas. Through writing, one can subject various claims to scrutiny, interpret for meaning and value, imagine possibilities, and make assessments and judgements against various criteria and within alternative frameworks. Empowerment in this framework is freedom not only "from" what is presented, but "for" what has not yet been stated and can be created.

Fleming recommends three requirements for technological literacy. First, for adult educators to construct pedagogies that make technological literacy possible, technology must be viewed as sociotechnical systems of manufacture and use in which one understands relationships between society and technology. Besides being viewed as having technical aspects consisting of hardware and know how that includes information, machinery, skills, and processes, technology within this perspective is seen to consist of systems of manufacture including public policy, administration, engineering, and design, and of systems of use which can become embedded in the culture. Because much current thinking is dominated by views of technology as tools for use, hardware and know-how, educational processes intended for learners to recognize technology's social, cultural and political dimensions need to shift thinking beyond the technical norms.

Second, technological knowledge needs to be recognized as "a unique form of cognition" in direct contrast to technology as applied science. In recognition of the limits of scientific knowledge as the primary or only components of technological knowledge, Fleming draws on Staudenmaier's four components of technological knowledge, two of which are scientific concepts and problematic data (Fleming, p. 395). Because the abstract ideas of scientific concepts "do not deal with the exigencies of time, cost and personnel" (Fleming, 1989, p. 395), Staudenmaier recognizes that scientific concepts are altered to meet specific project demands. In this context, where science is one component of technology, educational processes must work to have learners see past notions that confuse technology with science or with the cultural reverence for science. Through the second component, technologies are viewed as dealing with problematic data because they exist within the historical exigencies of "design concepts... limited material and societal contexts" (Staudenmaier in Fleming, p. 396). In contrast to this historical characteristic of technology, abstract theory remains unaffected by historical reality. Emerging, normally used, and difficult technologies have technical problems or "areas of ignorance" which can not "be completely understood" and about which questions will be "asked and possibly inadequately answered" (Staudenmaier in Fleming, p. 396). The requirements of engineering design and technical skill therefore separate technological literacy from viewing technology as science and simply as applied science.

Fleming's third requirement for citizen empowerment in a technological society requires that one "gain a realistic picture of a decisionistic society" (Fleming, 1989, p. 399). He develops his account of a decisionistic society from Habermas. In this society, the elite at the top of the social hierarchy does not have the highly specialized skills of technical experts at lower social levels. Technological outcomes are driven by elite interests with assistance of these experts.

The process is driven by an elite (or elites), a group or organization which commands the economic and political resources necessary to implement a new technology. Because of its command of these resources, this group, not the creator of the technology, legitimizes the deployment of the technology. (Fleming, 1989, p. 398)

For example, investments in uranium mining have been driven by scientific-military-industrial elites in several countries while endangering populations through weapons build-ups (Regehr and Rosenblum, 1983). While some stocks in uranium mining companies may be owned by some employees who work for them, these companies are owned primarily by governments (for example the government of France owns Cogema), and by investors with capital. These governments and owners of companies contract experts to design, advance and construct projects they want.

Elite access to this technical expertise is an important part of developing power relations and political domination of technological development. Technical experts, ...pass their expertise up but are expected to restrict the flow of expertise down to the next layer, the general public [which] is offered only carefully selected information about technical issues. The resulting ignorance results in a sense of powerlessness and depoliticization. (Fleming, 1989, p. 399)

Proposals for uranium mines, for example, are constructed by experts for their owners to mine uranium at a profit, to pass the scrutiny of environmental assessment, and to meet the requirements of regulations. To have their proposals pass scrutiny of environmental assessment hearings, technical experts are employed to construct documents which advance and advocate project acceptance. They are not employed to advance criticism of their own proposals nor argue for frameworks of criticism that will result in their proposals being rejected. Nor are these experts hired to assist those critical of uranium mining development to make arguments in support of criticisms nor to assist them in locating weaknesses in their proposals that might jeopardize them. If the public and public interest groups want to critically assess mining projects, they must obtain their own resources to fund their own experts who would assess the proposals.

Within Fleming's framework, "opposition to government policies is only possible for those with access to their own experts" (Fleming, 1989, p. 399). With this technical and social expertise, rational decision making requires consideration of a full range of concerns by its interested citizens. Decision making constructed from limited perspectives and vested interests results in "decisionism," ungrounded

decisions, decisions made with insufficient justification, decisions which reflect the interests of an elite rather than the common good. Experts can assist citizens decode the technical aspects of technological projects, reveal theoretical frameworks they are constructed within, and probe assumptions upon which they are built.

Anti-Nuclear Advocacy as Technological Literacy

In this project, ICUCEC's anti-nuclear advocacy focused on assisting interested people prepare and present written submissions to the joint federal-provincial panel that considered the Cluff Lake, Midwest Joint Venture, and McLean Lake Environmental Impact Statements. ICUCEC studied hearings, regulations, and requirements; spearheaded construction of a coalition of organizations to apply for FEARO intervener funding; built a research and education strategy; contracted and supported Radioactive Waste Management Associates (RWMA) to prepare technical briefs and a resource package; and advanced the project to the panel hearings. This section describes ICUCEC's work to tour visiting speakers to communities, contract expert assistance to analyze and interpret the three environmental impact studies, prepare a resource package to explain the hearings process and some technical issues to interested citizens, arrange for special presentations to the panel, hold workshops and provide logistical support for presenters, and provide public information to foster technological literacy about the proposed uranium mines. The next section analyzes some aspects of this work through Fleming's three educational implications.

Technical expertise. The three environmental impact studies provided by the industry posed considerable difficulty for ICUCEC because of the technical discussions presented in them. ICUCEC and the Coalition³ wanted to determine what the cumulative effects of these uranium mines, all proceeding at relatively the same time, would be on the region of the mining in particular and the world in general. This general question was the basis of more particular questions about air quality, water quality, and the handling of mine tailings. The Coalition needed someone to analyze the impact studies and respond to these questions; therefore it contracted RWMA.

ICUCEC was the principle protagonist in forming the Saskatchewan Uranium Coalition of eight Saskatchewan environmental, health, native, and church organizations. The Coalition applied for intervener funding from the FEARO Participant Funding Program to prepare for public hearings in May 1993. Funding was made available from the Government of Canada to those applicants who justified a proposal to the funding committee. The Uranium Coalition's funding application focused "on the health and environmental effects of wastes from the

³ The Coalition consisted of ICUCEC, Catholic Archdiocese of Keewatin-Le Pas, the Village of Green Lake, the International Uranium Congress, Community Health Services (Saskatoon) Association, Big RiveEnergy Alternatives, Pokebusters Citizen's Coalition, and the Regina Environmental Group.

existing and proposed mines" (Saskatchewan Uranium Coalition, 1991, p. 3). The application proposed examining these effects by "contracting the consulting services of Radioactive Waste Management Associates (RWMA) ... to review the available documentation on the effects of uranium wastes, critically assess the Environmental Impact Statements for current and proposed mining operations, prepare a report on potential environmental and health impacts" (Saskatchewan Uranium Coalition, p. 4). The three impact studies (AMOK Ltd., Midwest Joint Venture, Total Minatco Ltd.) were made available for public examination between December 1991 and March 31, 1992. RWMA criticized these documents as per application for intervenor funding and prepared "deficiency statements," which were submitted to the review panel on behalf of the Coalition. ICUCEC, which served as Coalition administration, distributed these deficiency statements to Coalition members who made them available to their membership. To expand involvement in the hearings, ICUCEC posted the documents on an international computer bulletin board run by the Association of Progressive Communications to make the analyses available worldwide.

Resource packages. After all the deficiency statements were submitted and studied by the Review panel, it declared that the original impact studies lacked significant information, and asked the companies to submit addenda to their studies. These requests provided much needed time for ICUCEC and the Coalition to expand their educational efforts beyond themselves. ICUCEC produced a resource kit called *Uranium Mining in Northern Saskatchewan "Is it Worth the Risk?"* With the assistance of RWMA, ICUCEC staff edited the deficiency statements into easy to read fact sheets for mass distribution. These were published in a package with introductory fact sheets prepared by the Campaign for Nuclear Phase-Out, a national antinuclear coalition, and by Jamie Kneen of the Inuit Tapirisat of Canada. The kit of nine separate four-page fact sheets provided introductions to issues of worker health, environmental protection, weapons connections, and economic development, radiation hazard issues related to air and water quality, assessment of tailings management, and mine decommissioning. Three booklets critically review the Midwest Joint Venture, McLean Lake, and Cluff Lake environmental impact statements based primarily on the technical reviews provide by RWMA. The three remaining booklets discussed concerns about the cumulative effects of mining the 12 proposed uranium mines and the 40 abandoned mines in Canada, the social and economic effects of uranium mining, and the hearings process for considering the three impact statements.

Educational tours. ICUCEC organized public speaking tours and open meetings in selected Saskatchewan communities for each of four speakers from other places affected by the nuclear industry. The tours were designed to build solidarity and encourage participation in the upcoming public hearings. They facilitated analysis of the relationships between uranium mining in Saskatchewan and nuclear developments in other parts of the world, and served as important venues to distribute the resource packages. The first tour was in October 1992. Lance Hughes, Executive Director of Native Americans for a Clean Environment

centered in Oklahoma, toured communities to discuss the damage to the environment created by operation of a uranium conversion facility which received shipments of uranium directly from a Saskatchewan mine. He brought with him an open letter from the Principal Chief of the Cherokee Nation, Wilma P. Mankiller, which described the situation resulting from the operation of the Sequoyah Fuels uranium processing facility. This facility converted natural uranium to uranium hexafluoride. Chief Mankiller stated that:

50% of the uranium processed at the facility comes from uranium mines in Saskatchewan, by way of Cameco Corporation. In fact, following a 6 month shut down by the U.S. Government, the facility was re-started with uranium from Cameco Corporation. Since the re-start, there have been 18 unusual events and the company has received 14 violations of their licence. Recent company reports show that an average of 7 people per month are contaminated with radiation. Additionally, there is an official estimate of 21,000 pounds of uranium that has leaked into the soil and ground water with equal amounts of thorium, radium-226 and many different chemicals including arsenic. (1992)

In other tours, a native journalist from Blind River discussed concerns about the effects of Cameco's uranium refinery built one kilometer upwind of the Mississauga First Nation; Mikhailo Prylutski, editor of the Ukrainian ecological journal "Green World," spoke about the effects of Chernobyl in the Ukraine; and Remuna Tufariua of the Polynesian Liberation Front from Tahiti spoke about the relationship between Cogema—a French mining company and project proponent—and the effects of French nuclear weapons testing in the South Pacific. The journalist described "the many health problems in her community as a result of a series of radioactive spills and accidents at the Cameco uranium refinery there. The most serious accident took place in May 1990, when 178 Kg. of yellowcake was released into the environment" (ICUCEC). The editor of *Green World* warned that "What happened at the Chernobyl nuclear reactor may be the last forewarning of a worse catastrophe" (E. Karmin, *Moose Jaw Herald Times*). Remuna Tufariua called for opposition to uranium mining by French corporations because of the linkages to nuclear weapons testing in the South Pacific.

Workshops. ICUCEC offered workshops to Coalition members and church groups to discuss the review process, the new uranium mines, and the technical issues addressed in the resource package.⁴ These workshops introduced people to many issues associated with the mine proposals, assisted them to decide what issues to address in their public presentations to the panel, and provided some documents from its resource library. Participants presented their papers to the assessment panel. The panel heard submissions in May 1993 at public hearings in Saskatoon and several other communities in Saskatchewan. The panel of five members chaired by Dr. Donald Lee sat at a table in front of the audience. To the

⁴ Workshops were held at the Prairie Christian Training Center, United Church, and Saskatoon Community Clinic.

left of the panel was a second table of as many as seven representatives from the companies who prepared the impact statements: Denison Mines, Total Minatco, and AMOK-Cogema. An audience of presenters and interested persons often filled the hearings room as television, video, and audio recordings of the proceedings were prepared for official transcripts, media outlets, and a video production company. Each presenter was allocated 30 minutes to make a presentation and respond to questions from the panel, industry representatives, and anyone in the audience. As the panel traveled throughout the province, Coalition members followed it to monitor evidence and arguments.

Special presentations to the panel. To ensure that certain voices and positions be heard, ICUCEC solicited presentations to the panel in person. Because of its hinterland location, expert presentations were solicited from urban centers a great distance away. Personal presentations were solicited from Dr. Gordon Edwards, President of the Canadian Coalition for Nuclear Responsibility, Montreal; Philip Harrison of the Navajo Nation in New Mexico; Marvin Resnihoff of RWMA, New York; Remuna Tufariua of the Polynesian Liberation Front, Tahiti; Gunter Wippel, Anti-Uranium Mining Institute, Freiburg, Germany; and Jim Garret of the Lakota Nation in South Dakota. These presenters gave testimony to the review panel, and met with media, citizens groups and politicians in the province.

Public information. For these national and international guests, ICUCEC organized media conferences, private television and press interviews, radio phone-in shows, meetings with various organizations, community sharing circles and a public celebration called "Honour Mother Earth Day." The public was alerted via posters about the hearings and where and when the guests made presentations.

ICUCEC had initiated a public education approach that provided technical and technological analysis, literature to interpret that analysis, solicitation of concerned citizens to speak to the social, economic and political dimensions of nuclear development in their lives, community meetings and workshops to consider and debate issues, and a multifaceted media campaign to inform the public. The educational meetings brought people directly affected by nuclear technologies into communities where they explored the social consequences of the technology. Technological know how put into real social and political contexts fired imaginations and motivated some into participating in the public hearings process. Though the ICUCEC membership was generally satisfied with the results of this program, these efforts failed to influence participation in the public hearings from northern residents as significantly as their efforts in southern communities. The meetings held in northern communities produced results which were less productive. While these meetings provided forums to become acquainted and to share questions of concern, they did not result in much direct participation in the hearings. As well, while ICUCEC and the Coalition successfully motivated some individuals and organizations to present briefs, they made no impact on larger organizations like the Saskatchewan Urban Municipalities Association,

Saskatchewan Rural Municipalities Association, and Chambers of Commerce. Their strategy failed to address these kinds of organizations.

Technological Literacy and the Assessment Hearings

Fleming's theory of empowerment provides three components of education for technological literacy through which to review ICUCEC's work to support citizen empowerment hearings through participation in the impact assessment hearings. Approximately 150 (Lee, 1993, Appendix D) persons and groups formally submitted written and oral presentations to the review panel during the public hearings. All oral presentations were recorded and transcribed in the *Transcript of Public Hearings*. Selections from some submissions, the transcripts and the panel's final report reveal how some presenters argued their opposition to the projects. In the analysis below, the submission of some presenters to the inquiry are reviewed through Fleming's three educational components to demonstrate how they constitute empowerment through technological literacy.

This analysis uses examples from participant presentations to highlight how their examination of issues constitutes a form of empowerment to challenge company proposals in the environmental impact statements. This analysis is not designed as a systematic study of participant presentations nor of the use of ICUCEC materials or support systems. Instead, the analysis provides a general commentary constructed from the authors' overall understanding and assessment of how some participants in the process were empowered to critically consider and challenge company proposals. This commentary illustrates how the work of ICUCEC and the Coalition supported the development of technological literacy as viewed through Fleming's theory.

Understanding uranium mining as sociotechnical manufacture and use.

To highlight how some presenters viewed the technology of uranium mining in relation to social and cultural values, it is worth reviewing how uranium mining is more than tools and hardware. Uranium mines are constructed through webs of social, economic, political, and cultural relationships. Besides transforming immediate environments by digging out vast open pit mines, depositing ore from underground on the surface, constructing tailings facilities for hazardous radioactive waste, and drawing and releasing effluent from and to local ecological systems, uranium mining requires corporate organization to design and advance projects, secure funding, ensure political support and public consent, meet regulations and requirements, procure chemicals and materials, market and transport product, account for income and expenditures, hire and fire employees, etc. Each part of this sociotechnical system of manufacture serves the total system of manufacture to advance the corporate profitability and other interests. Roads, airport, communications, and other systems new to the area shape sociocultural patterns of transportation, social relations, and politics. Besides affecting systems locally and regionally, mining requires political and economic systems to facilitate

product refinement and enrichment, use in reactors for the generation of electricity, and by the military for weapons, and eventual disposal as waste.

Many presenters who opposed uranium mining at the hearings criticized mining for imposing socioeconomic-sociotechnical structures that conflict with what they value. These presenters viewed mine developments as presenting obstacles to other economies. Because radioactive contamination through water and air is taken up by plants and wildlife, they questioned the compatibility of this mining with other economies. One presenter, for example, saw that "uranium mining is incompatible with hunting, trapping and fishing, northern fishery development, tourism and ecotourism" (Gagne, 1993, p. 1). In her presentation to the panel, Joan Scottie, resident of Baker Lake who represented the Inuit Tapirisat of Canada, the Baker Lake Concerned Citizens, and the Keewatin Inuit Association, made comments to the panel based on her experience with the proposed Kigavik uranium mine near her home. She saw uranium mining technology with its radioactive emissions from a proposed mine and mill site, and mine exploration as potentially interfering with traditional economy based upon caribou and livelihood. Scottie said:

...my people have depended on those caribou for hundreds and thousands of years. They have supplied our needs for all that time. And we have nothing to replace them with even if we wanted to. There is simply no substitute for caribou food and clothing and it is hard to express their cultural importance. We can not stand by and see them contaminated or disturbed. Even if the chances are small, what is at risk is too important to be put in any further jeopardy. (1993, pp. 1-2)

Joan Scottie presents mine development as related directly to social, economic, and cultural organizations, and offers a blistering attack on the Denison mine proposal, a proposal the panel eventually recommended to not be accepted and the government agreed not to accept. She speaks to the incompatibility of uranium mining with a traditional Inuit economy as it is presented in the company proposal:

In general the whole issue of social, cultural and economic effects is still dealt with solely from the point of view that the mine would provide a few jobs, and **nothing else matters**. This is unacceptable, because I can tell you that for my people, our culture, our economy and our social well being are closely related. And they depend on our Inuktitut language and our traditions as much as they depend on cash money. (Scottie, 1993, p. 5)

Two presentations which used ICUCEC's resource package addressed health, safety, and weapons issues. One questioned whether the social benefits promised by uranium expansion in the late 1970s and early 1980s ever truly materialized. He analyzed health statistics of Northern Saskatchewan residents for the period of 1974-1988, to show an "alarming trend in cancers of the lung, breast, and cervix uteri" and a doubling in the death rate due to congenital anomalies below age one during 1984-1988, as opposed to a constant rate in Southern Saskatchewan (Curry, 1993, p. 2). He concludes:

...that not only have the promised benefits not materialized but Northern Saskatchewan has suffered some significant setbacks in social and clinical indicators. (Curry, 1993, p. 3)

While the final recommendations of the assessment panel suggest that it was moved by the substance of debate and presentations, the examples above illustrate the forms of analysis that ICUCEC and the Coalition supported through its work. An empirical study of how extensively presenters used resources, attended meetings and workshops, and were influenced by the Coalition may point more directly to the effectiveness of its work. Nevertheless, observations at the hearings and review of transcripts show that participants were critically aware of social, political and cultural dimensions of uranium mining, a critical awareness supported by the Coalition's work.

Technological knowledge. Throughout its work, ICUCEC and the Coalition sought to have participants become increasingly aware of the technological knowledge required to mine uranium, and to be able to critically discuss the limitations of this knowledge. Skepticism about the cultural reverence often accorded to science, and distinctions between science and technology, were important foundations for questioning the industry. Scientific investigation leading to the discovery of the atom and its power, and the subsequent scientific theorizing about the atom, assumes very different knowledge and interests than the technologies for mining uranium and constructing nuclear power plants. While scientists propose various theories in their attempts to understand and explain the world, nuclear technologies are designed to serve practical political and economic interests. The initial military interests in uranium to produce nuclear warheads, fueled engineering and other knowledge for technologies to mine, refine and enrich uranium, to build reactors and reprocessing plants to produce plutonium, and for fabrication plants to construct weapons. The demand for weapons initially drove development of uranium mining technologies that have had to respond to demands for increased safety.

ICUCEC and the Coalition carried questions about the adequacy of uranium mine technologies to safely mine uranium to the participants. As the EIS for each of the proposed uranium mine indicates, conditions for mine development vary with geography, hydrology, radioactivity of ore, chemical composition of soils, temperature, etc. In its efforts to address specific considerations, mine development is not a theoretical undertaking but rather a practical undertaking. This practical undertaking draws upon scientific assumptions and presupposes some scientific knowledge. Essentially, the task of mine engineers is to find a way to remove iron ore from its deposit and to mill it economically so the company can make a profit. Each of the six mine proposals heard by the federal-provincial joint panel differed according to depth of ore, the percentage of uranium in the ore, the chemical composition of the ore and the need for acidic or leaching technologies to separate the uranium, the flow of water into the shafts or pits and the need for dewatering technologies, the contamination of water and its release, design of tailings

containment systems to prevent radioactive release to the environment, and decommissioning. Each of these problematic areas can be addressed only within the limitations of current ideas, materials, engineering design possibilities, and available technical skill. In their work, ICUCEC and the Coalition drew attention to questions about the limitations of existing technologies.

To assist adult learners, the Coalition had RWMA analyze the impact statements (Goldman, 1992; RWMA, 1992; Uranium Coalition, 1992), and provide a criticism of the technologies proposed for the mines. The impact statements are technical documents that describe each mining and milling project, the processes used to mine and mill, the specifications for each project, various mitigation measures to protect the environment and workers, and decommissioning. The impact studies were prepared by experts in engineering, chemistry, and hydrology to garner approval of the assessment panel. Because these studies assume various forms of knowledge, they demand expertise to decode. To facilitate citizen examination of the EIS and submissions, ICUCEC made the RWMA analysis available to its members and interested parties. It also interpreted the analyses so they could be made available publicly.

The analysis of problematic data by participants supported the panel's formulation of 16 recommended requirements before a mine would be allowed to open. One problematic area involved the air quality, more specifically the release of radon gas from ore bodies, stock piles, waste rock, the mill, water treatment, and tailings. In its review, RWMA criticized the McLean Lake EIS as deficient in accounting for radon.

The boundary for the radionuclide dose assessment is defined by six critical receptor points on and adjacent to the McLean Lake property. This is a major deficiency of the modelling scheme because it does not take into account the total radiation dose commitments of all persons affected by radioactive releases.

Radon will be released to the air and be distributed throughout the Northern Hemisphere, affecting about 4 billion persons (over 100,000 years). As has been shown by AECB consultants, Projected by Radioactive Waste Management Associates for the entire Elliot Lake complex, hundreds of thousands to millions of lung cancers can be caused by radon releases from tailings (Radioactive Waste Management Associates, 1992, p. 4).

Over the long time period that tailings and ore at the mine sites will release radon gas, which mixes very rapidly with the atmosphere, the health of very many people can be affected. The concentrations of radon progeny, particularly polonium, in the mine areas are not monitored, however. Several presenters commented on this problem, two of whom, Edwards and Sheill, are quoted in the panel's final report. The panel recommended that "all reasonable measures should be taken to minimize the release of radon and thereby mitigate health risks" (Lee, 1993, p. 14). While the assessment of the EIS by RWMA will be contested by the mining

company, it is uncertain that radon gas release can be substantially reduced even though requested by the panel.

Other presenters commented on a wide range of issues including those associated with radiation doses and the monitoring of workers. Concerns were expressed over the allowable radiation dose levels in Canada and the relation of radiation doses to cancers in miners. In one area, it was argued that lowering radiation dose limits is unlikely to reduce collective doses because using more miners for shorter periods is likely to increase the number of cancer victims. In response to the discussions on this matter, the panel suggested tightening radiation dose standards by recommending "that measures be taken to implement the standards recommended by the International Commission on Radiation Protection ICRP-60 before approval of any additional uranium mines" (Lee, 1993, p. 17).

The analysis by RWMA and the resource packages prepared by ICUCEC provided learning possibilities for what ever participant use them. Through research, the preparation of arguments, and presentation to the panels, many participants learned more about the technology of mining uranium than they had previously known. They learned how uranium mining is related to standards of environmental and worker health protection, about problematic areas such as release of radon gas that while monitored is not prevented, and engineering designs for mining, tailings containment, and decommissioning. Technological literacy for these participants consisted partly of understanding the science behind uranium mining and of recognizing problems specific to the engineering and technical requirements to remove ore from the ground and uranium from the ore. While this analysis does not review the extent of the influence of ICUCEC's and the Coalition's work, it does characterize the type of adult learning conditions it was trying to create.

The politics of decision making. How do you empower citizens to participate in making decisions about uranium mining? In *Literacy for a Technological Age* (Fleming, 1993) Fleming's concern about "decisionism" rests with the willingness of elites to make decisions about technology based upon their own interests rather than on a broader common good. Citizens in democratic societies who experience "a sense of impotence" (p. 403) need to see beyond what is given by technical experts and to assert a "form of control" (p. 403). They need to recognize the difference between their own and elite interests. Recognition of this difference is the beginning of political awareness.

A depoliticized electorate has little use for personal decision making skills about technology if all technical decisions are made by the on-tap experts. [A] smattering of knowledge won't help decide whose expert is right. More important is that the person understand the value claims implicit in the conflicting positions and realize that a struggle over the acceptability of value claims is an inherent part of science and technology. (Fleming, 1993, p. 403)

Depoliticization of value claims as they relate to connections between Saskatchewan uranium exports to weapons manufacturing and testing states has

been a standing concern of ICUCEC. Initially, this concern was related to Cogema and AMOK, the French corporations that advanced the Dominique-Janine expansion at Cluff Lake. However, soon after the hearings began Cogema acquired interests in all proposed projects. ICUCEC wanted mining company representatives on the weapons testing, and wanted to challenge federal and provincial government complicity in weapons proliferation through uranium supply addressed. The sale of uranium from Saskatchewan to France has been linked to weapons testing through corporate connections with Commissariat Energie Atomique of the French government and sales of uranium to France where civilian and military uses of uranium are combined (Harding, 1984; McKay, 1988; Saunders and Bolt, 1984). More specifically, ICUCEC wanted France to terminate nuclear weapons testing in the South Pacific, wanted the Canadian government to support a Comprehensive Test Ban Treaty that was to be renegotiated in the next year, and wanted to support the independence and democratization of Polynesia.

Some presenters wanted the panel to address the relationships between the French presence in Saskatchewan and weapons testing. At his presentation to the panel, Remuna Tufariua of the Polynesian Liberation Front of Tahiti (French) Polynesia, linked the decision making at the hearings process to French colonialism and the desire for independence of the Polynesians.

After the Algerian independence in the 1960s, the French decided to begin nuclear weapons testing on two of our islands: Mururoa and Fangataufa. This was done without the consent of our people.

With respect to the French nuclear weapons tests at Mururoa, the people have absolutely no say in the matter, nor are they allowed access to information. Every aspect of the tests is secret, including information regarding contamination, medical statistics and accidents at the test sites. All the French try to do is to convince people, through the French controlled media, that the tests are safe. Several demands that independent scientists be allowed to examine bomb fall-out have been refused. Simply stated, our people do not exist in the eyes of France. If I am in Canada, it is because we want to be heard. We want to bear witness to what is happening in our country, with respect to French colonialism and nuclear weapons testing. We are not only victims of the colonial process, but also victims of one of your resources from Northern Saskatchewan: uranium. Uranium is the vital component in nuclear weapons. (Tufariua, 1993, p. 2)

Tufariua linked the disenfranchisement of the Polynesians under colonial rule to decision making associated with uranium mining in Saskatchewan. Saskatchewan citizens and the panel were confronted with value claims that dramatically politicized decision making about uranium mining. It was linked to the decision making about independence in the South Pacific.

We are completely opposed to continued French nuclear weapons testing, and, because we are affected by these tests, we are opposed to the expansion of uranium mining in the North. The source and the continuation of our suffering is your uranium and French colonial power.

I would like to remind you that those who decide are not necessarily those who suffer the consequences of the decision. We are, unfortunately, those who suffer.

From our side, along with nonviolent actions we organize, we firmly believe that the way to stop French colonialism and her nuclear weapons testing is through one thing: independence. We want the freedom to speak for ourselves and to organize ourselves. And for this, we need your help. (Tufariua, 1993, p. 23)

Several presentations, such as Tufariua's, broadened the perceptions of other presenters about the uranium mining as it related to current global issues. These presentations broadened considerations about uranium mining from technical to political dimensions. They highlighted differences in power relations among the assessment participants. With mine proponents present at the forum where they questioned and responded to interveners, many issues were identified and contradictions clarified. The presentations drew attention to the global environmental impact of uranium mining through the release of radioactive substances at the mine site and throughout the nuclear fuel cycle, as well as to the value of uranium mining when full socioeconomic costs and benefits are tallied. The hearings provided many participants a forum to articulate the grounds of their opposition to uranium mining and to make that opposition public. Because the panel could make recommendations to assist the government in its decision making, participation in the hearings constituted at least a partial way of addressing the "decisionism" of corporations and government.

Limits of Empowerment Through Technological Literacy

How do you empower people in disempowering situations? Hearings processes can be forums that disempower citizens and transgress the common good while legitimating vested interests in technological development. These processes privilege the proposals of corporations, with substantial resources to advance their interests. For legitimation purposes, such processes require citizen interveners who will scrutinize or appear to scrutinize industry proposals. If no interveners appear at hearings, governments and corporations argue that there is no public interest, and panels have no publicly generated issues to scrutinize. Interveners who participate do so with less resources, time, organization, and expertise than proposal proponents, they are subjected to the limitations of inquiry rules and regulations, and the product of inquiries are generally nonbinding recommendations to the government with its own interests. Citizens are disempowered by not participating in the hearings process because the proposals are advanced and projects advanced without criticism and possible amelioration. Citizens can also be disempowered by participating in processes in which proposals are examined in less than adequate conditions for critical scrutiny, where this scrutiny is not adequately translated into recommendations, and where governments do not heed recommendations.

Critics of critical pedagogy and empowerment theory in education argue that possibilities for empowerment are often overstated. Gore points out that the "constructions of empowerment... often reveal a 'will to knowledge'...that is so strong, that the need, desire, willingness to question one's work is lost in the desire to believe that one has found 'truth,' that one is right" (Gore, 1992, p. 66). Gore questions the optimistic view of agency, simplistic conceptions of power, "the tendency to overlook context" and lack of reflexivity among critical theorists as limitations to much critical pedagogy (Gore, p. 63). While one must be cautious about using empowerment ideology, it is important to recognize the limitations of Fleming's notion of technological literacy in this analysis. Fleming's notion of technological literacy is limited to the metaphor of written literacy. While the notion of written literacy might theorize how preparing submissions fosters critical and imaginative considerations, ICUCEC brought participants into the forum of the assessment hearings. The difference between writing to clarify thought on paper, and writing to present one's thoughts at a public forum can be dramatically different. The necessity of defending a position in a public forum requires the courage to present one's work publicly where it can be criticized. It requires preparation to redeem claims discursively. Compared to the essayist who does not face criticism directly, participants must be doubly prepared to conduct a defence. This act of questioning, confronting, and opposing the industry directly and publicly is a political act that places citizens self-consciously and critically into the sociotechnology of uranium mining development. In this forum, differences in power relations between the industry and the citizen are highlighted. The industry presides with the panel over questioning participants. Within Giroux's dictum to "act as if you lived in a democracy," many participants appear at the inquiry through an act of courage in which they place their thinking under the scrutiny of the state and corporate interests. Within the framework of this scrutiny, the rightness and truth of one's claims are not only advanced but tested for certainty, integrity, and conviction.

Citizen action in this forum constitutes "making" a decision that engages them in challenging proposals. Making a decision to question, challenge and oppose is a form of critical action that can produce subjective clarity and objective change. This approach reflects elements of the Freirian model of emancipatory praxis which focuses on the dialectics of critical reflection and action (Freire, 1971) and Giroux's notion of creating public spheres where educators and citizens make emancipatory discourses possible (Giroux, 1983). In the Saskatchewan case, the panel recommended that the Janine-Dominique Extension proceed subject to 16 recommendations; the McLean Lake Project proceed after a five-year delay and implementation of 16 recommendations; and the Midwest Joint Venture could not proceed (Lee, 1993). On weapons proliferation the report stated:

There is no process whereby exported Canadian uranium can be separated from uranium derived from other sources. Therefore, no proven method exists for preventing incorporation of Canadian uranium into military applications. Current Canadian limitations on end uses of uranium provide no reassurance

to the public that Canadian uranium is used solely for non-military purposes. The panel wishes to bring concerns related to the possible use of Saskatchewan uranium for weapons to the attention of the government. (Lee, 1993, p. 26)

One meaning of the recommendations was headlined in the local paper next day: "Panel report death knell for uranium industry?" (Zakreski, 1993). While anti-nuclear groups celebrated success in the recommendations that created important conditions for mining, delayed development of a mine and stopped development of another, this celebration was dampened by government provincial subsequent decisions.

The Saskatchewan New Democratic Party (NDP) government had a policy to support mine expansion subject to the panel's recommendations (Burton, 1992). In response to recommendations, the provincial government agreed to allow the Janine-Dominique extension with conditions. They disallowed the Midwest Joint Venture to proceed as recommended. However, they did not accept some crucial recommendations, namely, the five-year delay of McLean Lake and that a revenue-sharing formula with the affected communities around the mines be agreed upon before any mines proceed (Prebble, 1994). In regard to uranium mining, weapons testing and weapons production, the federal government simply reiterated that international treaties existed and were effective.

Assessment panels can be forums that provide for citizen empowerment through technological literacy. It is possible to have panel's recommend on a broad range of potential outcomes including to reject industry proposals, delay mine start-up, and require conditions for acceptance of proposals. Although such assessments are part of governmental requirements, they function within broader political frameworks. Public democratic forums, like the environmental assessment review processes, have limits which can be stretched, but the limits are put in place by powers outside of that process. While the empowerment of citizens supported by the interveners like ICUCEC encourages citizen participation in state sponsored democratic processes, this empowerment does not necessarily translate into decisions that reflect citizen interests.

Participants became empowered by informing themselves about uranium mining issues, challenging the industry through the hearings, and identifying contradictions and limitations in the hearings process. At the same time, ICUCEC and the Coalition became current in the discourse and issues central to uranium mining projects specific to Saskatchewan. They helped develop national and international perspectives on uranium mining as part of technological literacy by organizing tours to communities, inviting guest presenters, and posting through electronic media. They used the hearings as an educational resource to construct and distribute materials and to assist citizens prepare and present submissions to the assessment panel. They used the hearings to expose federal and provincial complicity in nuclear weapons proliferation particularly in the French connection. For the first time, a FEARO panel concluded that Canada's international treaties

governing the use of exported Canadian uranium were ineffective at controlling the use of Saskatchewan uranium in weapons production and testing.

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