AMSE JOURNALS-AMSE IFRATH Publication –2016- Modelling C; Vol. 77; N° 2; pp 13-28
Submitted Sept. 2016; Accepted Oct. 31, 2016

Resources and Cognitive Accessibility: Definitions, Typologies and Model

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Abstract

The central idea of this article is to encourage reflection and contribute to the development of latent reserves of capacities to act of people with intellectual disabilities. Specifically, it is about the unconscious resources that could be developed and mobilized to improve their quality of life. Our approach consists of building up an individual from his/her competencies, i.e. from what he/she can do, and real life situations. We consider, despite the limitations related to age and disability, that everyone has the opportunity to progress, even though his/her acquisitions are limited.

Key words

Resources, R-HDM, inclusive design, cognitive accessibility, "competent to act" status.

1. Introduction

Cognitive accessibility plays a major role in controlling literate abilities needed to develop the autonomy of people with intellectual disabilities [1]. Literate abilities are defined as "the capacity to perform activities that require the mastery of basic abilities of writing code (reading, writing, arithmetic)" [2] [3].

People with intellectual disabilities have difficulties facing conceptualization and reasoning (e.g. handling money, using an agenda, a calendar or a schedule). The majority of them suffer from illiteracy [4] [5] [6] [7]. Learning literate abilities require capacities that they often lack (e.g.

attentional abilities, working memory, phonological awareness, problem solving, and flexibility). Based on available statistics, it is estimated that intellectual disabilities affect at least 3% of the world population [8]. According to INSEE[i], there would be in France at least 700 000 people with intellectual disabilities, or 1.8% of the working population (age 15-64). In Canada, the prevalence rate would be at least 1.58%, or 500 000 people (110 000 people in Quebec) [9]. These findings trigger rising needs for cognitive planning/adjustments, which are often still the responsibility of the intuition. Cognitive accessibility defines "access for all to the realization of cognitive activities that are essential to the autonomy and social participation" [1]. On this topic, Chalgoumi [10] emphasizes the illusory nature of accessibility to the extent that the person cannot use information to which he/she accessed. Access to information not necessarily involving access to understanding and learning [11].

1.1 Research Problem

It seems essential to assess the nature of the individual's difficulties to improve learning. However, the choice of appropriate methods and resources cannot be done without identifying his/her competencies and contextual factors, which facilitate the appropriation of resources and construction of personal practices. In the literature, several authors focused on the description of the disability creation process (e.g. [12] [13] [14] [15] [16] [17] and factors as barriers to learning literate abilities (e.g. [3] [18]). Nevertheless, very few studies attempt to describe the creation process of enabling situations. This article aims to make up for this shortcoming.

1.2 Research Objectives

The objective of this article is twofold. The first objective is to clarify the concept of a resource through a state-of-the-art of existing definitions and typologies in the literature. The second objective is to describe the development process of a system of resources which facilitates access to information (i.e. lisibility and intelligibility) to people with cognitive limitations. Cognitive limitations are defined as "the consequences of cognitive overload that is produced by the mismatch between the characteristics of a person and the requirements of cognitive tasks, especially those that require literate abilities" [1]. To do that, we present R-HDM, a Resources-centered Human Development Model. R-HDM allows to explain how environmental features, in interaction with cognitive and non-cognitive individual's features, may not handicap people, but make them more competent [20]. We consider a competent person as defined by Delignières [21], i.e. a person with "a structured and coherent set of resources that shows his/her effectiveness in a

field of social activity." The question of resources appropriation and their articulation with learning and teaching processes is here a central issue.

This article is divided in two main sections: (1) section 2 presents a review of definitions and typologies of resources found in the literature; (2) section 3 describes the Resources-centered Human Development Model (R-HDM), in a pedagogical context, in order to explain the development process of a system of resources sufficient for developing a "competent to act" status[ii].

2. Resources: Definitions and Typologies

The concept of resources is discussed widely in the literature, depending on the specific area of research (e.g. economics, psychology, sports education, and education) (e.g. [20] [21] [22] [23] [24] [25] [26] [27]). As such, the resulting typologies are mainly tailored to situations in specific areas of activity (e.g. [25] [28] [29]). Although a single resource may be common to several situations.

2.1 Definitions

Resources include "very heterogeneous classes of elements that may interact to support the system of exchanges between the individual and his/her environment" [24]. In general, a resource is considered as a means for an individual to improve his/her situation [19] through an "adaptive" [19] "power to act" [30] on daily life situations. The empowering potential of a resource lies in the fact that it is available, accessible, usable, useful [19] [31] and that the "support resources" for its use are themselves available and usable [27].

In economics, resources are defined as a set of "means and instruments" [32] [33], "goods and services available to an individual, whether produced and distributed by the private sector, by associations or by the public sector" [35].

In psychology, resources refer to "all knowledge, declarative and procedural, structural and functional, related to abilities for various behavior components that characterize an individual at a particular moment of his/her existence" [24]. In other words, resources "encompass knowledge stored in memory and the means used to activate and coordinate such knowledge" [35].

In sports education, Delignières et al. [21] define resources as "all the set of tools an individual has to accomplish tasks that he/she meets." Another definition, commonly used in the literature, presents resources as the set of "knowledge, capacities, skills, attitudes and instruments that an individual can mobilize and use in accomplishing a task" [25].

In this article, we will retain the more general definition used by DISCAS[iii], which considers resources as "everything that the individual perceives as potentially contributing to the management of a situation." Thus, we consider that "what is, by nature or social consensus, useful in handling a situation is not necessarily a resource. A possible resource only becomes a real resource when the individual perceives it as such" (DISCAS). In fact, as noticed by Rabardel [36], the use made of a resource is not necessarily one for which it was designed (e.g. case of extending or diverting use). We define a resource as "an available, accessible and usable means perceived by an individual as useful for the achievement of his/her activity" [20]. Consequently, we consider a resourceful environment as an incentive environment, which provides essential conditions for an individual to (1) recognize, activate and coordinate relevant resources for the achievement of his/her activity, and (2) to develop and mobilize alternative resources for maintaining a "competent to act" status, when normal resources are inaccessible or absent [20].

2.2 Typologies

The plethora of resources available to the individual is generally divided into two categories: internal resources and external resources (e.g. [19] [27] [31] [37] [38] [39] [40] [41] [42] [43]). However, this dichotomy is controversial in the literature where some authors favor either the internal dimension (e.g. [44]), or the external dimension (e.g. [45]).

Internal resources refer to individual resources developed throughout the individual's life (especially in terms of competencies and instruments), and external resources refer to resources provided by organizations and institutions [41] [46] [47]. The first can be grouped into three categories (i.e. *cognitive resources* such as knowledge or know-how, *conative resources* such as confidence or motivation, and *corporeal resources* such as postures or eyes), and the second in two categories (i.e. material and human) [19]. DISCAS considers internal resources as "cognitive" in nature (knowledge, skills, strategies) or "emotional" (attitudes)", while it considers external resources as "intellectual" (knowledge, procedures, methods), "social" (individuals or organizations), "documentary" (printed or electronic documents) or "material" (tools, equipment or objects). DISCAS also distinguishes levels of appropriation of resources: internal resources can be "under construction" (learning process) if the individual has not yet mastered them or "mobilizing" (competencies) if they are built, controlled or take place in one or several uses. Internal resources consist of individual resources or those that are "incorporated or integrated into the individual" (e.g. knowledge, personal qualities, experience, physiological and emotional resources), and supporting resources "that are not incorporated into individuals but are or should

be available to them (DISCAS)." In the literature, other typologies distinguish tangible resources (e.g. physical, human or financial capital) and intangible resources (e.g. knowledge, routines, competencies) (e.g. [27] [48]), or acquired resources (e.g. education) and inherited resources (e.g. ethnicity) (e.g. [27] [49]).

The typologies of resources found in the literature often include the same types of resources, such as motor, physical, cognitive, informational, conative or emotional (e.g. [19] [25] [28] [29]). For Le Boterf [50], these typologies do not enable us to take into account the variety of resources that the individual can mobilize. The typology he [50] proposes is interesting because it is based not on the nature of resources, but on their purposes and their uses (i.e. "Act, react or interact in a situation"). This author distinguished six categories of resources on the basis of anticipated goals, resources for: "understanding, customizing actions, operating and maintaining, cooperating, progressing and guiding" (Table 1). These resources encompass subcategories of resources that can appear in multiple categories (Table 2).

Goals	**Description**
Understanding	- Diagnose, analyze, identify, perceive and anticipate developments, infer, communicate with specialists in a field.
Customizing actions	- Adapt practices to the contextual specificities of a situation - Know when to intervene, when to stop, and to set limits.
Operating and maintaining	- Implement actions, interventions.
Cooperating	- To establish and implement links of cooperation necessary to meet individual and collective goals - Maintain and develop solidarity - Help others achieve their own goals.
Progressing	- Evolve, adapt, avoid repeating errors, consolidate effective efforts, and acquire new knowledge.
Guiding	- Guide practices and combinations of resources.

Table 1. Summary table of the goals of the resources according to Le Boterf [50].

Goals	Types of resources
Understanding	- Scientific and theoretical knowledge; - Modes of reasoning; - Emotional sensitivity.
Customizing actions	- Knowledge of work organization, regulations, current procedures; - Culture and the history [professional or personal] with the outstanding features; - Equipment, machines; - Particularities of team members or users; - Knowledge and know- how of stopping rules.
Operating and maintaining (diachronic perspective)	- Formalized methodological, instrumental, technical know- how; - Skills (e.g. flair, maneuvers, gimmicks); - Lessons learned from the experience; - Stress management capabilities, physical and physiological resources.
Cooperating	- Knowledge of the process, of organization of the work and distribution of roles; - Relational skills (e.g. teamwork); - Relational capacities (e.g. listening, empathy, written expression); - Expertise in communication technologies; - Language abilities, mastery of professional, scientific and technical language; - Resource people.
Progressing	- Learning abilities; - Capacity for critical thinking; - Imagination; - Creative skills; - Expertise in exchanging and sharing practices; - Cognitive resources (e.g. capacity to reason, capacity for analysis and synthesis).
Guiding	- Emotional; - Intuition (or *insight*); - Cognitive (e.g. capacity to build operative representations of situations to be handled, construct alternative solutions and choose the best operating patterns for social practices and allocation of the resources to be mobilized); - Professional guidance (e.g. rules of conduct); - Ethical guidance (e.g. values, ethics charters).

Table 2. Summary table of the typology of resources proposed by Le Boterf [50].

3. Developing a "Competent to Act" Status: Resources and Actual Capabilities

Individuals' adaptative power lies in the development of a network or a system of resources [19] [51] [52] [53] [54] [55], complementary or even redundant [54]. This redundancy allows them to anticipate the problems of failure or absence, and to introduce, into their system of resources, a flexibility that allows them to choose the most appropriate resource depending on the

situation [54]. Unlike Le Morellec [27], we consider that this network or system of resources is not comprised of a "main resource" [and "support resources"], but rather a combination of internal and external resources, with variable replacement values, which will enable the person to achieve or not his/her objectives.

3.1 Resources and System of Resources

Our description of the system of resources of individuals refers to the theoretical framework of the instrumental approach developed by Rabardel [36], and in particular to the concepts of instrument and system of instruments described by Rabardel and Bourmaud [41] [52] [53]. This allows us to establish a relationship between resources and what these authors designate as classes of situations. The situation refers to the context where the action takes place [36]. The classes of situations are created by an individual who brings together within a single class all the situations involved in following the same object of activity [53]. This means that resources are not only mobilized in unique situations but are linked to the invariant dimensions of classes of situations that form a particular field of activity. Rabardel and Bourmaud [52] have shown that classes of situations are themselves organized into higher level groups, which are called "families of activity". The classes of situations may be common to several families.

3.2 Resources-centered Human Development Model (R-HDM)

Based on a pluridisciplinary approach, the Resources-centered Human Development Model (R-HDM) is derived from the "Human Development Model and Disability creation process" (MDH-PPH2) developed by Fougeyrollas [15]. It draws on Sen's [34], Rabardel's [41] and Leplat's [56] work.

MDH-PPH2 [15] highlights the factors (i.e. personal factors, environmental factors and life habits) whose interaction may hinder or prevent the achievement of an activity. The Resources-centered Human Development Model (R-HDM) allows describing this interaction (Fig. 1). It explains how social and environmental characteristics, in interaction with people's health status (e.g. incapacities, deficiencies), may not handicap them but make them more competent [20].

R-HDM shows that contextual factors (i.e. personal and environmental) allow (or prevent) the mobilization of potential resources that the individual will identify or not as actual resources for his/her activity. Barriers and facilitators, described by Fougeyrollas [15], are defined by Sen [34] as conversion factors which will prevent or allow the individual to convert resources into opportunities or possibilities of action[iv]. There are three types of conversion factors identified by

Robeyns [57] and described by Bonvin and Farvaque [58]: individual, social and environmental factors.

In the capability approach developed by Sen [34], resources allow the development of capabilities through appropriate conversion factors. We define these appropriate conversion factors as personal, environmental or social factors that will enable a person to identify and combine the necessary resources to achieve his/her tasks autonomously and safely. We further consider that these factors are not limited to the so-called 'positive' (facilitators) conversion factors. They also encompass the 'negative' (annoying or binding) conversion factors that will provide the conditions for the development and construction of new resources, to the extent that they allow the person to stay in what Vygotsky [59] called the zone of proximal development (ZPD). This means that under no circumstances the proposed and implemented resources will allow the person to do what his/her current stage of development and operational status does not allow him/her to do. Annoying or binding conversion factors are disturbances that according to Piaget [60] are "the driving force of development and learning."

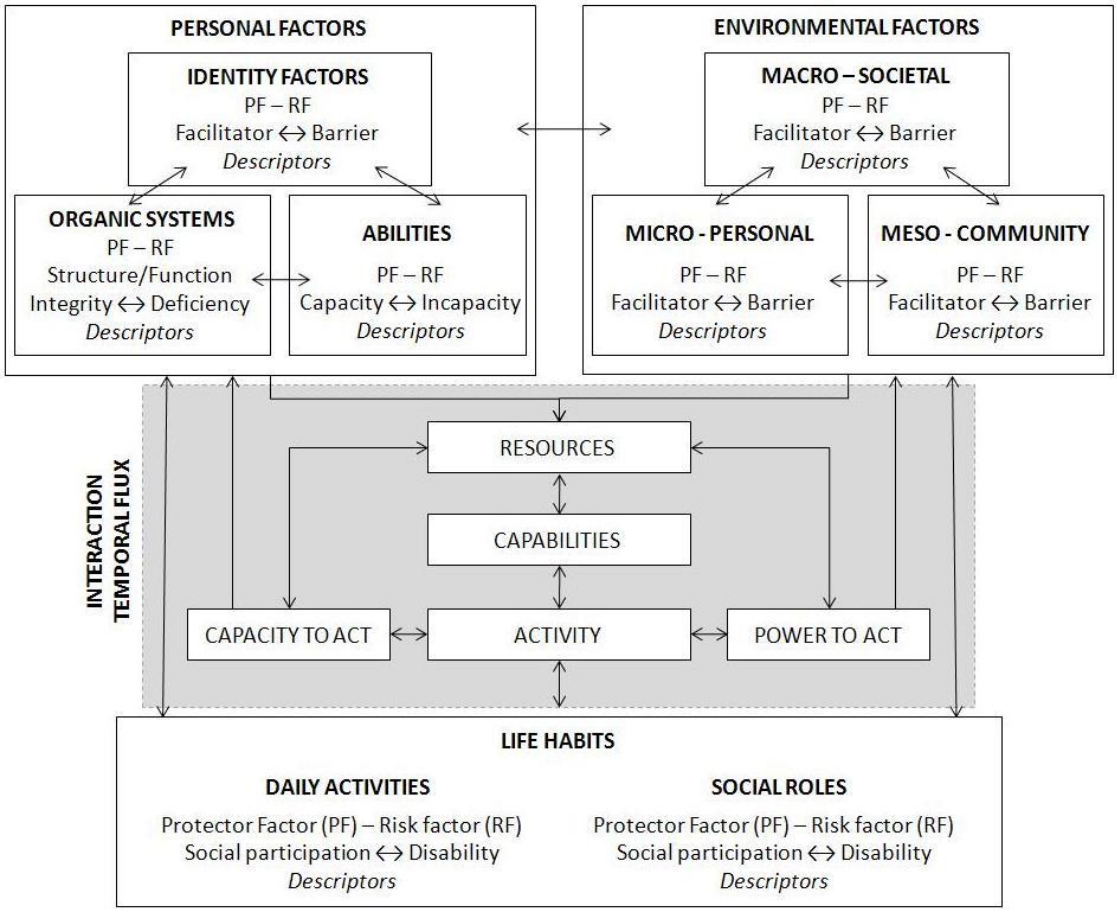

Fig. 1. Resources-centered Human Development Model – R-HDM [20]

In R-HDM, human activity is mediated and mediating using resources. As a first step, resources mobilized by the person will enable at first, the development of his/her power to act with the objective of active socialization. Then, with time and experience, these resources will in turn be mobilized for the development of his/her capacities to act (e.g. competencies, knowledge, instruments)[v]. The double arrow between resources and capabilities represents a control loop, which means that the capabilities developed by the resources through appropriate conversion factors will in turn enable the development and mobilization of new resources that will enrich the person's resources system. The double arrow between capabilities and activity indicates that capabilities lead to the realization of an activity, which in turn, generates new opportunities for action. Finally, along with Leplat's work on human activity [56], R-HDM shows that the development of the individual's capacities and powers to act will impact respectively the personal factors (e.g. level of incapacity) and the environmental factors (e.g. complexity of the task).

3.3 Inclusive Design: Importance of pedagogical context

Universal accessibility defines "the character of a product, process, service, information or environment, which for the purpose of equity and following an inclusive approach, allows anyone, especially those likely to experience limitations, to realize activities autonomously and achieve equivalent results" [61]. Yet, school and social inclusion policies, for people with intellectual disabilities, often lead to use of the same resources as the rest of the population [62]. Therefore, these initiatives rarely generate the desired effect (i.e. autonomy, social participation) due to lack of cognitive planning/adjustments.

To be autonomous, a person must have the resources that allow him/her to act appropriately in situations or areas he/she encounters [19]. In this perspective, R-HDM attaches great importance to the pedagogical relationship (i.e. learning, teaching, instruction) in the construction of a resources system sufficient and necessary for the development of a "competent to act" status. In the literature, many studies investigate the relationship of learning and teaching as direct relations "student-knowledge" and "teacher-student" [2] [10] [63] [64] [65] [66] [67] [68]. In R-HDM, these relationships are considered along with Rabardel [36] as activities mediated and mediating by the resources; which highlights the key role of resources in a human empowerment process. Moreover, we believe, as defined by Masciotra and Medzo [19], that competency, like

autonomy “is practiced and developed in and through the action in situation and by reflection on the action”. Subject-specific knowledge is inadequate to ensure a “competent to act” status [19].

Conclusion

Resources can contribute to improving individuals’ quality of life, especially for people with intellectual disabilities. However, the constraints on individuals are not always connected to a lack of resources. These often may also result from not having the means (e.g. competencies, cognitive planning/adjustment) to recognize and coordinate these resources [20]. To promote enabling situations that empower people, resources development cannot be done without assessing the real opportunities of action (i.e. real capabilities) offered to individuals. Furthermore, resources are not systematically anticipated, but are mobilized from among all available resources on the basis of the characteristics of the contextual situation [42]. Therefore, particular attention must be paid to contextual factors (i.e. conversion factors) promoting resources appropriation, activation and coordination.

References

1. J. Langevin, S. Rocque, H. Chalghoumi, I. Ngongang. “Balises et processus d’adaptation au regard des limitations cognitive”. In J. Viens, & M. Saint- Pierre (dir.), Accessibilité, technologies et éducation des élèves qui ont des incapacités intellectuelles : une responsabilité collective, pp. 193-220. Montréal: Les Éditions Nouvelles, 2012.
2. R. Legendre. “Dictionnaire Actuel de l’Éducation”. 3ème édition. Montréal: Guérin, 2005.
3. S. El Chourbagui, J. Langevin. “Habiletés alphabètes nécessaires à l’autonomie chez les personnes qui ont des incapacités intellectuelles: synthèse de trois études”. European Journal of Intellectual disabilities, 1-28, Février 2008.
4. C. Gardou, M. Develay. “Ce que les situations de handicap, l’adaptation et l’intégration scolaires «dissent» aux sciences de l’éducation”, Revue française de pédagogie, Situations de handicaps et institution scolaire, 134 : p. 15-24, 2001.
5. J-M. Lessan-Delabarre. “L’intégration en France: une dynamique paradoxale”, Revue française de pédagogie, situations de handicaps et institution scolaire, 134: p.47-58, 2001.
6. J. Duchesne, C. Rouette, S. Rocque, J. Langevin. “Alphabétisation et personnes qui présentent des incapacités intellectuelles”. Actes du colloque, Recherche Défi 2002,

Revue Francophone de la déficience intellectuelle. Vol. 13, n° Spécial, mai 2002. p. 27-32, 2002.

7. S. El Chourbagui, J. Langevin. “Identification d’habiletés alphabètes nécessaires à l’autonomie”. Revue Francophone de la Déficience Intellectuelle, 16(1-2), 5-22, 2005.
8. Ministère de la Santé et des Services Sociaux (MSSS). “De l’intégration sociale la participation sociale, politique de soutien aux personnes présentant une déficience intellectuelle à leur famille et aux autres proches”, Québec, La direction des communications du ministère de la santé et des services sociaux, 2001.
9. S. Larson, K.C. Lakin, L. Anderson, N. Kwak, J.H. Lee, D. Anderson, D. “Prevalence of mental retardation and developmental disabilities: estimates from the 1994/1995”. National Health Interview Survey Disability Suppl., American Journal on Mental Retardation, 106, 231-252, 2001.
10. H. Chalghoumi. “Balises pour l’intervention avec les technologies auprès des élèves qui ont des incapacités intellectuelles”. Doctorat en Sciences de l’éducation. Université de Montréal, Montréal, Canada, 2011.
11. D.H. Rose, A. Meyer. “Teaching Every Student in the Digital Age: Universal Design for Learning”. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD), 2002.
12. P. Fougeyrollas. “Conséquences sociales des déficiences, et incapacités persistantes et significatives: approches conceptuelles et évaluation des situations de handicap”. In Handicap, 84, 61-78, 1998.
13. P. Fougeyrollas, R. Chartier, H. Bergeron, J. Cote, M. Cote, G. Saint-Michel, M. Blouin. “Révision de la proposition québécoise de classification. Processus de production du handicap”, CQCIDIH/SCCIDIH. Québec: Lac Saint-Charles, 1998a.
14. P. Fougeyrollas, L. Noreau, H. Bergeron, R. Cloutier, S.A. Dion, G. St-Michel. “Social consequences of long term impairments and disabilities: conceptual approach and assessment of handicap”. International Journal of rehabilitation research, 21, 127-141, 1998b.
15. P. Fougeyrollas. “La funambule, le fil et la toile. Transformations réciproques du sens du handicap”. PUL: Québec, 2010.
16. P. Fougeyrollas, J.P. Robin. “The Interactive Person-Environment Disability Prevention Process: A Conceptual Framework and Methodology for Intervention and Social Participation Outcomes Measurement in the Field of Rehabilitation and Inclusive Urban

or Local Inclusive Development. A Proposal for the Expected Revision of ICF". Niepełnosprawność – zagadnienia, problemy, rozwiązania, Nr II/2013, 7, 51-57, 2013.

17. Organisation Mondiale de la Santé (OMS). "Towards a Common Language for Functioning, Disability and Health ICF". Report, 23 pages, 2002.
18. J. Beaulieu, J. Langevin. "Intellectual Disabilities and Reading Revue francophone de la déficience intellectuelle", 25, 52-69, 2014.
19. D. Masciotra, F. Medzo. "Développer un agir compétent: vers un curriculum pour la vie". Bruxelles: De Boeck, 2009.
20. F. Arab. "Resources-centered Human Development Model: a conceptual framework for creating alternative capabilities". Proceedings of the Third 21st Century Academic Forum Conference at Harvard, Boston, USA. September 2015, Vol. 6, Nr. 1. ISSN: 2330-1236. http://www.21caf.org/uploads/1/3/5/2/13527682/37_arab.pdf, access 25th July 2016.
21. D. Delignières, P. Duret. "Lexique thématique en sciences et techniques des APS", Vigot, Paris, 1995.
22. R. Leca, M. Billard. "L'enseignement des activités physiques, sportives et artistiques". Paris: Ellipses, Essentiel en sciences du Sport, 2005.
23. J. Rézeau. "Médiation et médiatisation dans l'enseignement des langues en environnement multimédia; le cas de l'apprentissage de l'anglais en DEUG d'Histoire de l'art à l'université". Doctorat en didactique de la langue, Université Victor Segalen Bordeaux 2, France, 2001.
24. M. Récopé. "La question de la gestion des ressources: positionnement théorique in APS, efficience motrice et développement de la personne". Clermont-Ferrand, AFRAPS, 1990.
25. J.P. Famose. "Tâches motrices et stratégies pédagogiques en EPS", in Dossier EPS n°1, Paris, 1983.
26. G. Le Boterf. "Manager des personnes, et non seulement des savoirs, savoir-faire et savoir être". In G. Le Boterf, "Repenser la compétence. Pour dépasser les idées reçues: 15 propositions", pp 39-53. Collection Ressources humaines, Eyrolles Editions, 2008.
27. F. Le Morellec. "L'approche par les capabilités: un nouveau cadre pour l'analyse de l'accessibilité universelle: application à la mobilité des personnes vieillissantes". Doctorat en ergonomie. Conservatoire national des arts et métiers – CNAM, Paris, 2014.
28. B. During. "Ressources et conduites motrices". In Energie et conduites motrices, INSEP, Paris, 1989.

29. C. Boulday, C. Cottinet, P. Tanguy. “Des indicateurs comportementaux aux ressources sollicitées, trois illustrations”, in Cahiers d’EPS de l’académie de Nantes, n°27, CRDP Pays de Loire, 2002.
30. B. Boda, M. Récopé. “Instrument d’analyse et de traitement de l’APS à des fins d’enseignement de l’EPS”. Revue EPS, 56-59, 1991.
31. C. Chatigny. “Les ressources de l’environnement : au cœur de la construction des savoirs professionnels en situation de travail et de la protection de la santé. Perspectives interdisciplinaires sur le travail et la santé”. Pistes, 3-2, 2001. http://pistes.revues.org/3719, access 25th July 2016.
32. I. Robeyns. “Sen's capability approach and gender inequality: selecting relevant capabilities”. Feminist economics, 9, 2-3, 61-92, 2003.
33. A.K. Sen. “Human rights and capabilities”. Journal of Human Development, 6(2), 151-166, 2005.
34. A.K. Sen. “Development as Freedom”. New York: Alfred A. Knopf, 1999.
35. C.H. Guillevic. “Psychologie du travail”. Paris: Nathan, p. 145, 1991.
36. P. Rabardel. “Les hommes et les technologies: Approche cognitive des instruments contemporains”. Paris: Armand Colin, 1995.
37. S. Höbfoll. “Conservation of resources. A new attempt at conceptualizing stress”. The American psychologist, 44 (3), 513, 1989.
38. C. Teiger. “L'approche ergonomique: du travail humain à l'activité des hommes et des femmes au travail”. Education permanente, 116, 71-96, 1993.
39. P. Falzon, C. Teiger. “Construire l’activité”. Séminaire DESUP/DESS de Paris I. Performances Humaines & Techniques, n° hors série (Septembre), 34-39, 1995.
40. G. Jobert. “Dire, penser, faire. A propos de trois métaphores agissantes en formation des adultes”. Education Permanente, 2, 143, 7-28, 2000.
41. P. Rabardel. “Instrument subjectif et développement du pouvoir d'agir”. In P. Rabardel & P. Pastré, “Modèles du sujet pour la conception. Dialectiques activités développement”. Toulouse: Octarès, 2005.
42. F. Arab. “Quelles ressources pour le sujet vieillissant? Les ontologies, une perspective pour la conception et l'évaluation des aides capacitantes”. Thèse de doctorat en ergonomie, Université Paris 8, 2010.
43. J-C. Marquié. “Environnements capacitants, développement cognitif et possibilité de maintien dans l’emploi”. Retraite et société, 59, 105-115, 2010.

44. R. Amalberti. “Gestion des ressources, Cognition située”. Dans M. de Montmollin, Vocabulaire de l'ergonomie, 53-54 & 210-211. Toulouse: Octarès, 1995.
45. J. Curie, V. Hajjar. “Vie de travail, vie hors travail: la vie en temps partagé”. In C. L. Leboyer, & S. Jean-Claude, Traité de psychologie du travail, 37-55. Paris: Presses Universitaires de France, 1987.
46. A. Leontiev. “Le développement du psychisme”. Paris, Editions sociales, 1972.
47. S.L. Rubinstein. “De la pensée et des voies de son étude”. Moscou, Académie des Sciences de l'URSS, 1958.
48. B. Wernerfelt. “A resource-based view of the firm”. Strategic management journal, 5(2), 171-180, 1984.
49. N. Lin. “Les ressources sociales: une théorie du capital social”. Revue française de sociologie, 36 (4), 685-704, 1995.
50. G. Le Boterf. “Ingénierie et évaluation des compétences”. Paris: Editions d’organisation, 2002.
51. L. Allal. “Acquisition et évaluation des compétences en situation scolaire”. In J. Dolz, & E. Ollagnier, L'énigme de la compétence en éducation, 75-94. Bruxelles: De Boeck Supérieur, 2002.
52. P. Rabardel, G. Bourmaud. “From computer to instrument system: a developmental perspective”. Interacting with Computers, 15(5), 665-691, 2003.
53. G. Bourmaud. “Les systèmes d’instruments: méthodes d’analyse et perspectives de conception”. Thèse de doctorat en ergonomie, Université Paris 8, 2006.
54. F. Arab, H. Pigot, P. Rabardel, V. Folcher, A.S. Rigaud, M. Mokhtari. “Age, memory and time: practices and support”. Special Issue for the AMSE Journals (Association for advancement of modelling and simulation techniques in enterprises), 71, 3, mars 2011.
55. F. Arab. “Interdisciplinarité et gérontechnologies: le rôle de l’ergonomie”. Congrès Handicap 2012 "L’interdisciplinarité au service de la personne en quête d’autonomie", 13-15 juin 2012, Paris.
56. J. Leplat. “Regards sur l’activité en situation de travail”. Paris: PUF, 1997.
57. I. Robeyns. “An unworkable idea or a promising alternative? Sen's capability approach re-examined”. Center for Economic Studies, Discussion Paper DPS 00.30. Katholieke Universiteit Leuwen, 2000.

58. J.M. Bonvin, N. Farvaque. “L’accès à l’emploi au prisme des capabilités, enjeux théoriques et méthodologiques”. Formation emploi, 98, 9-23, 2007. http://formationemploi.revues.org/1550, access 25th July 2016.
59. L. Vygotsky. “Interaction between learning and development”. Cambridge, MA: Harvard University Press, 1978.
60. J. Piaget. “Psychologie. Encyclopédie de la Pléiade”. Paris, Gallimard, 1987.
61. S. Rocque, J. Langevin, H. Chalghoumi, A. Ghorayeb. “Accessibilité universelle et designs contributifs dans un processus évolutif”. Développement humain, handicap et changement social, 19(3), 3-24, 2011.
62. J. Langevin. “Ergonomie et éducation des personnes présentant des incapacités intellectuelles”, Revue Francophone de la déficience intellectuelle, 7 (2), 135-150, 1996.
63. R. Legendre. “Dictionnaire actuel de l’éducation”. 2ème édition. Montréal : Guérin-Paris : Eska, 1993.
64. S. Rocque, J. Langevin, C. Belley, N. Trépanier. “Modèle de la situation de formation, approche écologique en réadaptation d’adultes présentant des incapacités intellectuelles”. Revue Repères, essais en éducation, 18, p. 81, 93, 1997.
65. C. Germain. “Un cadre conceptuel pour la didactique des langues”, Études de linguistique appliquée n° 75, 61-77, 1989.
66. J. Houssaye. “Le triangle pédagogique”, Berne: Peter Lang SA. 2ème édition, 1992.
67. P. Carré, A. Moisan, D. Poisson. “L’autoformation : psychopédagogie, ingénierie, sociologie”, Paris : PUF, 1997.
68. P. Robichaud. “Lecture de l’heure et incapacités intellectuelles: cahier de charges d’un cadran évolutif”. Thèse de doctorat. Université de Montréal, Montréal, Québec, Canada, 2010.

[i] Source: Insee, enquête Vie quotidienne et santé, 2007.

[ii] This concept was introduced by Masciotra and Medzo [19] to define competence as “an adaptive power” to new situations.

[iii] DISCAS is a “private pedagogical consulting firm” in Quebec that operated in the field of education from 1987 to 2006. http://www.csrdn.qc.ca/discas/index.html

[iv] The set of the possibilities of action available to an individual refers to the concept of “capabilities” defined by Sen [34].

[v] The difference between the concepts of capacity to act and power to act is based on the distinction between “what the individual can mobilize as opposed to what particular situations and conditions of activity will allow” [41].