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Mélange of Making: Bringing Children's Informal Learning Cultures to the Classroom

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Summary/Abstract:

We argue that we are seeing the beginning of a new phase of societal evolution in western worlds that requires children to be able to use emergent and informal learning as primary forms of knowledge building and that is leading to their acculturation into the emerging Do It Yourself (DIY) maker culture. The emergence of this DIY society requires educational reform that incorporates transdisciplinary pedagogies to accompany the informal learning opportunities where children can learn within social contexts that they themselves help to create, in which they co-construct new opportunities based on emerging knowledge and their lived experiences.

We explore how formal educational institutions can incorporate a DIY/maker culture as part of their evolution. Starting with explorations of the "hacking" deeply rooted in early childhood experience of open-ended inquiry through theory building, testing and reflection, we examine the ability of maker/DIY culture to foster the informal learning children naturally engage in. We contextualize this hacking within DIY philosophy and pedagogy, and we consider how informal, DIY learning can be adapted to function within formal education systems.

Introduction: DIY making as a Desired Societal shift

In 2010, at the National Science Foundation sponsored workshop "Innovation, Education and the Maker Movement," Thomas Kalil of the White House Office of Science and Technology Policy, identified maker culture as the next phase of societal evolution:

Technologically -- we are moving towards what MIT's Neil Gershenfeld has called personal fabrication.... Economically -- we are seeing the early beginnings of a powerful Maker innovation ecosystem. New products and services will allow individuals to not only Design it Yourself, but Make it Yourself and Sell it Yourself... Makers are also becoming successful entrepreneurs.¹

His words suggest that at least some members of President Obama's administration support hands-on, project-based approaches to learning. Kalil believes that "schools should be putting the tools of

¹ Dale Dougherty, "Innovation, Education, and Makers: Thomas Kalil: What would education look like after a Maker make-over?" *O'Reilly's Radar*, October 4, 2010, accessed August 7, 2011, <http://radar.oreilly.com/2010/10/innovation-education-and-the-m.html> ¶10

discovery, invention and fabrication at the finger tips of every child -- inside and outside of the classroom”² practices that are central to preparing them to become DIY citizens. Towards this goal, several federal agencies are beginning to support the ideas behind DIY/Maker culture inspired learning.

The DIY/maker culture that has emerged as a new frame of reference for our future societies represents a growing group of people:

who find making, tinkering, inventing, problem-solving, discovering and sharing intrinsically rewarding. These Makers have a strong "Do It Yourself" and "Do It With Others" mindset -- and making is an important element of their personal identity.³

One of the uniqueness of this culture is that it encompasses a diversity of activities often at odds with each other. According to Holtzman et al., the concept of DIY is:

fluid and fragmentary, constantly being modified and expanded by its actors. DIY can, however, be understood as a two-step process, first addressing value and then social relationships. It undermines exchange-value while simultaneously creating use-value outside of capitalism.⁴

Paradoxically, today’s DIY culture has been incorporated in practices that blend exchange and “use value” into new industrial processes. At one end of the spectrum of DIY makers can be found people who understand DIY to be an extension of consumerist culture adapted to hobbyists markets. At the other end of the spectrum, DIY is understood to be a manifestation of individuals constructing their own social realities, a culture that advocates and encourages connection between people and material aspects of living, taking user-generated hands-on production as a key to an individual self-determination, knowledge sharing, and community building. If makers are a very diverse group, they do have in common the use of informal and emergent learning and communities to achieve a goal based making practice on personal interest and/or needs.

According to Livingstone, informal learning corresponds to “any activity involving the pursuit of understanding, knowledge or skill which occurs outside the curricula of educational institutions, or the courses or workshops offered by educational or social agencies.”⁵ Though informal learning can be any learning beyond institutionally sanctioned explicit curriculum, in terms of DIY/Maker culture, it is often unauthorized, spontaneous and practical experience that occurs outside the curriculum of formal and non-formal educational institutions and programs.

² Ibid., ¶15-19

³ Ibid., ¶ 5

⁴ Ben Holtzman, Craig Hughes, and Van Kevin Meter, “Do it Yourself... and the Movement Beyond Capitalism,” in *Constituent Imagination: Militant Investigations, Collective Theorization*, ed. David Graeber, Stephen Shukaitis, and Erika Biddle (Oakland, Edinburgh and West Virginia: AK Press, 2007), 45.

⁵ David W. Livingstone, “Exploring the icebergs of adult learning: Findings of the first Canadian survey of informal learning practices.” *Canadian Journal for Studies of Adult Education* 13, no.2 (1999): 51.

The Internet has facilitated the emergence of a wider digital DIY community where individuals are now able to access information, consult peers and become active social participant in the creation of their folk cultures.⁶ Digital groups and communities are now distributing and sharing the new knowledge generated from their informal learning activities online, which has grown into a multitude of overlapping and intersecting, often public, informal learning communities⁷.

Learning in these environments is often stimulated and guided by experienced peers who become 'experts' through the content creation and community building, and learning becomes embedded in act of sharing. Emergent learning which:

is likely to occur when many self-organising agents interact frequently and openly, with considerable degrees of freedom, but within specific constraints; no individual can see the whole picture; agents and system co-evolve.... Emergent learning is open and flexible, so it is responsive to context and can adapt rapidly, particularly in a world in which careers, professions, identities, competencies, and roles, as well as interactive and communicative media, are rapidly changing.⁸

Emergent learning is not taking place within institutions but within communities of interests and/or practices which can be virtual and/or mobile. It is evident that networks have become a type of informal public library and a rich social sphere that DIY makers can use to build their own knowledge using experiential and multimodal forms of learning appropriate to their type of intelligence and within self organizing social communities.

In this paper, we argue that we are seeing the beginning of a new phase of societal evolution in western societies that requires children to be able to use emergent informal learning as primary forms of knowledge building and that can lead to their acculturation to DIY making culture. The emergence of this DIY society requires educational reform that incorporates transdisciplinary pedagogies to accompany the informal learning opportunities where children can learn within social contexts that they themselves help to create, in which they co-construct new opportunities based on emerging knowledge and their lived experiences.

⁶ Jason Nolan and Danny Bakan, "Social technologies for young children: Cultural Play with Songchild.org" In *Toronto/Montréal/Lille: Together Elsewhere*, ed. Louise Poissant and Pierre Tremblay (Montreal: Presse de l'Université du Québec, 2010), 279-291

⁷ Jason Nolan and Joel Weiss, "Learning Cyberspace: An Educational View of Virtual Community." In *Building Virtual Communities: Learning and Change in Cyberspace*, ed. Ann K. Renninger and Wesley Shumar (Cambridge: Cambridge University Press, 2002), 293-320

⁸ Roy Williams, Regina Karousou and Jenny Mackness. "Emergent Learning and Learning Ecologies in Web 2.0," *The International Review of Research in Open and Distance Learning*, Vol 12, no. 3 (March 2011).

We aim to analyze whether formal educational institutions can incorporate a DIY/maker culture as part of their evolution. Starting with explorations of the “hacking” deeply rooted in early childhood experience of open-ended inquiry, theory building, testing and reflection, we examine the ability of maker/DIY culture to foster informal learning. We then describe the DIY philosophy and pedagogy, and we conclude by analyzing whether informal, DIY learning can be incorporated into formal education systems.

1. DIY making as an Industrial Shift

The DIY ethos does not represent a new cultural phenomena. Over the last forty years it has been actively embraced by university professors, researchers and students through the creation and/or adoption of open source software and hardware, and as such is already part of capitalist society. This is evident in open source hardware activist Marcin Jakubowski’s discussion of the open source ecology project:

If this idea is truly sound, then the implications are significant. A greater distribution of the means of production, environmentally sound supply chains and a newly relevant DIY making culture can hope to transcend artificial scarcity. We are exploring the limits of what we all can do to make a better world with open hardware technology.⁹

While this statement suggests that open source is equivalent to grass-roots, non-institutional DIY culture, historically, open source began within universities by individuals who, believing in the idea that knowledge should be free and open, and developed innovation and software production models based on peer production, bartering and reciprocity and considered that source code should be made readily available to the public, in opposition to some institutional norms, but congruent with academic traditions of sharing knowledge within a learning community.

DIY/maker culture has moved beyond the margins, it has adapted to become an important and widely adopted industrial framework. Given the Obama administration’s interest in open source, it is now influencing the frameworks that will legitimize and formalize its position in mainstream society.

Open source advocates have developed industrial frameworks based on humanist values that utilize collaboration and reciprocity as key to a type of innovation emerging from “users entrepreneurs”¹⁰ who create their own social realities¹¹ driven by their interests and/or needs. Work becomes a mesh of volunteering activities that based innovation which is then incorporated into marketable competitive

⁹Marcin Jakubowski, *Marcin Jakubowski on the Global Village Construction Set & Open Source Ecology*, TED Talk 2011. Accessed May 16, 2011.
<http://www.youtube.com/watch?v=zIsHKrP-66s>

¹⁰ Sonali K. Shah and Mary Tripsas, "The Accidental Entrepreneur: The Emergent and Collective Process of User Entrepreneurship," *Strategic Entrepreneurship Journal* 1, (2007): 123-140.

¹¹ Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Doubleday), 1967

processes. In this case, informal learning and social relationships have been institutionalized into competition¹² processes. DIY culture encompasses forms of industrial production that emerge from the cooperative and reciprocating informal activities of peers, both within and outside of institutions. It is central to an emerging global culture where individuals' local needs drive the development of sustainable solution for either local crisis, needs and/or markets. Peers can be individuals or part of organizations ranging from smart mobs that remain anonymous and informal to more rationalized self-organizing bodies such as commons.¹³

More than just a new industrial framework, however, DIY culture allows for new forms of innovation to emerge at a time when societies in the west and around the world are in need of economic, social and cultural system reboot and refocusing on sustainable practices. Though some US policymakers understand these shifts and hold DIY/maker culture as an important part of how we must help children prepare themselves for the future, state-controlled, standardized education excludes instead of promotes hacking and autonomy, two key components of critical making. Educators and parents can leverage DIY/maker learning opportunities that support the development of autonomy in children by fostering their role as active social actors in interest-driven learning communities¹⁴ and develop conversations around these interests that help them become critical makers, by nurturing children's natural abilities for creating/hacking new out of the mundane.

2. Children as hackers: A First Step Towards Critical Making

Whether children become critical DIY/maker citizens depends on their ability to engage in informal learning activities and "hacking." In *Makers*, Cory Doctorow defines DIY individuals as people who hack hardware, business-models, and living arrangements to discover ways of staying alive and happy even when the economy is failing.¹⁵ And in the open source movement, hacking can be seen as a stretching of the capability or the purpose of a system. This view of hacking takes us back to its original meaning as articulated by Himanen in his book *The Hacker Ethic and the Spirit of the Information Age*. Hackers are not computer criminals, but enthusiastic computer programmers who share their work with others.¹⁶ They have an ethical code and values which promote individuals that can create things by joining forces in imaginative ways while maintaining existing ethical ideals, such as privacy and equality, in an increasingly technologized society.

¹² Adam Brandenburg and Barry Nalebuff, *Co-Opetition : A Revolution Mindset That Combines Competition and Cooperation*, 1996

¹³ Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective action*, (Cambridge, Cambridge University Press, 1990).

¹⁴ Jason Nolan, Kate Raynes-Goldie and Melanie McBride, "The stranger danger: exploring surveillance, autonomy and privacy in children's use of social media." *Canadian Children*. (Accepted Manuscript).

¹⁵ Cory Doctorow, *Makers* (Tor Books and Creative Commons Licence, 2009)

http://craphound.com/makers/Cory_Doctorow_-_Makers_Letter.pdf

¹⁶ Pekka Himanen, *The Hacker Ethic and the Spirit of the Information Age*, (New York: Random House, 2001).

Maker/DIY hacking is not limited to code/protocol manipulation, but includes acts of social manipulation,¹⁷ sprouting concepts like social engineering, life hack, and the global hackerspaces movement. Echoing such grass-roots proliferation of hacker culture, recent scholars have developed more extensive definitions of the term “hack.” Tim Jordan in his book *Hacking: Digital Media and Technological Determinism* deems the hack as an act of “altering a pre-existing situation to produce something new”¹⁸ that magnetizes people to work together and share knowledge. In a similar vein, Andrius Kulikauskas describes the hacker approach as “bottom-up, special-case, practical, nonstandard, unschooled, unexpected, solve-the-problem, build-on-what-exists,” as oppose to “the architect approach” which is “top-down, general-case, theoretical, grand vision, master plan, unlimited resources, question-the-problem, and start-from-scratch.”¹⁹

In the context of early years learning, hacking can be seen as an aspect of learning about the world. Children formulate theories, test them and reflect on the outcome. They change variables. They experiment with physical knowledge by throwing things or dropping things, abstract knowledge by comparing things, and social knowledge in learning how to speak and how to engage people socially. Hacking comes in the form of an act to produce unexpected outcomes out of what is already known or understood, or rather to make things that are known do new and unexpected things.

Hacking is key to the way in which young children build language, learn about social relationships, and explore physical space around them. Children are by nature hackers as they spend most of their early years experimenting and hacking the world ordered by adults. Children nurture and cultivate their hacking ability, when they are exploring physical knowledge, building theories about the world around them, testing the theories they create, reflecting on results of their tests, and repeating the process with ever increasing levels of complexity. Making a mess, playing with food, making noise, engaging with unstructured imaginary play are all examples of hacking, by way of which they counter parental orders and spaces, therefore cultivate personal awareness, self-esteem and a sense of autonomy.

Through everyday hacking, children set their own learning goals based on their social or recreational interests, and these goals often result from their own self-directed explorations. Through self-reflective and self-directed hacking, children are advancing as makers. Asking a reflective questions such as “what would happen if?” is the first step of enquiry, through which children learn how to pose problems as well as make informed and educated choices to solve them and be on the way to develop the self-awareness and self-criticism necessary to innovative and critical making.

Given the current societal shifts, education needs to foster hacking in curriculum activities as a means to sensitize children to the DIY making values and processes that are stabilizing in society.

¹⁷ Jason Nolan and Michelle Levesque, “Hacking human: data-archaeology and surveillance in social networks,” *SIGGROUP Bulletin* 25, no. 2 (February 2005): 33-37.

¹⁸ Tim Jordan, *Hacking: Digital Media and Technological Determinism* (Cambridge: Polity Press, 2008), 9.

¹⁹ Andreas Kulikauskas, “Social Hacking: The Need for an Ethics.” *Journal of Hyper(+)-drome. Manifestation* 1, (September 2004), accessed October 18, 2010, ¶ 4
<http://journal.hyperdrome.net/issues/issue1/kulikauskas.html>

3. Can informal learning be incorporated into formal education?

Can formal education engage these hacking modalities pass early childhood? If we are to help children become critical DIY makers and citizens, we must acknowledge that children are social actors, creators of their own socio-cultural and shareable objects and digital natives. Hence, we have to consider how we are facilitating their co-construction of knowledge and foster within schools hacking through the creation of informal social and educational processes that incorporate some of their social lives habits. Hacking is located in situational interest, curiosity, and boredom²⁰, and given the right supports and developmentally appropriate language and tools, children can critically explore questions that are meaningful and important to them.

Social-constructivists have demonstrated that children construct knowledge and meaning in multiple social locations.²¹ Today, digital media are becoming one of these locations where the hacking ethos is celebrated and encouraged. However, it is apparent that the current education model of classroom education does not prepare learners to move into virtual environments as a primary social world, employing educational principles that counter these new modes of mobile social engagement and emergent learning, and accentuate the cultural barriers that exist between school and a learner's social life.

In order to incorporate critical DIY making, education must acknowledge that a large portion of significant learning moments exists outside of schools, often in mobile and/or digital space. It can hone these experiences in the classroom by accepting personal interest as driving forces of learning as well as incorporating peer culture within much more fluid institutional boundaries. This valuing of intrinsic interest, motivation and the value of personal, practical knowledge implies building an emergent curriculum that is open-ended and flexible, responsive to the goals outlined by the educator-learner partnership and that validates situated emergent learning within material and immaterial communities of interests and practices in order to insure learners are socialized to engage in mixed spheres of social/learning interactions.

The integration of informal and emergent learning opportunities into formal education can be achieved by transforming the institution into a learning node that fosters making and becomes part of a network of mobile learning commons and that offers community workshops used to help innovative makers create sustainable solutions to local problems.²²

²⁰ Gregory Schraw and Stephen Lehman, Situational Interest: A Review of the Literature and Directions for Future Research. *Educational Psychology Review* 13, no. 1 (2001): 23-52.

²¹ Lev S. Vygotsky, *Mind in Society* (Cambridge Mass.: Harvard, 1978).

²² Gever Tulley, *Five Dangerous Things You Should Let Your Kids Do*, TED talk, March 2007, accessed June 28, 2011

http://www.ted.com/talks/gever_tulley_on_5_dangerous_things_for_kids.html

Such an approach is essential to change the nature of power dynamic within learning processes and prepare students for a different future. Instead of focusing on industrial processes that train children to the standard work flows, the standardized social rituals, and the power hierarchies of specific industrial contexts, it is necessary to make them get grounded in themselves and therefore be able to move into an uncertain future with confidence and self-assurance, as well as to be able to adapt and be flexible when facing life and work situations our generation can not foresee.

By giving voice to children and learners, DIY making education can help develop a process that empowers learners to participate in self-determination and know how to participate in various forms of production and governance, one of the most powerful vehicle for changing power dynamics within western capitalist institutions.²³ Central to this form of education becomes the ability to operate and negotiate within the social rules and contracts and governance structures of common property regimes based on self-management by a local community.²⁴

4. DIY citizenship: the problem of self-determination in autonomous practices

Autonomy is central to the critical DIY maker citizen ethos. Children naturally engage in learning activities and cultural production that lead to self-discovery and self-learning and as such increased autonomy, their first experiences towards an act in opposition to heteronomy, when present in institutional education and parenting.²⁵ However, how children choose to and/or are allowed to engage in informal learning activities influences the nature of their social life and help them develop specific types of autonomy.

Historically, different pedagogies have reflected specific ideological positions that change the nature of autonomy a learner is guided to develop²⁶. Some pedagogies promote the values of a hegemonic vision of society and by consequence constrain a learner's autonomy to the ability to perform a given task within a given institutional value system.

DIY pedagogies introduce an understanding of an autonomous individual. But depending on the ability of the individual to hack social norms, the individual can be either auto-controlled or self-determining. An auto-controlled autonomous individual has internalized the social norms and values of a specific social group to the point of being able to self-regulate in accordance to these internalized concepts. Within a marginalized social context, the individual internalizes the social values of his/her cultural community and work to reproduces its economic and other types of values, while in corporate contexts

²³ Michel Foucault, *Power* (Essential Works Vol. 3), ed. James D. Faubion (New York: New Press, 2000)

²⁴Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective action* (Cambridge: Cambridge University Press, 1990)

²⁵ Nolan, Raynes-Goldie, McBride. "The stranger danger"

²⁶ Bal, Alexandra. "Virtual Higher Education: A Liberalist or Humanist Socialization Tool"

the individual having internalized the values of corporate culture serves to evolve corporate markets by developing new niches that serve his/her specific local context and culture.

An individual becomes capable of self-determination once he/she has challenges traditional norms and has developed a self-awareness of being distinct as well as in relationship to social groups. Only once this awareness is created, can an individual develop critical thinking abilities necessary to move beyond dominant social norms and create a personal social reality.

Many educators have explored and successfully implemented pedagogical forms that are centered around promoting such values. The Reggio Emilia²⁷ culture of listening makes students' interest central to the educational process by making the student visible and audible in the learning process. The goal of such an approach is to re-launch "dialogue and sharing around a culture of childhood based on the necessity of respecting each child's identity so promoting his/her potential and rights." Some school initiatives have begun to explore these notions, alternative community schools, Gever Tully's tinkering school,²⁸ the edible schoolyard, the school at the blair grocery²⁹ and the NOLA³⁰ project in the United States.

These emerging projects could help redefine schools to continue to play a crucial role in providing students with access to research infrastructure in the sciences and the professions that is not available in the general community, facilitating collaboration between like-minded individuals on topics of interest, connecting learners to experts in the field and learn how to conduct and observe field placements. But such a redefinition will require activities such as deliver content, assessment of low level recall of content and administration of standardized evaluations happen elsewhere.

But the need for self-determination in the construction of one's own social reality limits the use of pedagogical models that are focused on mobile informal and emergent learning in current schools. The formal structures and social processes of institutions create barriers that are very difficult to overcome. Schools tend to block out the potential of new values systems to be introduced in a hidden curriculum which is embedded in the the very nature of the school system, its internal social structures and the behaviors and attitudes of its staff.³¹

Often, values important to societal curriculum, and by consequence to students, are not only unreflected in practice but also left out of curriculum. This "null" curriculum disempowers students and in the process tends to eliminate their belief in their own self-worth, an essential building block of

²⁷ Lella Gandini, "Introduction to the Schools of Reggio Emilia," in *Insights and Inspirations from Reggio Emilia: Stories of Teachers and Children from North America*, ed. Lella Gandini, Susan Etheredge, and Lynn Hill (Worcester, Mass.: Davis, 2008).

²⁸ <http://www.tinkeringschool.com/>

²⁹ <http://schoolatblairgrocery.blogspot.com/>

³⁰ http://www.nola.com/homegarden/index.ssf/2010/04/art_environmentalism_intertwin.html

³¹ Wilma S. Longstreet and Harold G. Shane, *Curriculum for a new millennium* (Boston: Allyn and Bacon, 1993)

towards self-determination, by ignoring the alternative and tacitly sending to students the message that these types of values are not as important as others.³² These hidden and null curriculum highlight the limitations of educational institutions to address the learning needs of individuals in more than select areas of education.

Conclusion

Children are never far away from DIY learning spaces. Born in current digital-rich era, young creators and learners actively participate in building new cultural artifacts out of given cultural commodities or from scratch,, engaging in DIY making processes.

Preliminary results of our “voices from digital natives: informal learning and sociable media in child and youth cultures” research project³³ suggest that networked spaces allow children to use a larger array of learning modalities including musical, visual, social and other knowledge that can better suit individuals whose dominant forms of intelligence are not addressed and/or a disadvantage in formal learning settings. This makes us postulate that networked spaces, let it be in the forms of games or social media, are home to experimentation with new forms of identity, communities, economic and social life that are based on self-determination and influence real life both in terms of learning possibilities but also social and political life.³⁴

Today, the DIY ethos has been absorbed by corporate culture which through gaming and social media can offer very attractive DIY production tools such as Sony’s LittleBigPlanet™³⁵ that already have a central place in children lives. And a casual look at children’s engagement with digital media may lead many adults to believe that what they are seeing is a passive consumption of corporate-driven commercialized commodities. However, children are continually - albeit largely unconsciously - hacking the norms, expectations and intentionality of these tools and spaces. They create their own social practices within existing games and social media, particularly when environments attempt to block the kinds of interactions they would like to have.³⁶ And in a growing number of contexts, children are DIYing their own culture and tools, with which to engage in the world around them. These emergent practices are not new, as journalism Logan McCall reminds us, the common man has been a craftsman

³² David J. Flinders, Nel Noddings, and Stephen J. Thornton, “The Null Curriculum: Its theoretical basis and practical implications,” *Curriculum Inquiry* 16, no.1 (1986): 33-42.

³³ Alexandra Bal, Yukari Seko, and Jason Nolan. “Digital space as semi-permeable membranes” (presentation, Annual Conference of the Association of Internet Researchers, Seattle, October 15-17, 2011). <http://tinyurl.com/4xmvp9z>

³⁴ Alexandra Bal, “Voices from one EDGE of new media,” *Function Magazine*, May 2011, 12: pp 92-93.

³⁵ Sony’s *LittleBigPlanet* is a video game based on user-generated content. It enables players to create their own home (“pods”) and worlds (“levels”) with a variety of objects and avatars, within which the players can explore different levels, create their characters and personal spaces, play and communicate with other players online as a part of social community.

³⁶ Sara M. Grimes, “The Hidden Playground” *The Escapist* 227, November 10, 2009, accessed August 7, 2011 http://www.escapistmagazine.com/articles/view/issues/issue_227/6752-The-Hidden-Playground

throughout the history of society, and it is only recently that the knowledge of how the central tools of our lives have become inscrutable products.³⁷ It is part of human nature to hack social norms and societal expectations in order to help society evolve.

If we want to capitalize on children's hacking proclivities in informal and formal learning environments, we need to acknowledge children as social actors who need to hack existing norms as an act of autonomy³⁸ and we must support their making choices regarding how and who they want to interact with. Thus, we must also insure that their informal social life both mobile, digital and geographical are considered legitimate learning spaces.

Such a change will be difficult to incorporate in formal education as DIY culture and values are in direct conflict with dominant values of educational institutions. By tradition, the public elementary mass education system teaches students to follow the 19th century middle class values as well as industrial working protocols, which tends to dwarf their own believe system and notion of being, both key to self-determination. Even with the desire to change, these institutions are not structured nor staffed in ways that can promote social and curricular change.

Current initiatives indicate that we are in the midst of a re-definition of education which, like other realm of societies can not remain impermeable to the influence and social life changes brought by DIY culture and digital media. The inability of schools to adapt is becoming more problematic as mobile learning is increasingly allowing people to take education into their own hands. Already, parents have turn to private and now online alternatives which better address their children's and their own needs and while some of the solutions offered come from within the traditional school system,³⁹ a majority are emerging out of other contexts.

We are currently on the cusp of changes to the global regulatory and legal systems that have been planned for decades⁴⁰ and within the next few years these regulatory systems will facilitate the acceptance of these alternate systems as part of education. Some of these alternatives are being quietly funded by governments, indicating that DIY culture is a recognized societal reality that some governments are seeing as our future by funding established and reputable DIY champions to build the educational infrastructures that acculturate the public to this culture and bypass traditional educational institutions. As these alternative find a legitimate place within our society, formal mid year education will evolve to become part of a larger secondary educational ecology that will mirror and resemble

³⁷ Logan McCall, "What is Maker Culture? - DIY Roots." *Associated Content*, March 10, 2009, accessed August 8, 2011

http://www.associatedcontent.com/article/1528122/what_is_maker_culture_diy_roots.html

³⁸ Nolan, Raynes-Goldie, McBride. "The stranger danger"

³⁹ For instance, there are the publicly funded Avon Maitland District e-Learning Centre (<http://www.amdec.ca/>) and Algoma District School Board (<http://www.adsb.on.ca>) accessible for homeschooling activities.

⁴⁰Alexandra Bal, "La délocalisation de la formation universitaire à Ryerson: une évolution vers l'internationalisation du savoir," *Distances et Savoirs*. Volume 5, n°3 (2007). Hermès/Lavoisier.

existing educational markets, opening the door to alternate DIY cultures and practices to be legitimized and for citizen to develop the literacies necessary to become critical DIY makers.

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