Author(s): Jäppinen, Aini-Kristiina

Title: 3D Visualization of Engendering Collaborative Leadership in the Space

Year: 2011

Version: Final draft

Please cite the original version:

Jäppinen, A.-K. (2011). 3D Visualization of Engendering Collaborative Leadership in the Space. In N. Callaos, H. Chu, W. Lesso, M. Savoie, F. Welsch, & C. Zinn (Eds.), The 2nd International Multi-Conference on Complexity, Informatics and Cybernetics, Proceedings Volume II (pp. 302-307). Orlando: International Institute of Informatics and Systemics.

3D Visualization of Engendering Collaborative Leadership in the Space

Aini-Kristiina Jäppinen, University of Jyväskylä/Finland, Finnish Institute for Educational Research
aini-kristiina.jappinen@jyu.fi

ABSTRACT

The paper focuses on collaborative leadership in education and how to illustrate its engendering process in a three-dimensional space. This complex and fluid process is examined as distributed and pedagogical within a large Finnish vocational upper secondary educational organization. As a consequence, the notion of distributed pedagogical leadership is used when collaborative leadership in education is studied. Collaborative leadership is argued to consist of the innermost substance of a professional learning community, as characteristics or qualities of a group of people working together for specific purposes. Therefore, collaborative leadership naturally involves actors, activities, and context. However, the innermost substance of the community is the crux of leadership. It is here presented in the form of ten "keys" and their operational sub-concepts. The keys are highly interdependent and a movement in one of them has an effect both on every other key and the whole. Within this framework, the paper provides a presentation of selected study results by means of the 3D program Strata. The visualizations illustrate concrete examples of the keys and how they relate to the reality in the vocational education organization in question. For this, a novel analysis is used, based on natural laws and rules of physics.

Keywords: Collaborative Leadership, Professional Learning Community, Distributed Pedagogical Leadership, Space, 3D Visualization

INTRODUCTION

Leadership is a debated and controversial concept and research subject. Ambiguity increases when leadership is examined from diverse points of view: (1) through persons in focusing on their roles, duties, tasks, outward status, or behavior; (2) through different instruments, such as technical and psychological tools, practices, measures, or activities; or (3) through processes of developmental issues, results of leadership, or situations in a specific context [1].

This paper considers c*ollaborative leadership* as a common endeavor of a professional community particularly in educational contexts. Further, collaborative leadership is here broadly considered as an open, complex, adaptive, and fluid system with no explicit boundaries [2]. To be exact, it is suggested here that the complex system of collaborative leadership naturally involves the human beings attending to the process and the actions they conduct in relation to specific contexts [3]. This tentative human, practice and context-related outline of collaborative leadership very much resemble the setting of Graen [4] when he mentions the necessary ABC elements of leadership: (A) actors, (B) behavior, and (C) context. But this is not all. It is argued here that the complex system of collaborative leadership occurs in a three-dimensional space [5] and should be, as a consequence, studied in relation to it.

Therefore, the paper takes use of a trans-disciplinary approach with certain universal rules of physics and applies them as representational tools to illustrate collaborative leadership. In considering the engendering process to happen in the space, tri-dimensionality also allows the study of collaborative leadership with regards to time as photo-like snapshots or longer videotaped stretches in providing provisional but nevertheless valuable understanding of the complex system [6].

SETTING AND DATA

Selected parts of a large-scale Finnish educational research project called ENTREE (2009-2014)[1] are here used to introduce the engendering process of collaborative leadership in the three-dimensional space. ENTREE is funded by the Academy of Finland[2], the central and leading research organization in Finland.

The theoretical aim of ENTREE is to develop an understanding of the kind of activities and measures in education that are communal. For this, collaborative leadership as distributed and pedagogical, explained below, is taken as one of the main concepts. ENTREE's empirical aim is to discover those practices, activities and measures that are collaboratively executed to support students' transitions. ENTREE's methodological aim is to create and develop an analytical method capable of describing the complex system of collaborative leadership. This paper mainly concentrates on this third aim although it also exploits the other aims to explain the method.

In the case presented in this paper, the actors are 400 staff members in a Finnish vocational upper secondary education organization with 4,000 students. The case organization is situated in an economically growing area within a mix of urban and rural surroundings.

Amongst ENTREE's several sub-studies, co-dynamics in the organization's leadership-teams, support to immigrants, teachers' pedagogical leadership, and shared curriculum work are here selected as the platform of collaboration. The context-bound measures of the personnel that are treated in this presentation relate, in

[1] Collaborative Enhancement of Transitions in Lifespan Learning Pathways through Distributed Pedagogical Leadership https://webapps.jyu.fi/wiki/display/entree/In+English

[2] www.aka.fi

general, to creating and sustaining practices that support heterogeneous learners' fluent transitions both in schooling and on to working life or continuing studies. The special context used here is a period when a large curriculum work was processed by the whole personnel and when a new structure of matrix organization was also being launched.

First, the data used in this paper consists of four semi-structured, tape-recorded and transcribed interviews of one to two hours of (1) the principal of the organization, (2) the head of the unit of general studies (mathematics, languages, physics, chemistry etc.), (3) a central person amongst the guidance personnel, and (4) a vocational studies teacher. Secondly, the data consists of two tape-recorded and transcribed observations of (1) a whole-day development event for the leadership-team of 12 persons in one of the organization's five units and (2) a whole-day training event concerning the curriculum work for a teacher-team of 16 members in the same unit.

Certain staff members or teams are here chosen as informants. However, we must note that in the engendering process of leadership, pedagogical actions and measures are collaboratively led in jointly agreed ways and to the jointly negotiated direction by *every member* of the personnel on the grounds of accumulative collective cognition and understanding and synergy creation [7]. Although collaborative leadership thus includes the idea that leadership belongs to everyone in the community because it represents its inner characteristics, it is easier and more practical to illustrate the engendering process of collaborative leadership with a smaller group of community members as representative as possible, as it is done here.

THEORY AND RESEARCH DESIGN

Distributed Pedagogical Leadership and Ten Keys

As a complex, open, and adaptive system, collaborative leadership is studied and understood through inner and extremely fluid *qualities* or *characteristics* of a learning community, as its *innermost substance*. In order to do this, a more precise theoretical notion of *distributed pedagogical leadership* is used [8]. It comprises ten vivid, changeable and fluid elements that are called the *"keys"*. They are composed of several operational sub-concepts. The keys are *polyphony, interaction, expertise, flexibility, commitment, responsibility, negotiation, decision-making, confidence-based control, and evaluation*. Their acronyms are Pol, Int, Exp, Fle, Com, Res, Neg, Dec, Con and Eva.

The ten keys were found on the grounds of two large-scale Finnish studies (2006-2009) preceding ENTREE [9]. This finding does not exclude the fact that in the follow-up studies more keys or sub-concepts might be detected.

All keys involve well-known conceptions in educational research and, in this sense they do not provide anything new. However, the ten keys are highly interdependent and a movement in one key has an unpredictable influence on all the others. This complexity is called *sounding* (Figure 1). It means that each key echoes with every other key. In addition, the keys manifest themselves in different forms in different times in the collaborative space according to the actors, practices and contexts.

Figure 1. Sounding of the keys

As a consequence, it is argued that the more traditional way to study collaborative leadership is not, perhaps, the best way. Further, it is also argued that collaborative leadership cannot be "learnt". If the complex system of collaborative leadership consists of inner qualities and characteristics of a learning society, leadership should arise from inside of it. That is, collaborative leadership is *engendered* although the individuals in the system learn. Moreover, it is argued that when collaborative leadership as a complex and adaptive system is engendered by the actors and in relation to specific contexts in the space, this process can be made visible.

The TenKeys® Model

The ten keys of distributed pedagogical leadership represent the shaping collaborative leadership qualities. The keys are connected together into a model called TenKeys® in order to study and visualize the complex system.

To better understand the flexible process in the space, this paper makes use of two ancillary concepts including the TenKeys® model. The concepts are scopes and positions. *Scopes* are different study angles to discern movements in the space. They are like "spotlights" that are directed towards the space from different directions. This paper considers, amongst a larger number of possibilities in ENTREE, the scopes of *script* and *equipment* (Figure 2; Obs. Figure 2 also includes two other scopes of power and dialogue that are studied in ENTREE but not included this paper).

Script is composed of the visions, values, aims, and objectives of the community, for example, as plans, strategies, rules, or curricula. Equipment means tools, devices, instruments, facilities and abilities that help the actors to realize the script. Thus, the scope serves as the special focus in the data exploited in this paper. Scopes of

equipment and script are obtained from the case organization as studies of co-dynamics in the leadership teams, immigrants' transitions, teachers' pedagogical leadership, and shared curriculum work.

Figure 2. Scopes and positions as supplemental tools

Position means those different "stances" that the members or even the same member can take in different times or situations in the space. The presentation mainly concentrates on the positions of *leadership*, *guidership*, and *teachership* (Figure 2; Obs. ENTREE includes other positions also presented in Figure 2 but which are not included this paper). This means that the data of this paper is examined through leadership, teachership and guidership related issues. However, it is worth to emphasizing once more that scopes and positions are only supplemental tools and the model allows the use of varying scopes and positions according to diverse sub-themes and other study interests.

The Wave Analysis and its Visualization

To study the collaborative space in which the engendering process of collaborative leadership happens, a novel analytical method is introduced. It is called the *Wave* because it applies the ideas of physics' wave motion and the laws related to it.

The symposium presentation will first introduce the basics of the Wave analysis with the 3D program Strata: how, in general, the engendering process of collaborative leadership can be visualized through the ten keys. Further, the paper highlights the analytical method with certain concrete examples about the engendering process of collaborative leadership in the educational institute in question and with regard to the study contents explained above. Thus, the focus is not on the wide range of results obtained from script and equipment but on the snapshots. In brief, the results serve to facilitate understanding of the TenKeys® model and its application to practice.

Fluidity and flux in nature: The inter- and trans-disciplinary theoretical background of the Wave is based on the fact that the three-dimensional space in nature is in a constant flux [10]. A crucial component in engendering leadership is its ever-changing character; it is also in flux. Because the collaborative space is a part of the fluid nature, laws that apply to the flux in nature also apply to the flux in other spaces. Thus, the analytical method of studying engendering leadership in the collaborative space should retell the realities of nature as a fluid entity. Therefore, the collaborative space can be viewed through the applied lens of the laws of physics, using the Wave analysis.

Transmitting energy and messages: Everything in nature and in the universe vibrates. Vibration transmits two fundamental things: *energy* and *messages*. When the source (e.g. sound) vibrates, it causes the medium (e.g. air) to vibrate. This vibration manifests as a wave motion which can be studied (Figure 3). Because everything in the universe vibrates, the collaborative space vibrates along with everything that is within it. Therefore, the course of sounding taking place in the collaborative space can be studied through the laws of wave motion.

In ENTREE, two main categories of waves are studied. *Communicative waves* relate to writing, reading, speaking, or listening processes. *Interior waves* relate to attitudes, feelings, gests, expressions and alike. However, this presentation only introduces examples of the communicative waves.

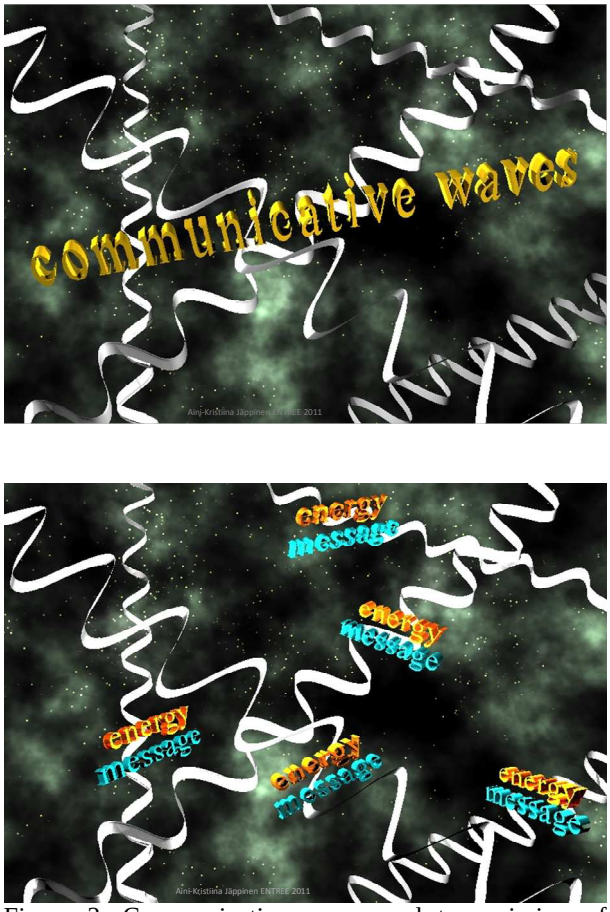

Figure 3. Communicative waves and transmission of energy and messages

As in nature, also in the collaborative space the waves carry energy and messages. These two elements can be now considered as two fundamental substances of the collaborative process that takes place in engendering leadership. It is suggested here that collaborative leadership is composed of the inner characteristics of a learning community. These qualities can be examined and visualized through the ten keys that vibrate and elicit waves according to the physics' models and mediate energy and messages.

Medium and source: In physics, the *source* of the wave feeds energy and messages to a *medium*. Through the medium, energy and messages are diffused by the waves in all directions. In the community, the personnel, learners and all the other stakeholders continuously feed energy and messages through diverse mediums, such as face-to-face or virtual discussions, meetings and appointments, technical tools, documents or other written texts, etc. to the space and effect a change that can be examined through the ten keys. The change can move in any direction. It can strengthen or hinder the process and engender "better" or "worse" leadership.
Myriad of waves moves through the length and breadth of the collaborative space and it is not by any means conceivable to study them all. However, the model provides enough information about selected situations, moments or contexts and offers a sufficient repertoire of knowledge to start to understand the inner qualities that are essential to engender the kind of leadership the community currently needs [11].

Criteria, scores, sub-concepts, and analysis units: Visualization of the engendering process of collaborative leadership as waves is quantified according to several previously defined criteria. The criteria determine the scores that the waves get. Scores that are used normally vary on the scale from zero to four, including half points. This allows further statistical analyses or other kinds of quantifications. We will come back to this issue in context of the wave magnitudes.
The criteria for the scores were validated through comprehensive research triangulation in ENTREE. During this pilot period, all the analyses were done in peer-groups so that the other analyst was always the author. In addition, different data was used to modify the criteria. At the time of writing, the piloting of the model is in the final phase and its use will be extended to other kinds of settings in different organizations.
The criteria, with which the scores to the waves are given, are not value-loaded in the sense that the researchers could interpret the diverse data in different ways. The criteria are the same for all data and in all settings. The criteria only tell the way in which the waves vibrate and the characteristics of the wave motions. Moreover, the criteria can mean both desirable and undesirable issues for the community in question.
The analysis unit to study communicative waves can be almost of any length or mode. The unit can be an utterance, a longer extract or even a whole session or document. This simply depends on purposes, data, settings, etc. (The interior waves have different kinds of analysis units.)
The sub-concepts of the keys were also verified and modified during piloting process of the Wave. The sub-concepts emerge both from the large repertoire of existing research about collaborative leadership and the data collected in ENTREE.
The symposium presentation will illustrate some criteria and scores related to the keys and sub-concepts introduced. Some examples of the criteria are also explained below.

Magnitudes – amplitude, wavelength, and frequency: The quantification process of the waves is done with three basic magnitudes of wave motion: amplitude, wavelength and frequency (Figure 4). The emphasis is in this paper on amplitude and wavelength although frequency will also be touched upon briefly.

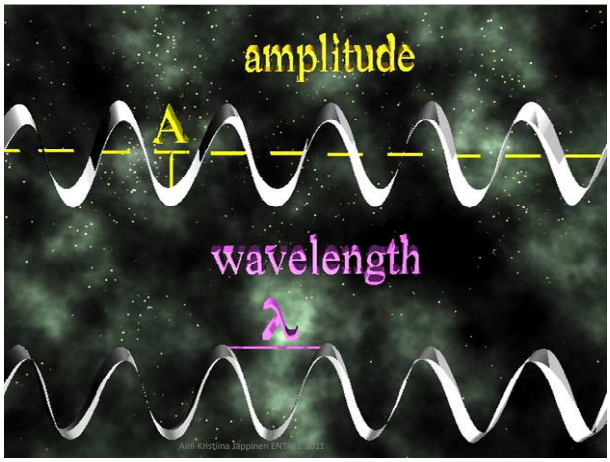

Figure 4. Amplitude and wavelength

Amplitude (A) is the greatest amount of change in the oscillating variable (Figure 4). It is the greatest deflection from equilibrium. Equilibrium means that there is no activity in the collaborative space: nobody moves or nothing operates. In fact, this is not possible. Somebody always acts or something happens. However, amplitude is defined with relation to this assumed balance.
Each amplitude score has its main validity but also includes many alternatives for different purposes. For example, a score of four means that the wave highly differs from equilibrium. It is extremely versatile, multiform, voluminous, or it has an exceptionally strong effect on the community in question. However, these score criteria are not "loaded". For example, rich can be rich as positively or negatively for the collaborative process. Multiform may mean something valuable or something opposed. Only the amount of the character in the issue in question matters.
In physics, ***wavelength (λ)*** is the distance between two wave crests. The longer the distance the easier it is for the wave to traverse the space without great obstacles. Thus,

wavelength illustrates how easy or troublesome is for the wave to move in the space and, in this way, which kinds of short-term or long-term effects on the community the waves have.
In the Wave, this magnitude is studied as combinations of several waves. The linkage was done in order to simplify the illustration process and facilitate the use of criteria in defining the score. The connected waves express the same kind of energy and transmit similar messages, that is, they have a common "theme". Thus, the new compound wave describes the synergy of several waves and their facileness or difficulties to traverse together through the space. In this way, wavelength also shows significant or insignificant themes in the space.
In addition, wavelength tells facts about the medium and the source in providing insight into their collective influence. For example, if wavelength is defined as one it means that the issue in question manifests itself as narrow, small-scale, fragmented or irregular. It can be again desirable or undesirable for the collaborative process.
Frequency (f) tells facts about the impact of the source. It totals the number of waves that have passed by the observation point in the defined term. This point is a predefined analysis unit, such as a session or an interview. In defining frequency, all waves of the same key and/or sub-concept are calculated together in order to see the foci of the collaborative leadership engendering process as distributed pedagogical leadership.
In addition, other magnitudes are also available in the Wave, such as the *speed of the wave*. This concept is not, however, introduced in this paper.

RESULTS

It was suggested that the complex system of collaborative leadership is in constant flux. Therefore, any complete description of the state of distributed pedagogical leadership in the target organization and in its professional learning community cannot be stated. The only way to more fully understand the phenomenon is to collect different topical snapshots or descriptions from longer periods in the space. When the vision about distributed pedagogical leadership will be, in this way, further clarified, more understanding and knowledge is gained about the engendering process of collaborative leadership.
As a consequence, the symposium presentation will illustrate various aspects of the innermost substance of the community as snapshots. This is done with the selected data, explained above, and in regards to different moments in the collaborative space. First, the ten keys are presented with more detailed explanations of their sub-concepts. Secondly, the presentation will include examples of the communicative waves that were found in the engendering process of collaborative leadership in the case organization. This is done in accordance with the data extracts. Figure 4 illustrates the basic picture according to which these results are introduced. Because of the limited time in the symposium, only snapshots are presented. Thirdly, on the grounds of the snapshots, the presentation includes descriptions of the energy and messages which were found to be feed into the collaborative space at the time of data collection. Fourth, some examples of wavelength will be presented as compound waves.

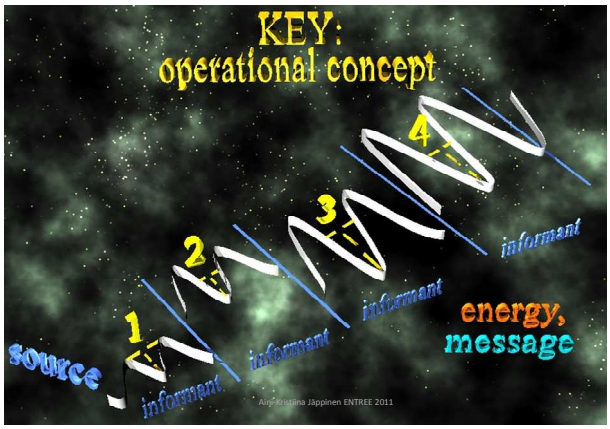

Figure 4. Basic picture of the results

CONCLUSIONS

This paper highlights that when using physics' universal rules, the complex system of collaborative leadership can be made visible and it is possible to approach the ambiguous phenomenon. Thus, there might be, nonetheless, universal rules of nature that are useful and applicable to superficially diverging phenomena.
The research of complexity emphasizes that it is not possible to develop an objective appreciation of something of which we are part [12]. This is naturally true but also concerns many other researches; the same difficulty lies with various qualitative researches that concern more simple phenomena.
However, the trans-disciplinary aspect of using the laws and rules of physics' allows us to better comprehend engendering leadership. In this way we no longer operate on the edge of chaos with uncertain systems that seem to evolve by themselves but gain more understanding about a complex system that is fluid and adaptive but still approachable and in some ways regulated or at least anticipated. In sum, although the TenKeys® model cannot explain any causal rules that operate in the space it can explain *prerequisites*, *consequences* and *conditions* of sounding. This knowledge supports a community to engender the kind of leadership they wish and to more fully understand the complex system of their collaborative leadership.
The possibilities to use the TenKeys® model and the Wave analysis in explaining collaborative leadership and its engendering process are almost endless. This results from the model's multiple layers. Depending already on the scopes and positions chosen, the model may provide multiform understanding of collaborative leadership. The different actors, activities and settings add to the number of choices.

The recent results of ENTREE project evidence that, actually, there is not one single but many manifestations of distributed pedagogical leadership in the collaborative space. These are called *hybrids*. The hybrids are modified according to the multiple choices, explained above. The next state of ENTREE is to find the kind of hybrids the community can make use of and which open new realms to the engendering process of collaborative leadership.

REFERENCES

[1] Bass, B. M (2008). *The Bass handbook of leadership. Theory, research & managerial applications*, 4th edition. New York: Free Press.

Katz , D. & Kahn, R. L. (1978). *The social psychology of organizations*, 2nd edition. John Wiley & Sons, Inc.

[2] Biesta, G. (2010). Five theses on complexity reduction and its politics. In D. Osberg & G. Biesta (Eds.) *Complexity theory and the politics of education*. Rotterdam: Sense Publishers, 5-13.

Davis, B. & Sumara, D. J. (2006). *Complexity and education: inquiries into learning, teaching, and research.* New Jersey: Lawrence Erlbaum Associates, Inc.

Urry, J. (2005). The complexity turn. *Theory, culture & society*, 22(5), 1-14.

[3] Fenwick, T. (2010). Complexity theory, leadership, and the traps of utopia. *Complicity: An International Journal of Complexity and Education*, 7(2), 90-96.

Haggis, T. (2009). Beyond 'mutual constitution': looking at learning and context from the perspective of complexity theory. In R. Edwards, G. Biesta & M. Thorpe (Eds.) *Rethinking contexts for learning and teaching. Communities, activities and networks*. London: Routledge, 44-60.

McClellan, J. L. (2010). Leadership and complexity: implications for practice within the advisement leadership bodies at colleges and universities. *Complicity: An International Journal of Complexity and Education*, 7(2), 32-51.

[4] Graen, G. B. (2007). Asking wrong questions about leadership. *American Psychologist*, 62(6), 604-605.

[5] Giddens, A. (1984). *The constitution of society*. University of California Press.

Hernes, T. (2004). *The spatial construction of organization*. Philadelphia: John Benjamins Publishing Company.

Lefebvre, H. (2000). *La production de l'espace*. Paris: Anthropos.

[6] Cilliers, P. (2010). Foreword. In D. Osberg & G. Biesta (Eds.) *Complexity theory and the politics of education*. Rotterdam: Sense Publishers, vii-viii.

Osberg, D., Biesta, G. & Cilliers, p. (2008). From representation to emergence: complexity's challenge to the epistemology of schooling. *Educational Philosophy and Theory*, 40(1), 213-227.

[7] Gronn, P. (2002). Distributed leadership as a unit of analysis. *The Leadership Quarterly*, 13(4), 423–451.

Gronn, P. (2008). The future of distributed leadership. *Journal of Educational Administration*, 46(2), 141-158.

Hargreaves, A. & Fink, D. (2009). Distributed leadership: democracy or delivery? In A. Harris (Ed.) *Distributed leadership*, 181-196. London: Springer.

Harris, A. (2009). (Ed.) *Distributed leadership. Different perspectives*. London: Springer.

MacBeath, J. 2005. Leadership as distributed: a matter of practice. *School Leadership and Management*, 25(4), 349–366.

Spillane, J. P. (2006). *Distributed leadership*. San Francisco: Jossey-Bass.

[8] Jäppinen, A.-K. (in print). Transitions in individual vocational education pathways – challenges and collaborative solutions. In P. Tynjälä, M-L. Stenström & M. Saarnivaara (Eds.) *Nothing is permanent but change. Transitions, transformations and transgressions in learning and education*. London: Springer.

Jäppinen, A.-K. (submitted a). Engendering leadership through collaborative learning process. *International Journal of Leadership in Education*.

Jäppinen, A.-K. (submitted b). Distributed pedagogical leadership and organizational qualities – supporting students' learning paths. *Journal of Leadership and Organizational Studies*.

[9] Jäppinen, A.-K. (2010a). *Onnistujia opinpolun siirtymissä. Loppuraportti* [Successful Transitions in the Individual Learning Pathways. Final report]. National Board of Eduaction. Proceedings and Reports. Jyväskylä: Jyväskylä Educational Consortium Press.

Jäppinen, A.-K. (2010b). Preventing early leaving in VET. Distributed pedagogical leadership in characterizing five types of successful organizations. *Journal of Vocational Education & Training*, 62(3), 297-312.

Jäppinen, A.-K. (2009). Get a vocation - Keeping on top of studies. Reducing the drop-out rate in vocational upper secondary education and training. *European Journal Vocational Training*, 47(2), 28-49.

[10] Lefebvre, H. (2000). *La production de l'espace*. Paris: Anthropos.

[11] Osberg, D., Biesta, G. & Cilliers, p. (2008). From representation to emergence: complexity's challenge to the epistemology of schooling. *Educational Philosophy and Theory*, 40(1), 213-227.

[12] Davis, B. & Sumara, D. J. (2006). *Complexity and education: inquiries into learning, teaching, and research*. New Jersey: Lawrence Erlbaum Associates, Inc.