THE IMPLICATIONS OF TRUST ON MODERATING LEARNER'S ONLINE INTERACTIONS

A Socio-technical Model of Trust

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Abstract: The main goal of this paper is to present and validate a socio-technical model of trust. This model aims to depict the implications of trust on moderating learners online interactions.
This work main motivation is focused on design ways to promote a stronger acceptance sense of community among learners, by giving emphasis to a more active learning through collaboration and social construction understanding.
This model aims to eventually provide the means to detect potential trust violations within an online relationship, helping educators to move towards practices of reconciliation. This socio-technical trust model takes into account individuals trust predispositions and other five trust attributes and establishes their role on building relationships, and in developing underlying attitudes, behaviours and beliefs of an learning community. This paper starts by providing a contextualization on this research background and rationale, that leads to a the design of the preliminary exploratory model of model of trust, describes it validation procedure by setting results of a survey procedure.

1 INTRODUCTION

Present times are changing our learning patterns and those changes demands for new capabilities. This changes represent a shift of approaches towards learning, sharing, participating and socializing. What we saw in the beginning of the Internet era as a relevant feature, i.e. the Internet capability for be a repository of information and data is not longer enough, today we face the new era the social web era. Where communication is no longer just a merely information process, and no longer occurs in spaces where usually its members could remain relatively strangers This increasing availability of user-generated content mechanisms and the growth of social networking services changed society, because it allows a supplemental form of communication, for support a variety of social an professional goals and activities. This increased the tendency for socialization in virtual spaces, as a consequence new challenges and new capabilities are emerging. People can easily become a prosumer or can send or post opinions and messages, or can socialize and create virtual social links with others, or even can learn at a distance. This new capabilities allow people to easily relate and interact at a distance with each other and enables new possibilities for people with a wide range of backgrounds and with a broad spectrum of experiences communicate and share knowledge. What make this excellent spaces for learning. But in order to do that we must improve our social skills because these spaces imply that people are willing to share, a need for seek information, and imply as well a human capability to detect patterns or opportunities for learning. This is the ground flourishing for collaboration. All this demands for new methods, methods formed upon shared commitments, responsibilities, goals, loyalties. Suggests as well the need for renew the notions that addresses the existing duality between the human need for participate, share and learn and their social experiences and the reunification of those experiences in such social dispersed virtual spaces(Lave and Wenger, 1990). Is this what motivates and supports this research efforts. We consider participation as an important key for ensuring the success this socio-technical learning spaces. We believe that participation emerges from the individuals, the collective and their social situations. Scenarios where trust plays foremost an important role as

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trust represents a key aspect in forming a relation and is as well a key element to ensure that social action occurs (Weber and Carter, 2003). This research aims to understand how trust can be a prominent factor in balancing and fostering individuals participation in such spaces.

2 RESEARCH APPROACH

Due to the complex and dynamic nature of this research settings, this research is build on an ongoing actions research approach, which contemplates fours distinct research stages. This research points towards the need for: (1) contemplate the trust role in supporting interactions; and (2) in balancing and fostering individual's participation in online learning scenarios. During phase one we decided to understand the problem and its context by identifying what is trust and understanding how e-learning communities are developed in online distance contexts. Phase two of this research contemplates the empirical approach to the problem, it implementation and result analysis and reflection. The adopted strategy in this second phase includes a mixed approach, which explores above addressed problem in context. More specifically it addressed two main steps: First, work towards proposing a conceptual model that relates trust with learners' predisposition interact online. Second, work towards the design of an empirical approach which aimed to reflect, evaluate and provide an analysis to the problem addressed above. This was due to exploring individual's trust predisposition and other five trust attributes (proposed in the conceptual model, see figure 1) and establishes their role on building relations, and underlying attitudes, behaviours and beliefs of an education community.

3 RELEVANT BACKGROUND

This section, explores the theoretical underpinnings of the structure of the constructs being measure. It firstly addresses trust notions and then discusses and describes relevant trust notions associations with learning online contexts. The multidisciplinary nature of trust provides several approaches and discussions on what trust is and what it represents in terms of sustain and support individuals' social actions. Trust assumes an important role in modern societies. Trust can be a key factor either in influence people's confidence in a system; either in influencing the the lack of or the success of a interpersonal relationship online (Weber and Carter, 2003). Trust supports and sustain social actions(Coleman, 1988) (Gambetta, 1998) (Luhmann, 2000). Trust reflects the believe on each other actions, after considering the risks involved, even when we cannot control each other actions. Such beliefs and moral choices shaped our perception of a situation as "trustworthy" or not (O'Hara, 2009). It takes into account that other's actions will not violate the moral standards of the relationship (Weber and Carter, 2003) (Gambetta, 1998). As well can influences (positively or not) our behaviors and attitudes. Influencing for example their predisposition to relate, cooperate, share and participate in a given context. From a learning perspective, the increased omnipresence of social network services and communities makes the learning process no longer seen as a passive activity. Internet became a hub of socialization what transformed learning process. Transformed as well the way we relate and socialize. This changes are influenced by the perceptions of trust in this virtual environments. Again, online learning driven context implies a degree of self-learning, and a need to be more prepared to participate in the learning process by sharing, interacting, collaborate and cooperate. But this socio-technical tools and services provided for learning can be perceived differently from situation to situation and this tools and services or learning process can no longer assume the participation is for granted, if not this can lead communities initiatives empty and dissent. Learning must emerges from interactions between individuals and their networks; between individuals and their social situation; between individuals and their physical activities (learning instructions and media artifacts) (Swan and Shea, 2005). In that context people learn by share opinions, values, norms, beliefs and language. People work together (provide collaborative actions), which results in transference of knowledge and way of doing things (Lave and Wenger, 1990) (Mishra, 1996) (Preece and Shneiderman, 2009) (Brown, 2000). As a consequence of this differences on personal perceptions more emphasis needs to be addressed to the course design, planning and learners guidance (Wilson et al., 2006) (Attwell, 2007). But we believe that more focus should remain in attain learners needs, rather than only on the content. Inflexible learning scenarios could block learners from experimenting, be creative and could lead to frustration, preventing them to be motivated to learn. Individual and collective interactions are sustained and fostered by media affordances (social media tools and social network tools and services) and peoples' social behaviors (providing supportive actions in those learning spaces) (Swan and Shea, 2005). Efforts should be

addressed towards assessing what motivates people to participate in; and what contribute to collaborative learning processes. We should focus on understand learners' attitudes towards new technologies; and motivation toward learning. Emphasizing in providing opportunities to reflect on student's effective learning achievements through participation. As well as providing efforts to support sustain student's motivation for learning, avoiding as well feelings of frustration, confusion that could lead to poor performance. Technology enhanced Learning is highly consistent with the ability to reach out to students throughout using technologies, as well as in promoting a strong sense of community among learners, with emphasis on active learning through collaboration and social construction of understanding (Rovai, 2002). Trust in this context is developed to maintained and support individual's beliefs in the credibility of a determined situation. Trust represents a key element to assure the success of that relationship. Is a fundamental conditions for stable concerted actions, influencing individual's active participation; and cooperation (Coleman, 1988)(Fukuyama, 1995) (Weber and Carter, 2003)

4 A SOCIO-TECHNICAL MODEL OF TRUST

This section addresses and provides a proposed socio-technical model of trust. The socio-technical model of trust herein proposed is the result of an initial research effort to understand the trust-interconnection with people's predisposition to beliefs on human nature. As well as understand the trust-interconnection other's ability to be competent, predictable, benevolent, transparent and reliable. As a mean or results of facilitating and influencing interactions and as an indicator of people's confidence degree towards a particular relationship and towards their predisposition to relate online (Sousa et al., 2011). This research efforts focused specially on exploring trust aspects that eventually could affects the capabilities of individuals to share and interact online, and included:

- The elicitation of main multidisciplinary notions and trust concepts;
- The identification of trust notions and effects that are related with online patterns and student's attitudes towards openness and sharing; and
- The identification of main components of a community driven learning environment.

One of the outcomes of this research effort was the socio-technical model of trust, (see figure 1), a cyclic model that takes into consideration individual trust predisposition and the attributes of trust and its role on: (1) building relationships; as well as on (2) the underlying attitudes, behaviours and beliefs. **Reciprocity signs**, those related to the presumption

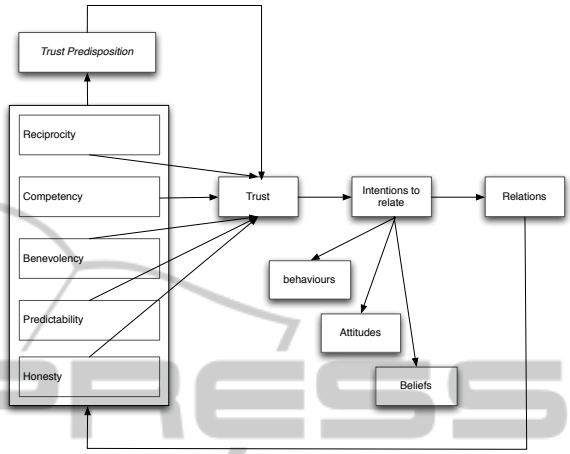

Figure 1: A socio-technical model of trust.

of whether he or she is trusted. the truster feels more motivate (i.e. more disposed to trust) if think the trustee trust him. (Bacharach et al., 2007) (Constantine, 2006) (McKnight and Chervany, 2002)

Competency signs, characterized by the confidence that all parts involved will act in a competently and dutifully way. Observed through people's online identities (background professional and personal paths ideas, and achievements) (Giddens, 1991)(Gambetta, 1998) (Constantine, 2006)

Benevolence signs, declaration of good intentions. 'kindness' raises trustworthiness, but that it does so only in the presence of perceived confidence. People's expectation on the human nature, resulting in attitudes of caring about the benefits of others. (Preece, 2001) (Bacharach et al., 2007)

Predictability signs, perceiving others' intentions in a given context, signs of interface stability, user control, and the match between expectations and performance. Depends on the level and capacity of perceiving others' intentions in a given context. (Bacharach et al., 2007) (Constantine, 2006) (McKnight and Chervany, 2002)

Honesty signs, is a open person. As predictability, honesty is a belief that depends on perceiving nature of the intentions of others. (Bacharach et al., 2007) (Kramer, 1999) (Weber and Carter, 2003)

Further the intrinsic attribute is the individual's **predisposition to trust**, represented by his or her inclination to depend on another in some way, with a felling of relative security (Bacharach et al., 2007) (Weber and Carter, 2003). Thus, in this model's con-

text, *trust* is perceived as the result of the combination of its explicit and implicit attributes. Trust is then a key feature on predicting the individual's intentions to relate, those perceived through their attitudes, behaviors and believes towards a determinate situation; which potentially determines how he or she establishes her or his *relations*.

5 THE SURVEY DESIGN

In order to validate and refined previous proposed trust attributes and it influence on individuals predispositions to relate in online contexts, a survey was designed. This survey procedure was designed to identify individuals underlying attitudes, behaviours and beliefs when build a online relationship.

Participants. This survey that was randomly conducted on 480 individuals, from which three-hundred and forty individuals were consider for analysis. Eighty nine (89) of those 340 participants, were from Cape Verde and two-hundred and fifty on (251) were from Portugal. From those fifty-three percent (53.2%) where male and forty-six percent (46.8%) where female. All participants work on education contexts and from those forty-six percent (46.5%) where higher education students, forty-one percent (41.2 %) where teachers of various levels of instruction, the remaining twelve percent (12.3%) had other educate related occupations.

Procedure. This survey was conducted using a online open-source questionnaire questionnaire tool called *Limesurvey*. Most of quantitative data collected in this survey used the means of likert scale of importance, ranging from very important, important, no opinion to not important. Survey remaining qualitative data included open question that aimed to provide additional thoughts or contributions important to be mentioned. Overall this survey accounted for forty-two questions and was divided in two main parts. First part regarded, demographic and background data questions — addressing questions like: place of living, age, gender, occupation, participants perceived level o Internet social interaction and perceived usefulness of a sort of social related activities in the Internet; and Second part regarded, trust related assertions — on individuals' trust expectation when interact online with friends, family and work fellows; to completely open relations like individuals' trust expectation when interact online with a teacher or a student, an acquaintances or a strangers. Second part was constructed based on three main questions, see table 1. Those question assessed individuals' expectations when interact online. Using the social, sharing and commitment dimension of a relationship that occurs in an online e-learning scenario. This survey,

Table 1: Questions addressed in the survey.

Code	*Questions*
$[Q1]$	What make someone trust in a online person
$[Q2]$	What is the important feature for be willing to share online
$[Q3]$	What is the important condition for being willing to communicate online

second part was constructed toking into consideration the trust predisposition implicit attribute as well and the other five explicit attributes of trust described in the socio-technical model of trust. The nature of the relationship that occurs online was addressed by six relationship types, described in table 2. Those type of online social relations ranged between more close and intimate relations to open. This is to cross the

Table 2: Nature of the relationship.

Code	*Nature of online relationships*
$[FR]$	friends;
$[FM]$	family;
$[WF]$	work fellows;
$[TS]$	teacher or student;
$[AQ]$	acquaintances; and
$[SR]$	strangers.

nature of the relationship (the social dimension) with trust related assertions. Survey second part included a total of 36 questions. In this part we use above three question and repeated them to assert people's trust towards different relationship nature, see figure 2. The

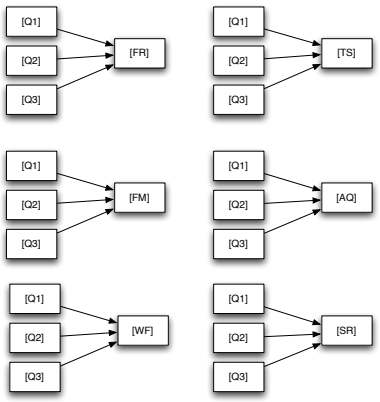

Figure 2: Survey design second part.

survey collection procedure was followed by a factorial analysis. Results gather from this analysis will be addressed below.

6 ACHIEVED RESULTS AND DISCUSSION

Results from this principal components analysis validates proposed a socio-technical conceptual model of Trust that relates trust with learners? predisposition interact online. This principal component analysis aimed to detect structure in the relationships between variables.This resulted in four component rotated matrix (with kaiser normalization method). This analysis was made for each question, see table 1, and included all relationship natures, see table 2. Further we will analysis the results with more detail regarding results on each of the questions.

What make Someone Trust in a Particular Person Online. This questions analysis contributed for the validation of trust attributes addressed by the socio-technical Model of Trust, which regards the nature of trust in influencing online relations. Main orientations assume a social tendency...

- to expect that working fellows or friends will act in a friendly way;
- to trust that all parts (Strangers and Family) will act in as expected;
- to assume a common related social presumptions (a social way of doing things) on acquaintance or family members attitudes; and
- to expect that strangers will behave as predicted (assuming existing social values in the relationship).

In detail, the **new trust sociability attribute 1**, addresses the importance of trust related relationship attributes like respect, honesty, reliability, empathy and sympathy. This is a result of items with primary lodgings over .5. The factor loading matrix for final solution is presented in table 3.

New Trust sociability attribute 2, addresses the importance of trust related relationship attributes like reliability, respect, be known, shared history and identity, be kind and be friendly.

New trust sociability attribute 3, addresses the importance of trust related relationship attributes like reciprocity, and benevolence in a form of sympathy, emphatic feelings and reliability.

New trust sociability attribute 4, addresses the importance of trust related relationship attributes like reliability, honesty, respectability, shared interests, sympathy, be a known person.

What is the most Important Feature for Be Willing to Share Information Online. This questions analysis contributed for the development of a trust new attributes, on the nature of people's sharing orientation in e-learning contexts. Main orientations assume a tendency to assume on truthful nature of the sharing interaction with acquaintances, working fellows, friends, family; to expect that their shared information and that somehow their digital identity is not threaten in some manner when share with strangers; and to belief that all parts (students or teacher) will act in as expected. A tendency to belief that the nature of the sharing relation is not threaten in some manner when sharing information with teacher or with students. In detail, the **trust sharing orientation 1,** address attributes like honesty, respect, transparency, empathy and reliability.

Trust sharing orientation 2, address attributes like reliability, predisposition to share, honesty, respect, transparency and empathy.

Trust sharing orientation 3, address attributes like transparency, honesty, respect, empathy, reliability and predisposition to share.

Trust sharing orientation 4, address attributes like predisposition to share, empathy and reliability.

Table 3: Factor loadings and commonalities based on principal Component Analysis.

Nature of the relationship	WF	FR
Respect me	.703	.75
Have honourable intentions	.732	.577
Be a reliable	.69	.697
Shared history and identity	.673	.613
Be a known person	.705	.606
Sympathy, be a friendly person	.649	.603
Nature of the relationship	(SR)	(FM)
Be a reliable	.846	.496
Sympathy, be a friendly	.641	
Respect me	.578	.809
Have honorable intentions	.543	.803
Be a known person	.433	.751
Shared history and identity	.74	
Nature of the relationship	AQ	FM
Respect me	.795	
Shared history and identity	.791	.499
Sympathy, be a friendly	.783	.456
Be a reliable friend	.779	
Have honorable intentions	.736	
Be a known person	.682	
Nature of the relationship	SR	
Be a reliable	.899	
Have honorable intentions	.888	
Respect me	.876	
Shared history and identity	.863	
Sympathy, be a friendly	.837	
Be a known person	.754	

What makes an Important Condition for Communicate Online. This question analysis contributed for the development of a trust new attributes, on the nature of interpersonal activities in a relationship.

Table 4: Factor loadings and commonalities based on principal Component Analysis).

Nature of the relationship	AQ	WF	FR	FM
Honesty	.788	.714	.699	.619
Mutual respect	.775	.703	.708	.535
Transparency	.755	.677	.637	.623
Empathy	.726	.506	.549	
Be a reliable source		.637	.598	.632
Nature of the relationship	SR			
Be a reliable source	.899			
Willingness to share	.897			
Honesty	.885			
Mutual respect	.88			
Transparency	.87			
Empathy	.856			
Nature of the relationship	ST			
Transparency	.793			
Honesty	.791			
Mutual respect	.737			
Empathy	.736			
Be a reliable source	.707			
Willingness to share	.618			
Nature of the relationship	FM	WF	AQ	FR
Willingness to share	.866	.77	.599	. 627
Empathy	.648			
Be a reliable source	.524			

Table 5: Factor loadings and commonalities based on principal Component Analysis.

Nature of the relationship	(FR)	(AQ)	(WF)	(FM)
Honest behaviour	.803	.786	.696	.595
Transparent actions	.698	.765	.676	.498
Receive support	.69	.712	.668	.511
Feel secure	.689	.71	.597	.506
Share similar interests	.552	.512	.622	
Nature of the relationship	(SR)			
Feel secure	.902			
Share similar interests	.885			
Honest behaviour	.884			
Transparent actions	.878			
Receive support	.847			
Predictability	.842			
Nature of the relationship	ST			
Honest behaviour	.837			
Transparent actions	.835			
Feel secure	.828			
Receive support	.761			
Share similar interests	.735			
Predictability	.537			
Nature of the relationship	FM	WF	FR	AQ
Predictability	.866	.796	.639	.522
Share similar interests	.653			

Main orientations assume a tendency to be willing to develop interpersonal activities online based ona need for support from others; a need to share similar interests in all relationship dimensions; a need to predict if the relationship will occur in secure and trustful exchange environments; and a need for develop trust bound with those we relate online. In detail,**Trust Interpersonal activities 1**, address attributes like honesty, transparency, receive support, secureness and share common interests.

Trust Interpersonal activities 2, address attributes like secureness and share common interests, honesty, transparency, receive support and predictability

Trust Interpersonal activities 3, address attributes like honesty, transparency, felling of secureness, receive support, share similar interests and be able to predict.

Trust Interpersonal activities 4, address attributes like be able to predict, share similar interests.

7 CLOSING REMARKS

The analysis showed that all five trust attributes (see figure 1) were statistically relevant for supporting and sustain a online relationship and commitments. Although some of the attributes addressed in the socio-technical model of trust dependent most of the nature of the relation, e.g. an online trustful relation with a friend, family or working fellow is diferent from establishing a relationship between a teacher or student, or even a family relative. Mostly because the trust believes are situation dependent, it varies from situation to situation. Also, regarding the question of trusting someone online, the signs of respect and honorability, reliability are important. As well as sympathy, known person and share some common aims and identities. When we analysis the online sharing orientations, it is noted that becomes important to foster the honesty signs, reciprocity (mutual respect) and benevolence (emphatic feelings). As well as reliability of the sharing context and sharing commitment.Same regards, with the condition for communicate online. Honesty signs, felling secure, Transparent actions or reciprocity signs are important attributes. Another important condition mentioned is support and predictability. This work major contributions are the intersection of areas such as trust and the predisposition to relate online, to share and be involved in social interpersonal exchanges situations and activities. Achieved results enable us to support and establish a potential interconnection of a sort of explicit and implicit trust attributes and predispositions to relate online. Those perceived through their individual's or group's assumptions through attitudes, behaviors and beliefs towards their predisposition to interact with others or with a specific online learning artifact. As well affecting somehow the predisposition to participate and share in those mediums. This works conclusions lead to the believe that trust is indeed a prominent factor in balancing and fostering the individuals participation in online learning scenarios. But, without a strategic driven analysis, and without

considering it appropriate factors, with it's suitable combinations of situation and time, is difficult to proceed in a deep and further analysis in how those factors can support different learning and working life contexts. This leads to future work proposal on the need of more clear and deeper understanding of trust and it's implications on people's online learning relations. Also, stress a need for a clear understand this trust elements as a key factor for today's human social development. This notion could possible be not only serve as a benefit for each individual, but also, indicate an important element for structured groups or a community and a society. Further aim is then observe this intersection between trust and peoples' efforts to interact online through time and within a specific online learning situation.

REFERENCES

Attwell, G. (2007). Personal Learning Environments - the future of eLearning? *eLearning Papers*, 2(1).

Bacharach, M., Guerra, G., and Zizzo, D. J. (2007). The self-fulfilling property of trust: an experimental study. *Theory and Decision*, pages 349–388.

Brown, J. S. (2000). Growing up digital: How the web changes work, education, and the ways people learn. *Change, USDLA Journal*, 32(2):11–20.

Coleman, J. S. (1988). Social capital in the creation of human capital. *The American Journal of Sociology*, 94(3):S95–S120.

Constantine, L. L. (2006). Trusted interaction: User control and system responsibilities in interaction design for information systems. In *CAiSE*, pages 20–30.

Fukuyama, F., editor (1995). *Trust: The social virtues and the creation of prosperity.* Free Press, New York.

Gambetta, D. (1998). Trust making and breaking cooperative relations. In Gambetta, D., editor, *Can we trust trust?*, pages 213–237. Basil Blackwell.

Giddens, A. (1991). *Modernity and Self-identity*. Polity-Press, Cambridge.

Kramer, R. (1999). *Trust and distrust in organizations: Emerging perspectives, enduring questions*, volume 50. Academy of Management, California.

Lave, L. and Wenger, E. (1990). Situated learning: legitimate peripheral participation. In *European Conference on Hypertext*.

Luhmann, N. (2000). *Familiarity, Confidence, Trust: Problems and Alternatives*, chapter 6, pages 94–107. Department of Sociology, University of Oxford, electronic edition.

McKnight, D. and Chervany, N. (2002). Trust and distrust definitions: One bite at a time. In Falcone, R., Singh, M. P., and Tan, Y., editors, *Trust in cyber-societies: integrating the human and artificial perspectives*, pages 27–54. Springer, Berlin.

Mishra, A. K. (1996). Organizational responses to crisis: The centrality of trust. In Kramer, R. and Tyler, T., editors, *Trust in organizations: frontiers of theory and research*, pages 261–287. SAGE publications Inc., California.

O'Hara, K. (2009). A general definition of trust. Technical report, University of Southampton - School of Electronics and Computer Science.

Preece, J. (2001). Etiquette, empathy and trust in communities of practice: Stepping-stones to social capital. *Journal of Universal Computer Science*, 10(3):194–202.

Preece, J. and Shneiderman, B. (2009). The reader-to-leader framework: Motivating technology-mediated social participation. *AIS Transactions on Human-Computer Interaction*, 1(1):13–32.

Rovai, A. P. (2002). A preliminary differences classroom communities and aln courses. *JALN*, 6(1).

Sousa, S. C., Lamas, D., and Dias, P. (2011). The interrelation between communities, trust and their online social patterns. In *SCA2011 - International conference on Social Computing and its Applications*. IEEE Computer Society.

Swan, K. and Shea, P. (2005). The development of virtual learning communities. *Learning together online Research on asynchronous learning*, pages 239–260.

Weber, L. R. and Carter, A. (2003). *The social construction of trust*, volume 33. Springer.

Wilson, S., Liber, O., Johnson, M., Beauvoir, P., Sharples, P., Milligan, C., and Others (2006). Personal Learning Environments: Challenging the dominant design of educational systems. *Proceedings of the first Joint International Workshop on Professional Learning, Competence Development and Knowledge Management-LOKMOL and L3NCD, Crete*.