Using activity theory for modelling transformative digital learning

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Abstract— **This theoretical and research proposal positions activity theory (in the tradition of Engeström) as a capable framework for modelling educational transformation towards innovative forms of social-constructivist digital learning. The primary strength of activity theory in this regard, is that it adopts a holistic socio-cultural and socio-technical perspective in which teachers, learners, technologies, pedagogical values, roles/identities and rules/cultures are considered together as interdependent elements of collective activity. An illustrative example is offered using activity theory to model a current and envisioned (target) activity system based on the authors' educational experience in Canada, Latvia and Ukraine. In addition, a readiness research program is proposed to facilitate program transformations at two partner universities as part of Ukrainian and Latvian, government-funded projects.**

Keywords— *transformative digital learning, online learning, e-learning, activity theory, Ukraine, Latvia, higher education.*

I. INTRODUCTION

Fundamental changes in society and technology have disrupted traditional socio-economic activities and triggered educational reinvention. Millions of jobs may be lost or reconfigured in the near future owing to advances in machine automation and human-machine symbiosis as envisioned, for example, by Industry 4.0 [1]. At the same time, many new (and currently unknown) professional roles will emerge requiring a more diverse workforce to develop advanced technological knowledge and skills, a positive disposition towards environmental and organizational change, strong competences for collaborating with both humans and intelligent machine agents, and creative problem-solving abilities [2]. The old concept of mass education, designed for the assembly line, focused on transferring standardized content, and enforcing patterns of top-down control cannot satisfy the demands of a digitalized, globalized, democratized, sustainability-focused and (from a climate-change perspective) increasingly precarious world [3]. But how must education change to align itself with the needs, rights and expectations of citizens.

Transformative digital learning (TDL) shifts the educational focus from predefined outcomes to emancipatory, digitally-mediated and augmented, inquiry and knowledge construction— "the expansion of consciousness through the transformation of worldviews and specific capacities of the self" [4]. Within this model, learners move through ongoing processes of cognitive and social change, establishing intermediate contextual learning goals and rethinking them once they are achieved. As educators, who have trained for an industrial model of top-down instruction and predefined answers ready for this approach? How might teachers transform their roles, competencies and values to facilitate TDL? What transformation model can be used to guide the transition to TDL? These questions guided our previous research on student and teacher readiness for TDL within the post-Soviet space [5], [6], [7], and many questions remain. In this article, we introduce two new international projects Latvia-Canada and Ukraine-Latvia, dedicated to envisioning and modelling educational transformations in an increasingly digitalized and democratized world.

Often, educational policy-making is informed by an unspoken assumption, that teachers are typically digitally empowered and experienced in meta-cognition, critical thinking and inquiry-based approaches [8]. However, educators' professional skills are generally uneven and largely dependent on historical, social and cultural contexts in which they have been formed. According to cultural-historical theory, humans, as active agents, should be seen as single functional units with their social environment [9]. Often, these differences cause misunderstanding regarding the desired learning models, outcomes, levels of skills and performance, especially in interna-

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tional projects. Previously, we observed such tensions within a Canadian-Ukrainian collaborative online course [7]. That experience highlighted the importance of establishing a common vision of the desired state of learning activity. In both our current projects, despite their different focuses and contexts, we are seeking to define the existing and the target models of learning systems and pave the transformation way from one to another.

II. THE CONTEXT: STARTING POSITIONS FOR EDUCATIONAL TRANSFORMATIONS IN LATVIA AND UKRAINE

Digitalization have emerged as a broad movement towards the intensive application of digital technologies and intelligent (cyber-physical) systems to transform societies and address global social challenges [10]. However, many argue that transforming society is much more than a technological issue. Successful transformation much more than technological innovation [11]. This is certainly true of educational transformation where studies have found, time and time again, that the presence of powerful digital tools does not in and of itself lead to innovations in teaching and learning. Without adequate digital competences, a deep appreciation of the affordances that digital technologies offer, and most importantly, a new vision of teaching and learning aligned with a digitally-mediated world, it is too easy to "pour old wine into new wine skins."

In some parts of the world, the challenges of reforming education in a manner aligned with a digitalized society are especially difficult. That is the current state of affairs is grounded upon a deep (and in many ways successful!) legacy of traditional education. The Soviet system of higher education, from which both the Latvian and Ukrainian originate, was a successful system built on principles of practical training, alignment with collective goals, obedience to hierarchy and centrally administered planning and control [12].

The dissolution of Soviet Union caused dramatic changes in the both societies. In general terms, education was reconfigured to support a transition from totalitarian ideology to democracy and pluralism. Despite economic limitations, each country made progress on several key elements of educational reform— developing new curricula and teaching materials, and establishing new links with international partners [13].

In Ukraine, after the student-initiated, "Euromaidan" revolution in 2014, declarations of educational reform emphasized more learning-centric, digitalized, democratized, and globalized education. However, Ukrainian educators are still struggling to achieve such reforms, often debilitated by lack of (personal and technical) resources and a strategic roadmap well aligned with their context and culture [14]. At the micro-level, individual Ukrainian academics often take matters into their own hands, pursuing opportunities for modernizing changes through international connections, an application of new learning models, greater academic democratization and richer integration of digital technologies [7], [15]. However, our measurement of digital competencies of students and professors at two Ukrainian universities [6],[5] suggest that many remain ill-prepared innovative forms of online-learning. It is perhaps noteworthy that in some cases, professors' skills fell behind those of students: e.g., publishing media and ideas online, operating with audio/video files, program or automate procedures. These are creative, independent-thinking skills, which are vital for 21st-century professionals.

In Latvia, the implementation of more democratic educational principles in universities was often more successful than in Ukraine [16], [17]. University autonomy was established, along with a new research infrastructures, a framework for quality assurance and a differentiated higher education system. Importantly, the Soviet restrictions in content and pedagogy were eliminated, which were especially significant in social sciences and humanities.

Some key issues are waiting to be addressed. For example, institutional transformation needs to pursue innovative democratizing learning models that leverage the powerful affordances of information and communication technologies (ICTs) and global networks. As McGuinness [18] argues, these changes require the professional development of faculty and researchers. To this end, several strategies, including strengthening doctoral programs, should be implemented. Given a shrinking student age cohort as well as migration and fluctuating economic conditions, it is likely that serious transformations of the institutional landscape in Latvia are just beginning [17].

The researchers of the post-Soviet educational transitions point out, that the common characteristic of all countries of this group is a quantitative a qualitative shortage of research in HE institutions, and the focus of the institutions exclusively on teaching [17]. We see that as a potential hindering factor for post-industrial learning transformations.

Readiness for innovative digital learning also contains an important gender aspect. Although the number of females obtaining post-secondary education in both countries are higher than that of males, only one-fifth of women work in high-tech industries in Ukraine, and about one quarter in Latvia [19]. This situation is typical around the world. Women largely tend to avoid ICT-related studies and are less likely to choose digital careers. In the EU, only 17,2% of IT-students and 16,7% of the employed IT-specialists in 2016 were females. The highest level of female participation in IT is in Bulgaria – 31% of women work in technology-related positions. At the same time, by 2020, the EU will lack 900000 skilled ICT professionals [20], which makes the broad gender imbalance in IT a critical issue. Importantly, our previous studies of general digital competencies in Ukraine and Georgia [6], [5] did not reveal notable gender differences.

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More specifically, post-publication correlational analyses conducted by the lead author from the primary data set revealed no significant statistical differences in general competency levels between males and females (Todd Blayone, personal communication, March 19, 2019). Therefore, this divide in the IT community most probably relate to other socio-cultural factors [21]. Some researchers find that distinct gender attitudes toward technology is reproduced and institutionalized within educational systems [22], [23]. That is, females are largely educated to avoid working in a male-dominated IT sector. This disbalance in the labor market, which is bound to have negative consequences, might be partially addressed by incorporating more digitally focused learning models that emphasize innovative forms of human-computer interaction aligned with visions of a "smart-technology" society.

To summarize, the educational transformations in both Ukraine and Latvia should be *democratically and digitally* reformed with a focus on strengthening innovative research skills, self-directed (life-long) learning and emancipatory values such as those related to perspectival diversity, gender equality, interpersonal trust and freedom of expression.

III. FROM TRADITIONAL TO TRANSFORMATIVE LEARNING: WHAT CHANGES ARE NEEDED?

Mezirow, the founder of transformative learning theory, emphasized that adult learning must include reinterpreting the world rather than simply acting on prior beliefs, judgements, and feelings. He suggests, that learning goals should be considered in relation to both short- and long-term perspectives in a manner similar to the traditional parable: giving a person a fish feeds her for a day (short-term objectives), teaching her how to fish can feed her for a lifetime (long-term goals). An short-term objective may be to obtain job-related competencies, but the life-term goal could extend is to become a socially active critical thinker and an engaged global citizen [24].

Traditional content-focused, highly structured and controlling teaching models [25] tend to emphasize the transfer of job-oriented knowledge. However, for successful functioning in the economy of uncertainty and ongoing disruptive innovations, this content-focused system of higher education has limited value. University-level education must focus on long-term goals, boosting empowerment, self-direction, digital and domain skills, deep reflection, free expression, critical thinking, independent decision-making, cognitive flexibility, emotional intelligence and a concern for helping others [26]. Häkkinen et al. [27] reduces these 21st century skills to two essential groups: collaborative and self-regulated. Harkins [28] distinguishes traditional learning from future-oriented, (knowledge and innovations producing) digital education as show in Table I.

Consistent with this vision, we suggest that transformative learning for teachers' professional development (doctoral programs etc.) should focus on digitally-mediated collaborative-constructivist models, which improve digital skills, boost internal motivation for learning [29], [30] and change attitudes toward democratized, socially- and inquiry-engaged teaching and learning [31], [32]. Constructivist learning focuses on addressing authentic and open-ended problems with no predefined "right" answer drawn from the learner's own context and experience. Problem-based learning increases participant motivation, and encourages negotiation and democratic deliberation, so everyone can test their understandings against others [33], [9].

TABLE I

Differences in traditional and future-oriented models of education	Distinguishing characteristics	
	Traditional ("download" and "open-access") models of digital education	*Future-oriented ("knowledge and innovations producing") models of education*
Meaning	Dictated or socially constructed with limited internet aid	Socially constructed and contextually reinvented knowledge, built through selective individual and team-driven embodiments in practice
Knowledge creating process	Transfer teacher-to-student, using learning management systems (LMS) or MOOCs	Technology-enabled co-construction of knowledge in learning community, amplified by critical creative feedback loops 24/7
Schooling location	In buildings or online, through hybrid or full internet courses with pre-recorded content	Everywhere, emerging in the globally networked human body
Who teachers are	Licensed professionals	Everybody, who is an innovation producing source, backed up by intuitive software "partners" and human collabourators
How employers view graduates	"Line workers", who must be trained to follow instructions	Knowledge- and innovation-producing co-workers and entrepreneurs who can initiate the new ways and support sustainable development

One collaborative-constructivist model of interest is the Fully Online Learning Community (FOLC) [31] (Fig.1), developed by EILAB researchers at the University of Ontario Institute of Technology (UOIT), Canada. It has several notable characteristics. FOLC was initially conceived as an offshoot of the Community of Inquiry (CoI) model [34], one of the most thoroughly researched and widely used collaborative-constructivist theoretical models in the world [35],[36]. However, it has removed "teaching presence" as a distinct dimension of learning, and has instead, inserted an emphasis on digital affordances and

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related competences—elements which the CoI considers extraneous. Indeed, FOLC continues to evolve conceptually as it is applied daily at the Faculty of Education, UOIT as the basis for teacher education programs and as it is deployed as a research framework for empirically studying the dynamics of fully-online community-based learning. FOLC emphasizes the need for (re)distributing educational control, reducing power distance between students and professional educators, and democratizing communication. Some modifications of this group of models also recognize the importance of socio-emotional interaction, and the innovative use of open digital affordances (e.g., using mainstream social media for collaborative inquiry and community-building) [37]. Most importantly, they are designed as a flexible model, adaptable to the needs of learners in a variety of socio-cultural contexts. It is for this reason that we have used FOLC as a basic guiding model in our own international teaching and learning projects.
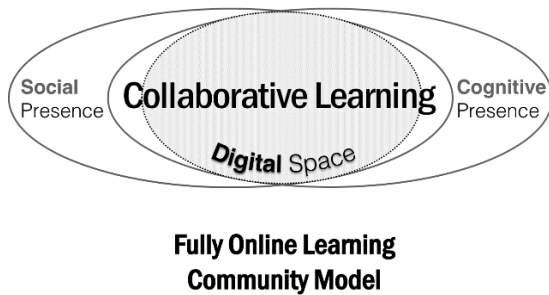

Fully Online Learning Community Model

Fig. 1. Fully Online Learning Community (FOLC) model

IV. TRANSFORMING LEARNING WITH ACTIVITY THEORY

Engeström, building directly on Vygotsky, Leontiev and other well-known cultural-historical psychologists from the early Soviet period [9],[38],[39] offers a visual theoretical model that includes an emphasis on individuals, tools, and several social and cultural mediators of collective technologically-mediated activity (Fig.2). This multi-triangle model, drawn with arrows to emphasize the dynamic nature of activity and the interrelatedness of the elements, offers a framework for envisioning educational transformation. More specifically, it provides an apparatus for modeling both current and desired educational practices (understood as activity systems), and exploring tensions between elements and other activity systems. (Within activity theory, tensions are catalysts for pursuing critical analyses and concrete changes. The assumption is that professionals (e.g., teachers) are, or can become, active and empowered agents capable of making evidence-based decisions and changing their practices without an official mandate. In this sense, activity theory emphasizes and enables radical change "from below" through both individual and collective action.

The activity system model includes six constituent elements: the human agent, tools/artifacts, an object, a "community", rules, and division of labour. Each of these elements is modeled as a discrete entity which

functions in a mediational relationship to the other elements. To more fully conceptualize these elements, they are presented in more detail.

- **Subject**: This is an active agent capable of taking purposeful action towards a goal by using the affordances of tools and technologies effectively, aligning her actions strategically with a driving collective objective (which is always flexible), and considering contextual opportunities and constraints.
- **Object**. The object or the "objective" represents the driving force of the activity. An object may be a need, desire, a vision of the future, a mission statement, a manifesto or a defined outcome. An activity without an object is meaningless!
- **Tools**. Tools include any instruments, artifacts or technologies used by participants to carry out an operation or action aligned with the activity. With today's digital society, a variety of digital hardware, software and systems are used to interact with each other and the world.
- **Community**. The community represents the relevant mediating collective, whether this is a team, workgroup, department, committee, class or something else. Collective activity always includes an individual and collective perspective, and there is no escape from the social nature of activity. Even actions taken alone are deeply connected to society and culture.
- **Rules**. These include both explicit and implicit ways for coordinating and mediating relations between the community members themselves and between them and the objects. Organization policies and values both function to mediate activities and participant perceptions.
- **Division of Labour**. From earliest recorded history, humans have coordinated their efforts to achieve desired outcomes more efficiently or effectively. Today, division of labour spans both human and machine agents in complex digitalized systems.
- **Outcome**. The outcome represents the end result of an activity. This outcome may become input for a new activity system. For example, a design or set of recommendations created from one group may be passed to another to implement.
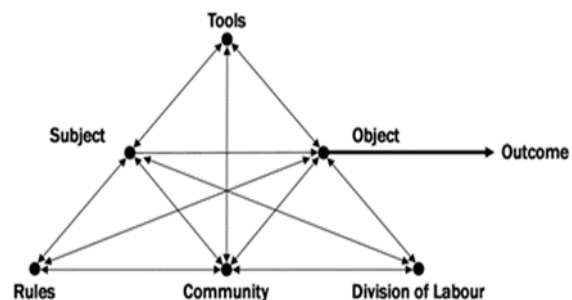

Fig. 2. Activity System model

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Activity systems, by their nature, produce tensions, contradictions and innovations, which generates both resistance among participants and possibilities for transformations. With the assistance of human mediators, transformations can be guided through a cycle of "expansive learning" in which existing objectives and standard practices modelled, analyzed and reinvented. This cycle typically starts by identifying contradictions, and using the activity-system apparatus to map both the current and desired state of affairs. The next step is to gather motivation, resources and strategies for implementing the new model in practice. Achieving change requires communication, activism and ongoing learning. Indeed the most successful results will be achieved when change agents commit to democratic deliberation, critical reflection and divergent thinking [39].

To provide an example of how the activity system apparatus can be applied in practice, we have modelled both a (hypothetical) existing and target educational activity system based on our experience as educational-transformation consultants (Fig.3).
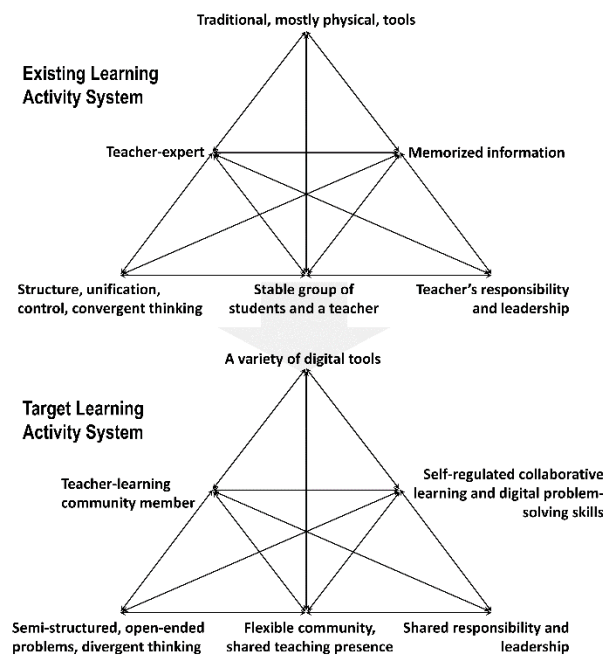

Fig. 3. The developmental model of the transition toward transformative learning

V. A RESEARCH PROPOSAL

The activity-system apparatus and transformation process described, is ideally suited for exploring potential educational transformations in post-Soviet contexts. Moreover, this model can be supplemented with several additional conceptual tools to help develop a general readiness for change among all participants. In our previous research, we have identified digital competences and personal-cultural orientations as especially important readiness factors at the micro-level. To measure these dimensions of readiness at the indi-

vidual and group-levels we rely on several valid instruments. These include:

- Digital Competency Profiler (DCP) [40]
- Personal Cultural Orientation (PCO) [41]
- Cultural Values Scale (CVScale) [41]
- Attitudes toward IT (AttIT) [42].

Data collected from these instruments can be analyzed using a number of statistical strategies that are designed based on the specific context of research and the guiding research questions. In any given study the focus may be on comparing different demographic segments, positioning participants in relation to established thresholds (that have been validated in relation to observed performance) or exploring individual changes over time. All of these situations require different analytical strategies.

VI. DISCUSSION

The outcomes of a transformation process and accompanying readiness research can be used as a firm foundation for creating new online courses, improving the existing academic program in pedagogy and creating transformative teachers' professional-development programs. Because transforming education in the direction of collaborative digital learning is an ongoing process all participants must remain open to new ideas.

When studying values, there is always the question as to what extent they can be changed as a result of transformative learning, and what time interval is needed for changes to become noticeable. Hofstede emphasizes that fundamental values are deeply entrenched within social practices and institutions, and they do not change quickly [43]. However, there are reasons to believe that practices can change. Some scholars have observed that when online communities come together to learn or organize social change, new sub-cultural dispositions emerge that, have a direct effect on forms of communication, democratic functioning, uses of digital technologies, and collective social commitments. Even if emergent community values cause (initial) internal tensions in some participants and trigger forms of subconscious resistance (or culture shock), caring and tolerant communities can move forward together by being open and honest about their feelings, respecting diversity as a core value and practicing understanding. In short, there is expressed commitment, there will be opportunities to hack our "software of the mind" [44].

VII. CONCLUSIONS

This theoretical proposal presented activity theory as a framework for modeling, analyzing and redesigning teaching and learning in higher education. Using the elements of Engeström's activity system, we suggested specific transformations toward digitalized, empowering and democratized learning that can be pursued in Latvia and Ukraine. Based on our research and experience we also noted that digital readiness and

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limiting gender perceptions are challenges to over-come. Our hope is that this proposal will provide learners and educators in higher-educational institutions in these countries with a practical apparatus for reforming university programs toward the requirements of 21st century economy and society.

VIII. ACKNOWLEDGMENTS

REFERENCES

[1]   M. A. L. Luo, J; Boccardo, J, "New Vision for Education: Fostering Social and Emotional Learning through Technology," in "Industry Agenda," World Economic Forum2016, Available: http://www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf.

[2]   T. Blayone, "Theorizing effective use of digital technology with activity theory," in Technology, Pedagogy and Education, ed, 2019.

[3]   A. R. Till, V; Zakhidi, S, "The Future of Jobs Report"World Economic Forum, Centre for the New Economy and Society09/17/2018 2018, Available: http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf.

[4]   M. J. Elias, J. E. Zins, and R. P. Weissberg, Promoting social and emotional learning: Guidelines for educators. Ascd, 1997.

[5]   T. Blayone, O. Mykhailenko, R. VanOostveen, O. Grebeshkov, O. Hrebeshkova, and O. Vostryakov, "Surveying digital competencies of university students and professors in Ukraine for fully online collaborative learning," Technology, Pedagogy and Education, vol. 27, no. 3, pp. 1-18, 2017.

[6]   T. Blayone, O. Mykhailenko, M. Kokhan, M. Kavtaradze, R. vanOostveen, and W. Barber, "Profiling the digital readiness of higher education students for transformative online learning in the post-soviet nations of Georgia and Ukraine," International Journal of Educational Technology in Higher Education, pp. 11-22, 2018.

[7]   O. Mykhailenko, T. Blayone, and R. vanOostveen, "Exploring democratized learning and dimensions of culture for educational transformation in Ukraine," in RIDRU Conference: Higher Education Reforms in Post-Maidan Ukraine, October 25, 2016, ed. Alberta, Canada, 2016.

[8]   D. Beijaard, P. C. Meijer, and N. Verloop, "Reconsidering research on teachers' professional identity," Teaching and teacher education, vol. 20, no. 2, pp. 107-128, 2004.

[9]   L. Vygotsky, Mind in society: Development of higher psychological processes. Cambridge, MA: Harvard University Press, 1978.

[10]   N. Roztocki and H. R. Weistroffer, "Information and communication technology in transition economies: An assessment of research trends," Information Technology for Development, vol. 21, no. 3, pp. 330-364, 2015.

[11]   J. B. Horrigan, "Digital Readiness Gaps," 2016.

[12]   A. Kuraev, "Soviet higher education: An alternative construct to the western university paradigm," Higher Education, vol. 71, pp. 181-193, 2016.

[13]   B. Kutsyuruba, "Education in the period of post-Soviet transition in Ukraine," Demokratizatsiya, vol. 19, no. 3, pp. 287-309, 2011.

[14]   S. Kvit, "The paradoxes of post-Soviet education," in KyivPost, ed. Kyiv, 2016.

[15]   M. Hladchenko, D. Antonowicz, and H. de Boer, "Understanding the changes of the higher education governance in Poland and Ukraine," in The University as a Critical Institution?: Springer, 2017, pp. 55-74.

[16]   T. Khavenson and M. Carnoy, "The unintended and intended academic consequences of educational reforms: The cases of Post-Soviet Estonia, Latvia and Russia," Oxford Review of Education, vol. 42, no. 2, pp. 178-199, 2016.

[17]   A. Smolentseva, J. Huisman, and I. Froumin, "Transformation of Higher Education Institutional Landscape in Post-Soviet Countries: From Soviet Model to Where?," 25 Years of Transformations of Higher Education Systems in Post-Soviet Countries: Reform and Continuity, pp. 1-43, 2018.

[18]   J. McGuinness, "Reforms in the Baltics," International Higher Education, no. 25, 2015.

[19]   A. Till, Ratcheva, V., Zakhidi, S., "The Global Gender Gap Report " in "Insight Report," World Economic Forum2017, Available: http://www3.weforum.org/docs/WEF_GGGR_2017.pdf.

[20]   European Parlament (2018, 08-03-2018). More women in ICT: empowering women in the digital world. Available: http://www.europarl.europa.eu/news/en/headlines/society/20180301STO98927/more-women-in-ict-empowering-women-in-the-digital-world

[21]   J. Clark Blickenstaff*, "Women and science careers: leaky pipeline or gender filter?," Gender and education, vol. 17, no. 4, pp. 369-386, 2005.

[22]   J. Fraser-Thomas and L. Strachan, "Personal development and performance? Exploring positive youth development in elite sport contexts," in Health and Elite Sport: Routledge, 2014, pp. 31-48.

[23]   P. C. Gorski, "What we're teaching teachers: An analysis of multicultural teacher education coursework syllabi," Teaching and Teacher Education, vol. 25, no. 2, pp. 309-318, 2009.

[24]   J. Mezirow, "Transformative learning: Theory to practice," New directions for adult and continuing education, vol. 1997, no. 74, pp. 5-12, 1997.

[25]   B. Levin, "Putting students at the centre in education reform," Journal of Educational Change, vol. 1, no. 2, pp. 155-172, 2000.

[26]   W. A. Aulbur, S.; Rishi, B., "Skill Development for Industry 4.0," BRICS, India2016, Available: http://www.globalskillsummit.com/whitepaper-summary.pdf.

[27]   P. Häkkinen, S. Järvelä, K. Mäkitalo-Siegl, A. Ahonen, P. Näykki, and T. Valtonen, "Preparing teacher-students for twenty-first-century learning practices (PREP 21): a framework for enhancing collaborative problem-solving and strategic learning skills," Teachers and Teaching, vol. 23, no. 1, pp. 25-41, 2017.

[28]   A. M. Harkins, "Leapfrog principles and practices: Core components of education 3.0 and 4.0," Futures Research Quarterly, vol. 24, no. 1, pp. 19-31, 2008.

[29]   Z. Akyol and D. R. Garrison, "The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence," Journal of Asynchronous Learning Networks, vol. 12, no. 3-4, pp. 3-22, 2014.

[30]   [30] F. J. Desjardins, "Collaborative Online Learning Environment: From PBL theory to working prototype," presented at the 1st Annual conference for the Canadian Network for Innovation in Education (CNIE), April 27-30, 2008, Banff, AB, 2008.

[31]   T. Blayone, R. vanOostveen, W. Barber, M. DiGiuseppe, and E. Childs, "Democratizing digital learning: Theorizing the Fully Online Learning Community model," International Journal of Educational Technology in Higher Education, vol. 14, no. 13, pp. 1-16, 2017.

[32]   D. R. Garrison, Thinking collaboratively: Learning in a community of inquiry. New York: Routledge, 2016.

[33]   D. H. Jonassen, "Designing constructivist learning environments," Instructional design theories and models: A

<##>

new paradigm of instructional theory, vol. 2, pp. 215-239, 1999.

[34] D. R. Garrison, "Online Community of Inquiry review: Social, Cognitive, and Teaching Presence issues," Journal of Asynchronous Learning Networks, vol. 11, no. 1, pp. 61-72, 2007.

[35] P. P. E. Elicor, "The notion of pedagogical authority in the community of inquiry," Kritike, vol. 11, no. 2, pp. 80-92, 2017.

[36] W. Boston, S. R. Díaz, A. M. Gibson, P. Ice, J. Richardson, and K. Swan, "An exploration of the relationship between indicators of the community of inquiry framework and retention in online programs," Journal of Asynchronous Learning Networks, vol. 13, no. 3, pp. 67-83, 2014.

[37] C.-J. Yen et al., "A Predictive Study of Students' Self-regulated Learning Skills and Their Roles in the Social Network Interaction of Online Discussion Board," Journal of Educational Technology Development and Exchange (JETDE), vol. 11, no. 1, p. 2, 2019.

[38] A. N. Leontiev, Activity, consciousness and personality. Englewood Cliffs, NJ: Prentice-Hall, 1978.

[39] Y. Engeström, "Activity theory as a framework for analyzing and redesigning work," Ergonomics, vol. 43, no. 7, pp. 960-974, 2000.

[40] EILAB. (2017, October 29). Digital Competency Profiler. Available: https://dcp.eilab.ca/

[41] P. Sharma, "Measuring personal cultural orientations: Scale development and validation," Journal of the Academy of Marketing Science, vol. 38, no. 6, pp. 787-806, 2009.

[42] A. A. Gokhale, P. E. Brauchle, and K. F. Machina, "Scale to measure attitudes toward information technology," International Journal of Information and Communication Technology Education, vol. 9, no. 3, pp. 13-26, 2013.

[43] G. Hofstede, Culture's consequences: Comparing values, behaviors, institutions and organizations across nations, Second ed. London: Sage Publications, 2001.

[44] G. Hofstede, "Culture and organizations," International Studies of Management & Organization, pp. 15-41, 1980.

<##>