#### **Research Article**

Ken Brown\*, Viola Larionova, Natalia Stepanova, Vic Lally

# Re-imagining the Pedagogical Paradigm Within a Technology Mediated Learning Environment

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**Abstract:** Traditional didactic pedagogies employed within the culture of the Russian higher education system precluded students' engagement with problems which were described as generating dissonances in learning cognition. Addressing issues of dissonance within the higher education learning sphere requires re-imagining the educational culture. Re-imagining provides an opportunity to promote new approaches to learning through alternative affordances; one such affordance is technology mediated learning.

Pedagogical re-design within an alternative learning paradigm requires deep understanding of the problems associated with the previous paradigm. Re-imagined pedagogical scope for exploration of the professional, learning, cultural, institutional and technical aspects expand the knowledge base beyond the didactic towards an engaging student-centered ethos using open education and gamification.

To address issues of learning, culture, technology, and institution, a convergent mixed methods design using student questionnaires and academic interviews alongside performance observations was employed. The research study examined the re-imagining of the educational culture to promote new approaches to learning through the affordances of technology mediated learning within a constructivist, critical realism epistemology using thematic analysis.

The re-imagined pedagogical design within a technology mediated learning environment demonstrates a cultural shift towards an engaging and supportive educational experience. The lessons learned may be applied in other higher educational contexts.

\*Corresponding author: Ken Brown, Lettekenny Institute of Technology, Ireland, E-mail: ken.brown@lyit.ie

Viola Larionova, Natalia Stepanova, Ural Federal University, Ekaterinburg, Russia

Vic Lally, University of Glasgow, United Kingdom

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## 1 Introduction

Under conditions of ideological restrictions, the education system in the former Soviet Union (USSR) developed in isolation and was closed to external peer interaction. The policies of total leadership and control gathered pace during the post-World War Two era in all aspects of Soviet society, and education was no exception; all educational reforms and policies were intertwined with the social, economic and cultural development of the USSR (Pogosian, 2012). It cannot be denied that Soviet education in the field of physics, mathematics, and technical sciences ensured rapid scientific and technical progress in the postwar period, and made possible high rates of achievement in various industries. This is evidenced by the large number of discoveries and technical inventions made by Soviet scientists and engineers. However, the humanities did not receive the same levels of ideological priority, resulting in reduced development in comparison with scientific and technical areas.

The end of the soviet era saw the collapse of the USSR. The subsequent exposure to the external market economy revealed the perilous fragmented state of the problems in Russian society and threatened the stability of the nation (Blum, 2006). Russia faced the challenge of transition to a market economy, formation of privately owned institutions and the transformation of education to new market needs. The first post-soviet policy document "On Education" 1992, cited in Blum 2006, highlighted the desire for educational autonomy, accessibility and adaptivity of education to the learner's needs; the educational transformation required to achieve these policy desires was not trivial.

The hegemony of didactic pedagogies, excessive unification, and regulation by the state prevailed in the early post-soviet period. A lack of Western interaction with Russian education and culture masked the discourse

taking place within the education system. An example of mis-matched comparison may be found in the literature, where traditional didactic pedagogies employed within the culture of the Russian higher education system were considered to preclude students' engagement with problems which were described as generating dissonances in learning cognition (Presseisen & Kozulin, 1992). This study compared recent immigrants from Russia with American students and young professionals; language, culture and educational background weren't highlighted to permit sensible judgements. The timing of the study by Presseisen and Kozulin did not allow the re-conceptualized education policies to take effect. The failure by Western reformers to take cognizance of positive post-Soviet developments was the result of having been distracted by their idealized Western models (Pogosian, 2012, p. 285). Positive developments in education include the involvement of Russia in the Bologna Process in 2003 and the use of ECTS supporting student mobility within Europe, and the prioritisation of internationalization in higher education.

The distributed socio-economic-historical framework of post-soviet Russia is an example of the highly complex nexus between learning and society made more difficult by the push economic forces associated with new technologies (Brown, Larionova, & Lally, 2018). The abundance of technology offers pathways for alternative pedagogical paradigm development to address the complex nature of education and distributed learning spaces in Russia.

Addressing issues of dissonance within the higher education learning sphere requires re-imagining the educational culture. Re-imagining provides an opportunity to promote new approaches to learning through alternative affordances; one such affordance is technology mediated learning. Technology in education is taken for granted and when considered from a multi-level perspective (Sorrell, 2018) the potential to embed technology as a sustainable method for mediation becomes apparent. The availability of tools for social communication enables symbolic representation (Vygotsky, 1978) of distributed learning materials, allowing learners to address, explore and develop higher order constructs such as problem solving. It thus becomes incumbent on education providers to remain cognizant of the needs of all learners within the technology mediation learning environment (Czerniewicz, 2018); awareness of the gaps between open online education and traditional systems is required.

## 1.1 Technology Mediation in Learning

Socially constructed learning through the mediation of technology requires pedagogical design to go beyond a superficial construction for the promotion of thinking and to engage learners' inert knowledge (Mattar, 2018). Mediation occurs when language and discourse is pitched at the appropriate level, and subsequent cognitive transition is measurable if the correct instruments are employed. Higher order mediation (Vygotsky, 1978) through technology occurs over long periods of time; the technology epoch becomes visible on a national and international level. Difficulties of technology mediation visibility arise when shorter periods of time are employed as in higher education semesters.

To better understand the role of technology mediated learning it is useful to employ a set of descriptors (Schumann, Wünderlich, & Wangenheim, 2012) in the form of technology supported media, cooperation, interaction and discourse. The variation in learners' cognitive structures within a technology mediated environment places greater emphasis on the pedagogical design of the learning. Questions arise as to how negative learning responses are detected and rectified. It should be possible for the mediated system to adapt in a timely manner to reorganise the process of learning. The technology mediated learning environment exposes the pedagogy to a culturally diverse learner body (Brown et al., 2018). The emphasis on pedagogy increases in line with increased neuro-diversity of learners, cultural awareness requirements, and the expectation of geographically remote students. Pedagogy in a technology mediated environment must be cognizant of cognitive flexibility and learning tendencies.

Within a technology mediated learning environment the instructional role of the provider alters to become a source of affirmation of the cognitive importance of objects. The primary role of the learners' cognitive processes is paramount, and technology mediation must facilitate learner interaction through meaningful engagement, reciprocity, discourse and stimulation. Mediation and the manner by which it is communicated is context dependent to promote internalization of the extended expectations and intent. Without contextual internalization a valid worldview cannot be developed. The learning experience may be damaged as a result of poor mediation, limited access to high quality subject knowledge, or an inability to provide authentic contextual experiences. Enhanced cognition, mastery and performance (Pajares, 1996; Alt, 2015) are achieved when the learner overcomes or expands their own psychological processes through the use of psychological tools, i.e. the tools support cognitive functions. Maximum benefits occur when the mediation supports the creation of meaning leading to a greater sense of belonging (Osterman, 2000; Thomas, 2012; Ni Shuilleabhain, Meehan, Cronin, & Howard, 2016).

## 1.2 Re-imagining the Pedagogical Paradigm in the Russian Context

Ural Federal University (UrFU) realised the fundamental requirement of an engaging technology platform to support the learning activities of students through the development of the Hypermethod platform (Stepanova, Davy, Bochkov, & Larionova, 2017). The Hypermethod platform supports all standard degree programmes utilising technology-mediated activities within the university. Besides, UrFU is one of the leading universities in Russia at the vanguard in the development of open e-learning (Bystrova, Larionova, Osborne, & Platonov, 2015) and Massively Open Online Courses (MOOCs) (Larionova, Brown, Bystrova, & Sinitsyn, 2018). A national development supporting open education, in the form of the Russian National Open education platform based on the edX open platform, is now in operation to promote national activities. The MOOC model has evolved to meet the demands of employers, universities and private companies while emphasising support of inclusion and diversity (Brown et al., 2018) for lifelong learning. Increased awareness of the international stage for education (Kochetkov & Larionova, 2016) is not limited to UrFU, and similar activities are actively underway in other Russian universities.

In recognition of the learner as a central active agent, the feedback processes, and subsequent discourse between learner and academic (Boud & Molloy, 2013; Narciss et al., 2014), the pedagogical paradigm must accommodate the community of practice (Wenger, 1998) identified by the learners within their chosen course or profession. The students' understanding of their sense of belonging within the programme of study may vary according to the perceptions held by the students and experiences prior to engagement with higher education. The sense of belonging may be 'fuzzy' in the initial metacognitive stages (Flavell, Friedrichs, & Hoyt, 1970), leading to motivated engagement in the community as reality provides authentic and contextual relationships (Smith, 2013). As a member of an authentic community of practice it is expected that learners will continue to develop their own sense of learning (Gikandi, Morrow, & Davis, 2011).

Consideration of progressive paradigms to meet the desire of the learner as a central active agent has resulted in the identification of gamification as a suitable pedagogical tool. The purpose of gamification is to provide authenticity in decision making whilst gaining practical experience. Researchers introduced gamification to a variety of UrFU schools in academic year 2016/17; this resulted in more than one hundred and fifty learning units. A Personal e-cabinet was developed where second vear undergraduate students select two minor gamified subjects in the spring semester. The e-cabinet has proved very popular and students reported that their motivation and enjoyment of the learning processes improved as a result. Gamification provides stimuli, mastery, authenticity, cognitive dissonance, creativity and strategic planning opportunities within the programmes.

Gamification within the context of this research addresses the following competency requirements within the curricular framework:

- Cultural
- Professional
- Employer

An example of gamification in practice is the course "Game Practice in Management" where students develop their own games and game exercises to learn how to apply the principles of gamification. On completion of the course students are expected to be able to:

- set adequate goals and objectives,
- develop business skills and make investment decisions,
- make timely and profitable decisions, whilst applying a systematic management approach,
- establish communication and interact with peers,
- negotiate with other people and organizations,
- display creative approaches to future activities.

The gamification learning model helps to create a realistic worldview model (Trull, 2015), to organize certain forms of behaviour, and to solve complex behavioural problems. UrFU collected numerous data from various surveys of students at the entrance and exit to determine the perceptions of the students; the results were positive and encouraging.

### 1.3 Aims and Objectives

The main objective of the research reported here is to determine the efficacy of technology mediated learning within the context of a Russian university. To meet this objective, the aims of the study are:

- Investigate the perceptions of Russian academics and experiences of technology mediated education,
- Investigate the experiences of students within technology mediated education,
- Investigate the efficacy of technology mediation in open learning.

## 2 Methodology

The setting for the study is bounded within the context of a Russian university with students dispersed across a large geographical region with multiple time zones. To maximise engagement with academics and students, and address issues of learning, culture, technology, and institution, a convergent mixed methods design using student questionnaires and academic interviews alongside performance observations was employed. The research study examined the re-imagining of the educational culture to promote new approaches to learning through the affordances of technology mediated learning within a constructivist, critical realism epistemology using Leximancer<sup>™</sup> for thematic analysis.

Three academics from Ural Federal University who engaged in e-learning participated with consent in an anonymized semi-structured video interview and were asked the same questions to allow comparisons to be made. Prior to the lecturer interviews a set of questions covering the thematic areas was provided to determine if there would be any problems with translation between English and Russian languages. Participants were informed they would be identified by a pseudonym to preserve anonymity. The selected thematic areas were decided in advance based on the outputs from a student questionnaire. The lecturer interview questions were formed around the following thematic areas: Training/ preparation for online assessment; Perceptions of student confidence for online assessment; Perceptions/knowledge of barriers for optimal online assessment. Sampling was based on the criteria that participants must be fluent in English and engage in online education.

The methodology applied in the qualitative analysis of the video interviews was a thematic content analysis (Braun & Clarke, 2013) of the textual representation of the video interviews to determine the phenomena by means of a conceptual map. The use of Leximancer allows the conceptual structure of the interview to be presented graphically along with connections between other phenomena.

The level of granularity for the analysis was determined to be an utterance rather than individual words. An utterance could be part of a sentence or even be one or more complete sentences. To determine the topology of the Quote/Sub-Theme/Main-theme tree, the thematic classes are inferred and a thesaurus of terms is extracted for each theme. This technique reduces the need for a specific coding schema to be developed (Ryan & Bernard, 2003).

Quantitative studies, consisting of questionnaires and an analysis of online activity, were conducted over a period of two years to ascertain students' use of technology as a mediating affordance in the education programmes. The students represent a wide range of disciplines within Ural Federal University. The data was analysed using SPSS v24 and all participants conducted the questionnaires anonymously and without prejudice to their studies.

## 3 Data Analysis and Thematic Interpretation

Analysis of the interview transcripts was conducted using Leximancer<sup>TM</sup>. Boolean weightings were applied to the thematic concept coding to focus of themes relating to students, assessment, institution and future. The relationships between the thematic outputs and the research questions are addressed thus:

## 3.1 The Perceptions of Russian Academics and Experiences of Technology Mediated **Education**

The distribution of students across a wide geographic locale presented issues with delivery of educational programmes and consistency in pedagogy using the didactic processes of the early post-soviet era. Academics struggled to address issues of autonomy, adaptability and flexibility (Blum, 2006; Brown et al., 2018) within the traditional didactic system as discussed in Pogosian (2012). Russian students were not perceived as having mastered skills in problem solving, communication and creative thinking; desirable qualities for engaged citizens in the new millennium. The provision of a policy base for imaginative educational processes demonstrated the clear desire to re-imagine the didactic and inspired academics to explore new pedagogical models in the quest for a more meaningful and inclusive education system (Bystrova et al., 2015). The pedagogy was re-imagined by academics

encouraged to explore more inclusive and meaningful methods with which to engage students.

"...some facilitation to interact with students and so on, and let them use their imagination to do these abstracts and they will like them".

Adaptability within technology mediated learning provides for academic flexibility in the support of students. Pedagogical awareness of flexibility, and the mechanisms by which learning may be mediated by the technology, to provide individualised support opens a window of opportunity to enrich students' experiences.

"Perhaps the system could learn by listening to questions and maybe it will recognise a question which isn't typical and work on it and try to explain; maybe make a solution more visual for example".

An important aspect of the curriculum is the sense of belonging (Ni Shuilleabhain et al., 2016) within the university leading to the students' chosen profession. Applying contextually relevant examples of assessment for learning (Gikandi et al., 2011) whilst being aware of the need for the feedback to support learner agency (Charteris, Quinn, Parkes, Fletcher, & Reyes, 2016).

"We try to improve and help their imagination and they can see the application of their knowledge in their profession".

These utterances support the beliefs of academics in Ural Federal University that technology provides scope for enhanced mediation for students on campus and via e-learning. Autonomy in design of programmes, increasing awareness of technology and how technology may be applied as a mediating affordance in communicating the context of learning, is evidence that the intended programme expectations are being met.

# 3.2 The Experiences of Students Within Technology Mediated Education

In a study (Brown & Lally, 2017) using Google forms to distribute a questionnaire (n=51), approximately 80% of engineering students reported they had prior experience of e-Assessment before entering higher education and considered that they had high levels of preparedness for engagement online. They also reported that they were confident in their ICT skills. The beliefs of the students and their expectations were matched by their experiences using the technology in support of their learning.

Another study (Stepanova, Larionova, Davy, & Brown, 2018) (n=171), engaged Management students, also using a Google forms distributed questionnaire. The study focused on e-learning, face-to-face and blended learning paradigms for the same course "Game-practice in management". Students were informed about the purpose of the study and selected one of the three paradigms to engage with. Students were tested prior to the commencement of the course and at the end to determine efficacy of the paradigms. Students participated across a wide geographical area and reported that the use of gamification supported by technology: helped to develop their thinking skills (64.9%); allowed them to gain personal qualities to support their social inclusion (49.7%); made the learning processes interesting (23.4%); motivated them (77.6%). It is interesting to note that 30.4% of students reported no training in self-assessment but that gamification helped them in this area. Even though the students utilised technology as a mediating affordance almost half of the students reported that they preferred to conduct their summative assessments using traditional written methods

# 3.3 The Efficacy of Technology Mediation in Open Learning

Discourse, internalization, self-regulation and the sense of belonging (Osterman, 2000) are fundamental aspects of students' perceptions of the community in which they exist. The community of practice (Wenger, 1998) may have the traditional structure of the classroom or may be distributed within a blended or totally online context. The socio-technical affordance of technology mediated learning is viewed differently in a variety of cultures providing opportunities for complex community development. Learning may occur in the standard platforms found in many higher education institutions such as Moodle or Blackboard. Additional learning opportunities also prevail on extended social media platforms.

"Some social networks allow communicate with students so maybe solve things if they do not understand something".

Studies of student behaviours using open education platforms were undertaken in two separate studies. In the first study (n=918), engineering mechanics students (Sinitsyn, Tolmachev, Larionova, & Ovchinnikov, 2019) engaged in an active meaningful manner. The main findings related to assessment and feedback supporting

the literature on the limitations of transmissive feedback and the failure of some students to actively engage in the formative processes. In the second study (n=277) an experiment aimed at the comparing different models of online-learning included 277 students from three regional Russian universities (Larionova, Semenova, Bystrova, & Tretyakov, 2018). Students were offered an onlinecourse from the National platform of online-learning made by UrFU and answered questions concerning their readiness for this educational technology. It was shown that the median value of students' inner motivation was approximately 4, and the identified motivation was 5.5 while the maximum value of both types of motivation was equal to 7 on a 0 to 10 scale. 74.6% of students demonstrated enhanced skills in self-organization; 92.1% of students use their own strategy, which was successful in the past; 87.6% believe that they will succeed in their chosen programme of study. There was no statistically significant difference in progress between students who learnt online using different models.

## 4 Discussion and Conclusions

The affordance of technology should facilitate adaptive (Allal & Lopez, 2005, cited in Wiliam, 2011) assessment (Ramaprasad, 1983) as a paramount factor in the mediation of learning and the development of cognitive functions (Seabi, 2012). Elicitation of deficits in cognition should become visible through the facilitation of interactive mediation; issues such as impoverished grammar and cultural differences in learning (Seabi, 2012, p. 37) have the potential to negatively impact information processing if not facilitated correctly. The locale of technology in the mediation of learning suggests a distance component has been introduced as a parameter in the paradigm of learning; placing the human teacher further from the focal point and relocating the student to a more central function. Responsibility for teaching should not be attenuated as a result of the paradigm shift towards a centralised student role.

Awareness of psychographic student associations within the community of learning require alternative learning parametric support. Mechanisms to promote stimuli should be identified by the technology mediated learning system to support students considered to have a reduced propensity to learn. The study shows that technology mediated learning interaction with content knowledge and duplex feedback mechanisms are fundamental parameters in the pedagogical design of programmes. A multi-layered perspective (Sorrell, 2018) is

required to accommodate the wide range of neuro-diversity encountered in the operation of socio-technical open education systems. Multi-layered design cannot simply be left to programme designers if the benefits of technologymediated learning are to be fully realised. Facilitating mechanisms at student, programme, institution, national and cultural levels must be considered within a meaningful, contextual manner. Mediation of meaning requires useful verbal, textual and pictorial tool mediators within the framework of cognition.

An exploration of tool mediators took place within the combined study revealing successful as well as problematic issues to be considered. Researchers combined student activity logs with humanistic engagement in the testing of individual and compound mediating tools. The results demonstrate a willingness by students to engage with certain tools and a reluctance particularly with active pictorial tools such as video. Further research is required to extract additional information in the area of video technology and its inclusion within an active pedagogy.

Didactic pedagogies and restricted interaction outside of the Russian education system were primary motivating factors in the far-sighted educational policy developments introduced by Boris Yeltsin. Didactic pedagogies did not offer scope for development of community learning, and expansion of cognitive dissonance to promote critical and creative thinking. Active re-imagining of the teaching paradigm and access to progressive, constructive learning theories provided scope for educational researchers to engage in a more inclusive and meaningful manner. Gamification and the extension of cognitive activities to include peer interaction, dissonance in questioning and authenticity of problem solving produced increased student engagement. The relocation of the teacher to a facilitating and supporting role required considerable redesign of the pedagogy leading to a meaningful interaction with students. Enhanced feedback processes and meaningful interaction demonstrates a successful re-alignment of the teaching process.

The conservative nature of education is visible in the results of the studies on open education involving academics and students in an imaginative multiinstitutional experiment. Students participated without prejudice in a large open education programme, however discussions with students revealed a reluctance to conduct non-written summative exercises. The reasons for this reluctance are not yet clear and will be the subject of further research.

The distributed socio-cultural-economic-historical nature of Russia presents a complex problem for educational designers wishing to engage in distributed learning processes. Multiple time-zones and cultural differences present opportunities as well as issues that must remain at the forefront of the design process. National support mechanisms are necessary to fully implement meaningful technology mediated learning systems. The willingness of institutions to participate in collaborate studies demonstrates that the national will is visible and this willingness is being promoted on the international stage.

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#### Orcid:

Ken Brown https://orcid.org/0000-0001-8863-1410 Viola Larionova https://orcid.org/0000-0002-2132-5176 Natalia Stepanova https://orcid.org/0000-0003-3233-7962

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