

The use of computer enhanced education: twenty years of dashed hopes

A educação aprimorada pelo uso do computador: 20 anos de esperanças frustradas

Educación mejorada por computadora: 20 años de esperanzas frustradas

Received: 03/17/2022 | Reviewed: 03/24/2022 | Accept: 03/30/2022 | Published: 04/07/2022

Ramon Garrote Jurado

ORCID: <https://orcid.org/0000-0002-3971-9894>
University of Borås, Sweden
E-mail: ramon.garrote@hb.se

Tomas Pettersson

ORCID: <https://orcid.org/0000-0003-1956-3762>
Librarian, Sweden
E-mail: 276pettersson@telia.com

Marlene Zwierewicz

ORCID: <https://orcid.org/0000-0002-5840-1136>
Universidade Alto Vale do Rio do Peixe, Brazil
E-mail: marlene@uniarp.edu.br

Stephanie Cristina Böhme Suchara

ORCID: <https://orcid.org/0000-0001-8825-5347>
Universidade Alto Vale do Rio do Peixe, Brazil
E-mail: stesuchara@gmail.com

Joely Leite Schaefer

ORCID: <https://orcid.org/0000-0002-8478-8362>
Universidade Alto Vale do Rio do Peixe, Brazil
E-mail: joely.leite@gmail.com

Madalena Pereira da Silva

ORCID: <https://orcid.org/0000-0002-8886-2822>
Universidade Alto Vale do Rio do Peixe, Brazil
Universidade do Planalto Catarinense, Brazil
E-mail: prof.madalena@uniplaclages.edu.br

Abstract

The purpose of this article is to present conditions implied in the use of Learning Management Systems (LMS), at the University of Borås (UB), Sweden, specifically in 2004, 2009, 2010, and 2018, highlighting patterns that characterize the routines adopted by the teachers. Utilizing quantitative and qualitative approaches, the exploratory research included the analysis of courses in area of STEM (Science, Technology, Engineering, and Mathematics). In addition to a general analysis of the respective courses, a questionnaire was applied to 76 professors and 926 students from the mentioned courses. The pattern of use is analyzed by means of classification of tools in four groups; distribution tools, communication tools, interaction tools, and course management tools. The results confirm that LMS is widely utilized to distribute documents to students, while the tools facilitating interaction and collaboration are used sparingly and this pattern is consistent over time. Despite an increase in the total use of LMS, there is no increase in the use of digital tools for interaction in Higher Education, which indicates the importance of promoting a wide use of collaborative methods and of encouraging interaction.

Keywords: Information and communication technology; Learning management systems; Higher education.

Resumo

Este artigo tem como objetivo apresentar condições implicadas no uso de Learning Management Systems (LMS), na Universidade de Borås (UB), Suécia, especificamente nos anos de 2004, 2009, 2010 e 2018, destacando padrões que caracterizam as rotinas adotadas pelos docentes. Utilizando as abordagens quantitativa e qualitativa, a pesquisa exploratória envolveu a análise de cursos na área STEM (Ciências, Tecnologia, Engenharia e Matemática). Além de uma análise geral dos respectivos cursos, foi aplicado um questionário a 76 docentes e 926 estudantes desses cursos. O padrão de uso foi analisado por meio de uma classificação de ferramentas em quatro grupos: ferramentas de distribuição, ferramentas de comunicação, ferramentas de interação e ferramentas de administração de cursos. Os resultados confirmam que o LMS é amplamente utilizado para distribuir documentos aos estudantes, enquanto as ferramentas que facilitam a interação e a colaboração são usadas com parcimônia, e esse padrão é consistente ao longo do tempo. Apesar de um aumento no uso total de LMS, não há aumento na utilização de ferramentas digitais para a interação no Ensino Superior, indicando a importância de se promover uma ampla utilização de métodos colaborativos e incentivar a interação.

Palavras-chave: Tecnologias da informação e comunicação; Sistemas de gestão de aprendizagem; Ensino superior.

Resumen

Este artículo tiene como objetivo presentar las condiciones involucradas en el uso de Learning Management Systems (LMS) en la Universidad de Borås (UB), Suecia, específicamente en los años 2004, 2009, 2010 y 2018, destacando patrones que caracterizan las rutinas adoptadas por los docentes. Utilizando enfoques cuantitativos y cualitativos, la investigación exploratoria implicó el análisis de cursos en el área STEM (Ciencias, Tecnología, Ingeniería y Matemáticas). Además de un análisis general de los respectivos cursos, se aplicó un cuestionario a 76 docentes y 926 estudiantes de dichos cursos. El patrón de uso se analiza por medio de una clasificación de herramientas en cuatro grupos; herramientas de distribución, herramientas de comunicación, herramientas de interacción y herramientas de gestión de cursos. Los resultados confirman que el LMS es más ampliamente utilizado para distribuir documentos a los estudiantes, mientras que las herramientas que facilitan la interacción y la colaboración se usan con moderación y ese patrón es consistente a lo largo del tiempo. A pesar de un aumento en el uso total de LMS, no hay aumento en la utilización de herramientas digitales para interacción en la Educación Superior, indicando la importancia de promover una amplia utilización de métodos colaborativos y a incentivar la interacción.

Palabras clave: Tecnologias da informação e comunicação; Sistemas de gestão de aprendizagem; Ensino superior.

1. Introduction

In the literature related to the educational area, theoretical perspectives that serve as a basis for the teaching and learning processes are frequently divided into four categories: traditional, behaviorist, cognitivist, social-constructive pedagogy (Nawaz & Kundi, 2010; Ouadoud et al., 2018). It is worth highlighting, however, that over the last years a new epistemological perspective has been discussed, based on concepts such complexity, trans-disciplinarity, and eco-formation. It is what Petraglia (2013) defines as complex education and which, for Zwierewicz et al. (2019), may be considered a new teaching approach.

Moving forward that can be seen in the transition of perspectives includes valuing the student as the center of the teaching and learning processes going as far as articulating the curriculum to the local and global demands. The latter condition is considered in transdisciplinary and eco-formative pedagogical practices and, therefore, it is mobilized by an approach of complex education.

It is based on the different options that the introducing technologies in education may be streamlined with significantly distinctive conditions. Therefore, technologies may simply serve as mechanism to reproduce knowledge up to the point of linking teaching projects to contextualized demands as is the case of the globally observed demands.

In general, one observes that, amidst the theoretical advancement, the use of computers in the educational area has been followed by the hope that Learning Management Systems (LMS) will facilitate student-centered methods and the creation of effective learning environments and communities. This may be noticed in publications about educational technology in the early 21st century, which confirms that many theoreticians still have great expectancies in LMS as a tool to improve teaching and learning processes (Blin & Munro, 2008; Bush & Mott, 2009; Findik & Ozkan, 2010; Ladyshevsky & Gardner, 2008; Ubell, 2000; Wilson & Stacey, 2004).

In operational terms, many tools that are available in a LMS merely replace the older technology, such as copy machines (Dutton et al., 2004). Moreover, it has been demonstrated that a significant portion of teachers prefer tools which facilitate the distribution of information in relation to the students when a LMS is introduced (Bongalos et al., 2006; Garrote Jurado & Pettersson, 2007; Phillips, 2006). For Chaw and Tang (2018) and for Garrote Jurado and Pettersson (2011), the usefulness perceived in the communication and interaction tools relies on a change in practice, that is, it enhances the use of socio-constructivist student-centered procedures, while for Zwierewicz et al. (2019) the pedagogical practices also require a relationship between the curriculum and the real contextual and planetary demands.

Regardless of the option, the importance of reflections such as those by Uijl et al. (2017) must be highlighted as they uphold the value of social interaction for learning. In addition to such interaction, authors such as Irwin and Berge (2006) and Murphy (2004) draw attention to the importance of academic interaction.

Therefore, if interaction is plays an important role in the teaching processes, then even the use of asynchronous online

discussion and other strategies facilitated by the use of computers to unleash interaction may considerably improve the experience of learning (Anderson & Kanuka, 1998; Cronjé, 2006).

Regardless of the course, distance education still provides the students with the opportunity of structuring and organizing their thoughts better than in-person discussions in real time (Cheng et al., 2011; Ghadirian et al., 2018). On the other hand, even a short face-to-face interaction remarkably helps improve the quality of online interaction among students (Baragash & Al-samarraie, 2018).

In the face of the choices resulting from the introduction of computers in the teaching and learning processes, different researchers have reported the use of LMS in Higher Education, and one can observe a consensus among such researchers that a LMS can improve the results and help students manage their time and efforts. They also show that the differences in the students' behavior, that is, the way they utilize LMS, significantly reflects on the results achieved (Bickle, 2018; Cerezo et al., 2016; Msonde & Aalst, 2017). LMS has also been used as a tool to devise self-assessment tests for distance learning environments (Ditzz & Gomes, 2021).

Facing this scenario, this article has the purpose of presenting the conditions implied in the use of Learning Management Systems (LMS), at the University of Borås (UB), Sweden, specifically in 2004, 2009, 2010, and 2018, highlighting patterns that characterize the process. For such, it analyzes the movement generated in different courses and highlights the perception of professors and students in relation to introducing LMS in the teaching and learning processes.

2. Methodology

This study aims to present the pattern of use of LMS, how it has changed over time, and suggest explanations as to why tools facilitating interaction and collaboration are not more widely utilized. The study compares the use of different tools in LMS at the University of Borås in 2004, 2009, 2010, and 2018. It should be noted that some of the data have been previously published.

A mix of methods was used, first three quantitative investigations of courses within the STEM field given at UB in 2004, 2009, 2010, and 2018 and then a web survey for lecturers and another (slightly modified) for students, conducted in 2019. In this process, priority was given to exploratory research and the use of both quantitative and qualitative approaches.

The purpose of exploratory research includes enhancing familiarity with the phenomenon being studied (Marconi & Lakatos, 2006). The quantitative approach was chosen because it allows to handle data with the support of what Pereira et al. (2018, p. 69) have defined as “mathematical techniques as is the case of percentages”. Quantitative approach can be utilized together with the qualitative method, as according to Yin (2015) they do not exclude each other and may be relevant for a better understanding of the phenomena being studied.

Each quantitative survey investigated about 100 courses by checking the traces in the LMS. The same procedure was used to investigate the courses on all occasions; the scheme of observations created in 2005 was followed on the subsequent occasions.

For the qualitative part, an online questionnaire was used to survey perceptions about the use of LMS, and in particular verify if their responses align with the findings from the quantitative surveys. Lecturers and students were approached by e-mail requesting their participation; 76 lecturers (response frequency ca 19%) and 926 students (response frequency ca 17%) completed the questionnaire.

The interpretation was based on a division whose classification of digital tools below, where tools were divided into four groups, makes it possible to investigate and compare patterns of use, no matter what LMS is being looking at. This four-way classification was suggested by Garrote Jurado and Pettersson (2011).

- Tools for distribution: Tools that allow lecturers to upload documents, text or multimedia, and make them available for the students. The process is one-way, that is, teacher-to-learner distribution of information.

- Tools for communication: Tools that allow information to go either way as well as between students. The most common example is e-mail. It should be noted that if a tool like e-mail is used to work on group assignments or to exchange messages in ongoing discussions, then it should be classified as a tool for interaction in the particular course.
- Tools for interaction: Tools that elicit reaction and feedback. Discussion boards are the most typical example.
- Tools for course administration: Tools primarily used to monitor and document the educational process, rather than facilitate teaching or learning.

It is important to mark that the classification of tools is flexible. Tools can be used in different ways but the classification of tools in tables 1-4 depends solely on how they were used in the investigated courses. A typical example is the tool “surveys” in Ping Pong; it may facilitate interaction in many ways, but in the courses investigated in this study it was predominantly used to conduct a mandatory course evaluation. Hence, the tool is classified as a tool for course administration and not as a tool for interaction.

Another example is the tools “assignments” and “project groups” in Ping Pong. They were classified as “tools for interaction” in 2011 but in 2018 they had only been used to send material to or from the students and hence, in the latter survey, they are classified as tools for communication. The use of the tool “surveys” in Ping Pong is yet another example; it may facilitate interaction in many ways but in most courses investigated in this study it had only been used to conduct mandatory course evaluations and is therefore classified as a tool for course management. It was not necessary, but we were also prepared to divide and report separately, i.e. “Surveys used for course administration” and “Surveys used for collaboration” etc.

The data presented in this article were gathered at a university in Sweden with ca 12,000 students and the surveyed courses were all given on-campus. There is no reason to believe that the use of LMS at UB differs from higher education elsewhere in the developed world, but the situation in Arts and Humanities (A&H) may differ from the STEM (Science, Technology, Engineering, and Mathematics) field. Online surveys were used to outline and learn more about those differences.

The classification of tools in this study is based on actual use of tools and reflects the methodological application, rather than the technical functionality of the tools. It is important to note that each course was examined to see how different tools had been applied. In most courses, many tools were made available to students but had not been used.

Another concern is that lecturers and students have access to free or low-cost tools with similar features as those one finds in an LMS, i.e. e-mail, discussion boards, YouTube video etc. Therefore, one has to consider the possibility that computer-facilitated, collaborative methods are applied without using an LMS, but comments from the online surveys in this investigation as well as a number of informal interviews indicate that this is rarely the case.

Each course was examined to see what tools had been made available and then if and how they had been used. Only tools that were used by the lecturer or some student(s) is counted in the tables below; in most courses more tools were available/activated but not actually used.

The observation scheme was developed during the first investigation, conducted in 2005 at the School of Engineering at the University of Borås in 2004 (Garrote Jurado, 2006). At that time, 107 courses registered in a proprietary LMS called WebCT were examined. The data from those courses are shown in tables 1-4.

In the following investigations, carried out in 2011 and 2019, data were collected from courses offered from August 2009 to June 2010 and courses offered in 2018, respectively. The procedure in the 2005 investigation was followed as closely as possible, using the same scheme of observations.

3. Results from the Survey of Courses

In 2004, WebCT was used at the School of Engineering, the School of Business and Informatics, and the School of Textiles. The courses surveyed in 2010 and 2019 are from the STEM field, given on-campus (Table 1).

In Table 1, the use of tools for distribution, i.e. tools enabling lecturers to upload documents, text or multimedia, and make them available for the students is presented. The use of these tools allows lecturers to use the LMS to distribute documents in an effective manner, but typically it does not require any changes in a traditional teacher-to-student flow of information.

Table 1: The use of tools for distribution in 2004, 2009-10, and 2018.

WebCT, 2004 (N=107)			PingPong 2009-10(N=185)			PingPong 2018 (N=113)		
Tool	n	%	Tool	n	%	Tool	n	%
URL	58	54%	Link (URL)	10	5%	Link (URL)	20	18%
Content Module	67	63%	Contents	128	69%	Contents	89	79%
Single Page	73	68%	Documents	136	74%	Documents	95	84%
Image Database	2	2%						
Multimedia	2	2%						
Student Tips	4	4%	Overview	164	89%	Overview	3	3%
Organizer Page	69	64%						
Syllabus	41	38%						
			Podcasts	0	0%	Podcasts	0	0%
Glossary	9	8%						

Source: Authors.

Tools for distribution are used extensively and the trend is from 70% up to 85% over the timeframe. Both LMS offer similar functions, for example, the tool “Document” in Ping Pong may include text, image, and multimedia files and replace three different tools in WebCT. In Ping Pong, the tool “Link” is rarely used, because links to internet sites or other parts of the LMS can be included in any text.

Table 2: The use of tools for communication in 2004, 2009-10, and 2018.

WebCT, 2004 (N=107)			PingPong 2009-10 (N=185)			PingPong 2018 (N=113)		
Tool	n	%	Tool	n	%	Tool	n	%
Mail/Private post	36	34%	Participants	(163)*	88%*	Participants	*	*
Calendar	16	15%	Calendar	4	2%	Calendar	0	0%
			Message Board	30	16%	Message Board	19	17%
			What's new	21	11%	What's new	16	14%
			Ask/Answer questions	40	22%	Ask/Answer questions	0	0%
Student tips	4	4%	FAQ	3	2%	FAQ	1	1%
			Logbook	1	1%	Logbook	2	2%
						Assignments	62	55%
						Project groups	24	21%
Student Homepages	2	2%						

Source: Authors.

Table 2 shows the use of tools for communication. They allow information to go either way between teacher and student as well as between students. The level of utilization appears to be low, but of course students may communicate outside the LMS by E-mail. However, it should also be noted that if a tool like e-mail is mostly used to work on group assignments or to exchange messages in ongoing discussions, then it should be classified as a tool for interaction within the particular course.

Table 3 shows the use of LMS features that elicit reaction and feedback; they are defined as “tools for interaction”.

Interaction tools are of particular interest since their use is connected to the use of pedagogical practices such as collaborative learning and problem-based learning, and the formation of communities of learning.

Table 3: The use of tools for interaction in 2004, 2009-10 and 2018.

WebCT, 2004 (N=107)			Ping Pong 2009-10(N=185)			PingPong 2018 (N=113)		
Tool	n	%	Tool	n	%	Tool	n	%
Discussion	34	32%	Discussion	21	11%	Discussion	1	1%
Assignments	22	21%	Assignments	24	13%	Moved to communication		
Chat	7	7%	Chat	0	0%	Chat	0	0%
Self test	6	6%	Tests	5	3%	Tests	4	4%
Student Presentations	1	1%						
			Project groups	17	9%	Moved to communication		
Whiteboard	0	0%						

*In PingPong there is no integrated mail system. The tool “Participants” works as a mail list and connects the user to an external mail client, but we cannot see if it has been used. The high number (163) in 2009-10 only shows that the tool was available to students, not that it really had been used. **Source:** Authors.

The tools in this group are used sparingly; notably the use of “Discussion” dropped by two thirds from 2004 to 2009-10 and is now almost nonexistent. This result confirms that most lecturers predominantly use LMS to distribute documents, but also that many lecturers tried different tools and then decided to refrain from using them.

Table 4 presents the use of course management tools; primarily used to monitor and document the educational process rather than facilitate teaching or learning. To what extent they are used depends largely on decisions made by the university administrations rather than the lecturers in charge of the education process.

Table 4: The use of tools for course management in 2004, 2009-10, and 2018.

WebCT, 2004 (N=107)			PingPong 2009-10(N=185)			PingPong 2018 (N=113)		
Tool	n	%	Tool	n	%	Tool	n	%
Quizzes/Surveys	26	24%	Surveys	158	85%	Surveys	6	5%
My Grades	30	28%	Objectives	16	9%	Objectives	7	6%
My Progress	0	0%	Statistics	8	4%	Statistics	1	1%
			Portfolio	1	1%	Portfolio	0	0%
			Reports	0	0%	Reports	0	0%

Source: Authors.

A policy that recommended that the tool “Surveys” in Ping Pong be used for a course evaluation, in place in 2009-10, explains the 85% level, but it is also the reason why “surveys” is classified as a tool for course management.

3.1 Questionnaire for lecturers and students

To supplement the data obtained from WebCT and PingPong, two slightly different web surveys were sent out to students and lecturers. We received responses from 76 lecturers (the response frequency was ca 19%) and 926 students (the response frequency was ca 17%). The lecturers were divided into two groups depending on whether they teach mainly STEM or other subjects (A&H). The students were divided into four groups depending on the subject area and study time.

3.2 Results from the questionnaires

Most responses, from both lecturers and students, confirm our observations from the survey of courses above. That is

to say, LMS is widely used, but predominantly to distribute documents from teachers to students. The responses from STEM lecturers and students are in line with the results of the survey of courses. Tools for distribution are used extensively, the tools for communication are used less, and the tools for interaction are rarely used. The figures from the questionnaire are slightly higher than observed in the survey of courses (above) but it is reasonable to assume that people who actually use the LMS are more likely to respond to the questionnaire than those who do not.

In the tables below, L-A&H means lecturers in arts and humanities and L-STEM means lecturers in science-technology-engineering-mathematics. A&H-1 are students in arts & humanities with less than one year of study, STEM-1 are students with less than one year of study in STEM, A&H-2 are students with at least one year in arts & humanities and STEM-2 are students with at least one year in STEM.

Table 5 shows the lecturers' perception of the students' use of the LMS for collaboration. In the questionnaire, the LMS available to lecturers and students is referred to as "Ping Pong" since, at the time, it was the only system supported by UB. Below are the responses from lecturers, divided into the A&H and STEM field.

Table 5: Use of Ping Pong.

Question: do your students use ping pong to collaborate on any project or major task during your courses?		
	L-A&H (N=45)	L-STEM (N=31)
Yes, in most courses	29%	32%
Yes, occasionally	36%	29%
It has happened	13%	6%
Never	20%	32%

Source: Authors.

Comment: The Lecturer responses indicate that students do use the LMS to interact and collaborate in many courses. This is more often than the students themselves say but the apparent contradiction makes sense if a minority of students use the opportunity frequently and those students are also more active in the classroom.

Table 6 shows responses from students. Respondents are divided into four groups, depending on their field of study (STEM or A&H) and time of study (first year or later).

Comment: The students have access to a number of tools that would allow them to interact and collaborate in most courses, but only a small part of the students take the opportunity.

Table 6: Use of Ping Pong in activities.

Question: have you used ping pong as a tool to collaborate with your fellow students about any project or major task during your courses?				
	A&H-1 (N=349)	STEM-1 (N=72)	A&H-2 (N=380)	STEM-2 (N=125)
Yes, in most courses	11%	3%	9%	5%
Yes, on several occasions	10%	7%	12%	5%
Yes, i have tried	14%	20%	20%	22%
No, never	65%	71%	59%	68%

Source: Authors.

In Table 7, respondents are students with at least one year of studies behind them, divided in two groups according to their field of study. All students have computers, smartphones or other devices that provide them with reliable high-speed internet

access.

Table 7: Use of LMS.

Question: Have you used the LMS to discuss the subject of your courses?		
	A&H-2 (N=380)	STEM-2 (N=125)
Many times	22%	5%
Once or a few times	40%	34%
Never	38%	61%
Have you discussed the subject of your online courses without using the lms?		
Many times	67%	80%
Once or a few times	11%	5%
Never	22%	14%

Source: Authors.

Comment: We can see that online discussions are common, but mostly take place outside the LMS. From the comments, we could see that Facebook is the most common tool to discuss online and that most students read posts even if they do not write themselves. The responses confirm that students in A&H do use the LMS for online discussions more often than the STEM students do but only a minority of students that participate in discussions. Another conclusion from students' comments is that most discussions regard the teaching and their studies, rather than the subject of the courses.

Table 8 presents the opinion from both lecturers and students about online discussions as a pedagogical tool. Respondents are divided into six groups; L-A&H means lecturers in arts and humanities, L-STEM means lecturers in science-technology-engineering-mathematics. A&H-1 are students in arts & humanities with less than one year of study, STEM-1 are students with less than one year of study in STEM, A&H-2 are students with at least one year in arts & humanities and STEM-2 are students with at least one year in STEM.

Comment: Out of the six groups, lecturers in A&H are the most positive about OADs: over 50% of them agree that students should be required to participate in online discussions, at least in some courses. Over 40% do not agree, but the comments show a wide range of opinions from "yes of course, in particular when students are working on projects" to "absolutely not, it may exclude some students".

Students in arts & humanities use the tools for interaction more often than the STEM students and are more positive about the use of OAD. Still a solid majority of the students (68% of A&H-2) think that participating in OAD should be voluntary for the students, while 32% are open to the idea that OAD be included as a mandatory task in some or most courses.

The differences between lecturers in STEM and A&H show that both categories are more positive than their students but a significant share of the lecturers (42% of L-A&H and 62% of L-STEM) agree with the majority of students that OAD should not be mandatory in any courses.

Table 8: Opinion about online discussions.

Question: do you think online discussions should be a part of student tasks?						
	L-A&H (N=45)	L-STEM (N=31)	A&H-1 (N=349)	STEM-1 (N=72)	A&H-2 (N=380)	STEM-2 (N=125)
Yes, in most courses	28%	16%	17%	4%	15%	9%
Yes, but only in some courses	28%	23%	15%	19%	17%	10%
Yes, though it should be voluntary to participate	12%	23%	27%	23%	30%	26%
No, the students can discuss if they want to	30%	39%	41%	51%	38%	53%

Source: Authors.

The pattern of use of LMS looks similar over the years. Only a few students utilize the tools for interaction, and half of the lecturers and about two thirds of the students are opposed to mandatory participation in online discussions.

4. Discussion

Judging by the pedagogical literature, it would be reasonable to expect a development towards more collaborative methods and a wider utilization of digital tools for interaction in higher education, but this is not happening. It is tempting to interpret this as a result of resistance from the lecturers to changes in teaching practices, but responses from lecturers and students, together with the decline over time in the use of OADs, do not support that conclusion. In contrast, the results in this investigation suggest that the major barrier to more student activity and collaborative efforts in education is that many students fail to appreciate such approaches and lecturers are reluctant to challenge their student's preconceptions about education.

To explain why there is a decline over time in the use of discussions in education, we have to consider another development in higher education: an approach to running public service organizations called New Public Management (NPM). It was developed during the 1980s as part of an effort to make public service more cost-effective by using management models from trade and industry, i.e. financial control, performance monitoring, competition and business plans (Broucker et al., 2016; Seneviratne & Hoque, 2017).

Within universities, there has been resistance from academics who see NPM as an attempt to undercut academic freedom; the principle that scholars should be able to teach or communicate any ideas or facts without institutional censorship or fear of repression from governing bodies (Berg et al., 2017; Boulton & Lucas, 2011).

In recent decades, many policy documents aligned with NPM have been published and there are growing demands from government that the cost of higher education and research must be justified in economic terms, i.e. the creation of new jobs or products (Beach, 2013; Lorenz, 2006). Beach asserts that increased importance is placed on external networks, quasi-standardization of quality assurance, and accountability systems. Other researchers have expressed similar concerns about the impact of implementing the Bologna Declaration ("Bologna Declaration," 1999) on higher education (Broucker et al., 2018; Lorenz, 2006).

As Theocharis Kromydas puts it: "Education has become an instrument for economic progress moving away from its original role to provide context for human development." (Kromydas, 2017). Lorenz (2006) warned in his article that the Bologna process will force universities into a commercial practice, where they produce and transfer knowledge as a marketable commodity. It seems obvious that this process will increase the gap between research and education and force universities to focus the education on subject specific, testable knowledge in response to demands from government and business community

(Cain et al., 2012; Molesworth et al., 2009; Wasserman & Berkovich, 2020).

If we evaluate academic activities in performative, economic and management terms, the perceived usefulness of tools for interaction decreases, and it is hard to justify the cost for maintaining an LMS. Of course, the programs themselves are not expensive, some well-known LMS are free (and open-source) but it takes considerable funding to provide support and training. Another reason to refrain from using discussions and other forms of interaction as a pedagogical tool has to do with concerns that some students may feel insecure or excluded as a lecturer suggested in a response to the questionnaire. This fear, that students may feel insecure, appears to be a growing concern in higher education. Lukianoff and Haidt refer to many testimonies indicating a growing caution from lecturers to challenge the preconceived notions or opinions of their students, even when it would be pedagogically justified (Haidt & Lukianoff, 2018; Lukianoff & Haidt, 2015).

To appreciate the value of tools for interaction, one has to perceive knowledge as something created by the individual learner in a cognitive process, enhanced by interaction with other people. This view of knowledge, called social constructivism, is more comprehensive than one that concentrates on transmitting and testing the specific content of a course. It includes generic competencies such as information handling skills, problem solving and social skills. From that viewpoint, it is reasonable to expect that a wider use of tools that facilitate interaction and collaboration would improve long-term results and enhance the learning experience. If this view of learning is correct, such methods could contribute to create students that are better equipped for a judicious application of subject specific knowledge and better prepared to take responsibility for their own intellectual development, a desirable result for academia, industry, and society (Adams, 2006).

In conversation with the authors, many lecturers have expressed their discontent over their students' failure to look at the purposes of education beyond the scope of subject specific and testable knowledge. They have also mentioned worries that the academy is giving in to pressure from industry and government towards focusing both research and education on useful or profitable knowledge. If they are right, we can expect the universities to become increasingly similar to vocational schools over time and that students will demand that all teaching and tasks are aligned with the explicit course requirements. In other words, that everything be directly aimed at them receiving a diploma.

A feasible remedy to student reluctance to participate in online interaction could be to introduce them to the ideas about collaborative learning and the importance of interaction for their intellectual development at an early stage of their education. However, this will only work if there is a consensus about the main purpose of higher education as a means to reach intellectual maturity beyond subject specific, testable knowledge.

If we adhere to these traditional values in higher education, there are obvious benefits to reap from interactive and collaborative efforts. It would also be a self-evident obligation for educational institutions to provide training for students to participate in discussions and orderly debates.

5. Conclusion and Recommendation

In spite of an increase in the total use of LMS, there is no increase in the utilization of digital tools for interaction in higher education. The main barrier to a wider use of collaborative and interactive procedures in higher education is the perception of education foremost as a way to acquire testable knowledge and diplomas, and that research and higher education should be justified by the creation of new jobs, new products and economic growth.

The authors of this article hold that an obligation to promote democratic values and teach students to exercise freedom of expression in a responsible and constructive way is the best argument for universities to justify academic freedom and public funding. Therefore, we urge higher education institutions to promote a wide use of collaborative methods and encourage online interaction and discussions in order to develop the student's analytical and critical thinking.

References

- Adams, P. (2006). Exploring social constructivism: Theories and practicalities. *Education*, 34(3), 243-257.
- Anderson, T. & Kanuka, H. (1998). Online social interchange, discord, and knowledge construction.
- Baragash, R. & Al-Samarraie, H. (2018). Blended learning: Investigating the influence of engagement in multiple learning delivery modes on students' performance. *Telematics and Informatics*, 35. 10.1016/j.tele.2018.07.010.
- Beach, D. (2013). Changing higher education: converging policy-packages and experiences of changing academic work in Sweden. *Journal of Education Policy*, 28(4), 517-533.
- Berg, E., Barry, J. & Chandler, J. (2017). The New Public Management and Higher Education: A Human Cost? (pp. 161-175).
- Bickle, M. (2018). Student-to-Student Interaction: Humanizing the Online Classroom Using Technology and Group Assignments.
- Blin, F. & Munro, M. (2008). Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory. *Comput. Educ.*, 50(2), 475-490. 10.1016/j.compedu.2007.09.017.
- Bologna Declaration. (1999). Towards the European Higher Education Area: Conference of Ministers responsible for Higher Education in 29 European countries (June), Bologna, Italy.
- Bongalos, Y. Q., Bulaon, D. D. R., de Celedonio, L. P., de Guzman, A. B. & Ogarte, C. J. F. (2006). University teachers' experiences in courseware development. *British Journal of Educational Technology*, 37, 695-704.
- Boulton, G. & Lucas, C. (2011). What Are Universities For? *Chinese Science Bulletin*, 56, 2506-2517. 10.1007/s11434-011-4608-7.
- Broucker, B., De Wit, K. & Leisyte, L. (2016). Higher Education System Reform: A Systematic Comparison of Ten Countries from a New Public Management Perspective (pp. 19-40).
- Broucker, B., De Wit, K. & Verhoeven, J. (2018). Higher education for public value: taking the debate beyond New Public Management. *Higher Education Research and Development*, 37, 227-240. 10.1080/07294360.2017.1370441.
- Bush, M. D. & Mott, J. D. (2009). The name assigned to the document by the author. This field may also contain sub-titles, series names, and report numbers. The Transformation of Learning with Technology: "Learner-Centricity, Content and Tool Malleability, and Network Effects". *Educational Technology Publications*, 49(2), 3-20.
- Cain, J., Romanelli, F. & Smith, K. M. (2012). Academic entitlement in pharmacy education. *American Journal of Pharmaceutical Education*, 76(10).
- Cerezo, R., Sánchez-Santillán, M., Ruíz, M. & Núñez, J. (2016). Students' LMS interaction patterns and their relationship with achievement: A case study in higher education. *Computers & Education*, 96. 10.1016/j.compedu.2016.02.006.
- Chaw, L. & Tang, C. M. (2018). What Makes Learning Management Systems Effective for Learning? *Journal of Educational Technology Systems*, 47, 004723951879582. 10.1177/0047239518795828.
- Cheng, C. K., Paré, D. E., Collimore, L.-M. & Joordens, S. (2011). Assessing the effectiveness of a voluntary online discussion forum on improving students' course performance. *Computers & Education*, 56(1), 253-261.
- Cronjé, J. (2006). Paradigms regained: Toward integrating objectivism and constructivism in instructional design and the learning sciences. *Educational Technology Research and Development*, 54(4), 387-416.
- Ditz, Á. J. M., & Gomes, G. R. R. (2021). Ferramenta de elaboração de testes de autoavaliação para ambientes de ensino a distância. *Research, Society and Development*, 10(8), e32710817424-e32710817424.
- Dutton, W. H., Cheong, P. & Park, N. (2004). The Social Shaping of a Virtual Learning Environment: The Case of a University-wide Course Management System. *Electronic Journal of e-Learning*, 2(2), 1-12.
- Findik, D. & Ozkan, S. (2010, 27-30 Oct. 2010). *Identifying success factors for WBLMS use by instructors of engineering departments*. Paper presented at the Frontiers in Education Conference (FIE), 2010 IEEE.
- Garrote Jurado, R. (2006). *The use of learning management systems in Engineering Education: A Swedish case study*. In M. F. Christie (Ed.), *Shifting Perspectives in Engineering Education* (pp. 213-226): Chalmers Strategic Effort on Learning and Teaching (C-SELT) Chalmers University of Technology.
- Garrote Jurado, R. & Pettersson, T. (2007). *Lecturers' Attitudes about the Use of Learning Management Systems in Engineering Education: A Swedish Case Study*. *Australasian Journal of Educational Technology*, 23(3), 327-349.
- Garrote Jurado, R. & Pettersson, T. (2011). The use of learning management systems: A Longitudinal Case Study. *eleed*, 8(1).
- Ghadirian, H., Salehi, K. & Mohd Ayub, A. f. (2018). Exploring the behavioural patterns of knowledge dimensions and cognitive processes in peer-moderated asynchronous online discussions.
- Haidt, J. & Lukianoff, G. (2018). *The coddling of the American mind: How good intentions and bad ideas are setting up a generation for failure*: Penguin UK.
- Irwin, C. & Berge, Z. (2006). Socialization in the Online Classroom. *E-Journal of Instructional Science and Technology*, 9(1), n1.

- Kromydas, T. (2017). Rethinking higher education and its relationship with social inequalities: past knowledge, present state and future potential. *Palgrave Communications*, 3(1), 1. 10.1057/s41599-017-0001-8.
- Ladyshevsky, R. K. & Gardner, P. (2008). Peer assisted learning and blogging: A strategy to promote reflective practice during clinical fieldwork. *Australasian Journal of Educational Technology*, 24(3), 241-257.
- Lorenz, C. (2006). Will the Universities Survive the European Integration? Higher Education Policies in the EU and in the Netherlands before and after the Bologna Declaration. *Sociologia internationalis*, 44(1), 123.
- Lukianoff, G. & Haidt, J. (2015). The coddling of the American mind. *The Atlantic*, 316(2), 42-52.
- Molesworth, M., Nixon, E. & Scullion, R. (2009). Having, being and higher education: the marketisation of the university and the transformation of the student into consumer. *Teaching in Higher Education*, 14(3), 277-287. 10.1080/13562510902898841.
- Marconi, M., & lakatos, E. (2010). Pesquisa bibliográfica e resumos. *fundamentos de metodologia científica. (7a ed.)*, Atlas.
- Msonde, S. E. & Aalst, J. V. (2017). Designing for interaction, thinking and academic achievement in a Tanzanian undergraduate chemistry course. *Educational Technology Research and Development*, 65, 1389-1413.
- Murphy, E. (2004). Recognising and Promoting Collaboration in an Online Asynchronous Discussion. *British Journal of Educational Technology*, 35(4), 421-431 July 2004.
- Nawaz, A. & Kundi, G. M. (2010). From objectivism to social constructivism: The impacts of information and communication technologies (ICTs) on higher education. *International Journal of Science and Technology Education Research*, 1(2).
- Ouadoud, M., Chkouri, M. Y. & Nejari, A. (2018). Learning management system and the underlying learning theories: towards a new modeling of an LMS. *International Journal of Information Science and Technology*, 2(1), 25-33.
- Pereira, A. S., Shitsuka, D. M., Parreira, F. J., & Shitsuka, R. (2018). *Metodologia da pesquisa científica.[e-book]*. Santa Maria. Ed (pp. 3-9). UFSM.
- Petraglia, I. (2013). *Pensamento complexo e educação*. Livraria da Física.
- Phillips, R. (2006). *Tools used in Learning Management Systems: Analysis of WebCT usage logs*. Paper presented at the ASCILITE 2006, Sydney, Australia.
- Seneviratne, C. & Hoque, Z. (2017). Management control systems research in the public higher education sector: Current status and future research agenda. In E. Harris (Ed.), *The Routledge Companion to Performance Management and Control*. London: Routledge.
- Ubell, R. (2000). Engineers turn to e-learning. *Spectrum, IEEE*, 37(10), 59-63.
- Ujil, S., Filius, R. & Ten Cate, O. (2017). Student Interaction in Small Private Online Courses. *Medical Science Educator*, 27(2), 237-242. 10.1007/s40670-017-0380-x.
- Wasserman, V. & Berkovich, I. (2020). Higher education professionals in the age of NPM and digital knowledge: Distinction strategies for forming new occupational capital. *Studies in Higher Education*. 10.1080/03075079.2020.1732909.
- Wilson, G. & Stacey, E. (2004). Online interaction impacts on learning: Teaching the teachers to teach online. *Australasian Journal of Educational Technology*, 20(1), 33-48.
- Yin, R. K. (2015). *Estudo de Caso-: Planejamento e métodos*. Bookman editora.
- Zwierewicz, M., Souza, J., Veber, S. C., Ferreira, H. M., Vestena, C. L. B. & Berg, J. (2019). Das abordagens do ensino do século xx à educação complexa e aos projetos criativos ecoformadores. *Querubim*, 15, 113-123.