Barriers to the utilization of educational software

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Abstract:

Quantitative data about the use of various tools in the Learning Management System (LMS) in the year 2004, the academic year 2009-2010 and 2018 at a small Swedish university confirm the notion that increased use of educational software usually does not lead to a wider use of collaborative pedagogical methods. This paper aims to explain why lecturers predominantly use LMS to distribute documents to students, rather than to facilitate collaborative learning and interaction. A survey of lecturers and students' perceptions collected in the spring of 2019 with an online questionnaire provided additional qualitative data.

The authors discuss the situation with restrictions due to the Corona pandemic and a change of LMS in the years 2019-2022 as a problem to both the education process and the collection of data, but also as an opportunity to accelerate the implementation of on-line digital methods. It remains to be seen if the increased use of off-campus methods in 2020 to 2022 will be persistent over time.

In their conclusions the authors assert that a wider use of the tools for interaction depends on pedagogical practices built on social constructivist, learner centered theories of learning. They suggest that if higher education is only justified by the impact on economic growth, creation of new jobs and new products rather than as a means for personal growth and development, it works as a barrier to the use of pedagogical methods intended to elicit student activity and promote the creation of learner communities and shared perspectives.

Keywords: E-learning, Learning Management systems, Engineering Education, Higher Education, Educational Software

1 INTRODUCTION

1.1 Educational software at the University of Borås

The first Learning Management System (LMS) with integrated features for teaching, evaluation and administration of courses was introduced at the University of Borås (UB) in 1999. It was a proprietary program called WebCT and during the first years, it was only used by a few enthusiasts. By 2004, two different LMS with similar features were in use at UB, Luvit and WebCT. In 2007, a procurement process was completed and from 2008 to 2019, an LMS called PingPong was the only LMS supported by UB. In 2020 the LMS PingPong was replaced by a new LMS called CANVAS. Since 2004 the use of educational software at UB has been documented and published in different articles and conference papers. These publications are part of an ongoing action research project [1].

The situation with restrictions due to the Corona pandemic and a change of LMS in the years 2019-2022 was a problem to both the education process and the collection of data, but also an opportunity to accelerate the implementation of on-line digital methods. A survey published in spring of 2022 presented the lecturers' experiences of working with a new LMS during periods of mandatory distance education due to the pandemic restrictions [2]. It is too early to tell if the wider use of on-line methods in 2020 to 2022 will be persistent over time.

1.2 The Purpose of this Study

This study presents the pattern of use of educational software, with focus on online discussions. The changes over time is outlined and explanations as to why tools facilitating interaction and collaboration are not more widely utilized is suggested.

1.3 Scope and Limitations

The authors assert that the results are relevant for educational institutions all over the western world. There are of course examples of creative and pedagogically sound application of computer supported interactive methods in the literature, but most of the positive examples are the result of initiatives by single or small groups, of teachers.

1.4 Background

1.4.1 Teaching, learning and educational software

Teaching and learning models can be divided into four categories: traditional, behaviorist, cognitivist and social constructivist* pedagogy [3, 4]. Many theoreticians in the latter category believe that educational software could enhance the learning experience by facilitating collaboration and the establishment of learning communities [5-7].

Many articles report positive impact from the use of Online Asynchronous Discussions (OADs) [8, 9]. It has been argued that even in on-campus courses, OADs still give students better chances to structure and organize their thoughts than chat or face-to-face discussions [10, 11]. Some articles describe less positive outcomes [12], and we have plenty of anecdotal evidence from lecturers who have tried OADs, but were disappointed with the outcomes and no longer use them. One must consider the possibility that the reported positive effects of online discussions is due to observation or publication bias [13]. Also, an observed correlation between participation in OADs and study outcomes [14, 15] does not prove causation; probably students who struggle with their studies are less likely to participate in discussions unless it is a compulsory element [16].

**Note that "Social constructivism" as a theory of learning or creation of knowledge to which the authors adhere should not be confused with "social constructivism" as an epistemology or metaphysical worldview in which reality is a function of human activity or negotiation [17, 18, 19, p. 5.ff].*

1.4.2 New Public Management in higher education

New Public Management (NPM) 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 [20]. 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 [21, 22].

In recent decades, many policy documents have been published in the spirit of NPM 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 [23, 24]. Or, as Kromydas puts it: "Education has become an instrument for economic progress moving away from its original role to provide context for human development."[25]. In his 2006 article Lorenz warned 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 [26, 27].

In Sweden, there have been a number of bills from the government putting considerable pressure on the universities to direct their efforts towards areas leading to jobs, new products and economic growth [23]. Beach asserts that increased importance have been placed on external networks, quasi-standardization of quality assurance and accountability systems. Other researchers in Europe have also expressed concerns about the impact of the implementation of the Bologna Declaration [28] on higher education [24].

2 METHODOLOGY

The data used in this article are quantitative results from investigations of courses in science, technology, engineering or mathematics (the STEM field) given at UB in the years 2004, 2009 – 2010 and 2018, previously published in [29-31]. Additional data come from a web survey of lecturers and students perceptions about the use of educational software. 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.

2.1 The survey of courses

Data in this paper was published before (see above). A scheme of observations was created for the first occasion in 2005, and then used again in 2010 and 2018. Each course was examined and the classification depends on how the tool was used in the investigated courses.

2.1.1 Classification of Tools

There are many digital tools available for educational purposes, often put together into an LMS. With the tools divided into the four groups below it is possible to analyze the pattern of use even if we have different brands of LMS or a set of separate tools [31].

For the purpose of this investigation, the tools for interaction are of particular interest. They offer many possibilities to enhance the learning experience but their perceived usefulness depends on our view of knowledge. Social constructive theories of learning view knowledge as something created by the learner in a cognitive process stimulated by interaction with other people and if lecturers and students accept this perspective they can appreciate the benefits of collaboration and interaction.

1. **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.

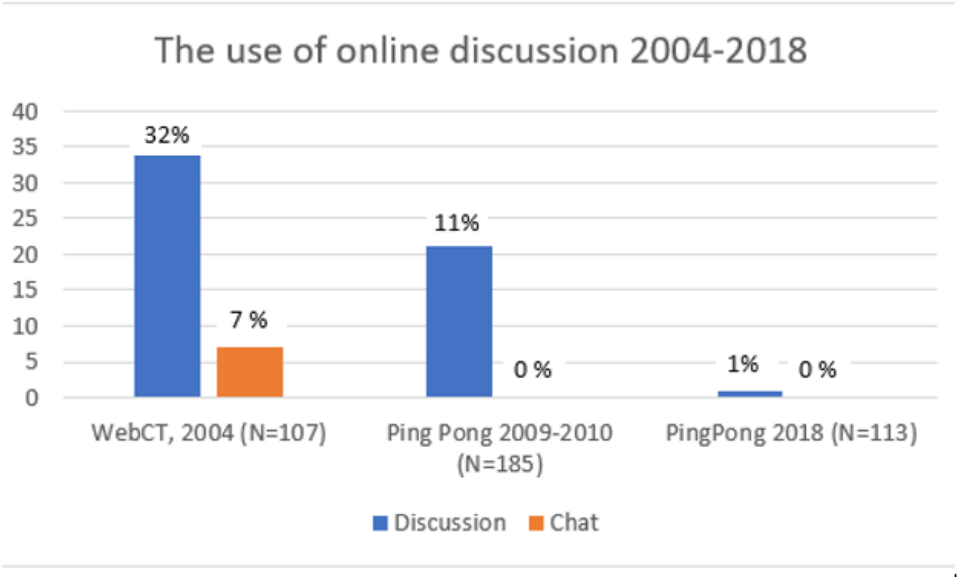
2. **Tools for communication**: Tools that allow information to go either way as well as between students. The most common example is e-mail. It should be noted that if a tool like e-mail is used to work on group assignments or to exchange messages in ongoing discussions, then it should be classified as a tool for interaction in the particular course.

3. **Tools for interaction**: Tools that elicit reaction and feedback. Discussion boards are the most typical example and for this investigation we picked “discussion” and “chat” to represent the tools for interaction.

4. **Tools for course administration**: Tools that are primarily used to monitor and document the educational process, rather than facilitate teaching or learning.

3 RESULTS FROM THE SURVEY OF COURSES

The courses surveyed below are from the STEM field, given on-campus.



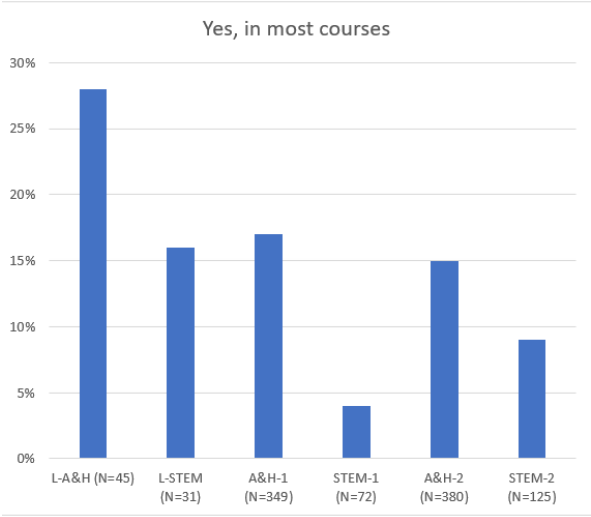
Figur 1: The use of tools for interaction in 2004, 2009-10 and 2018.

Tools for interaction was used sparingly; the use of “Discussion” dropped by two thirds from 2004 to 2009-10 and is almost nonexistent in the latest survey. The results confirm that most lecturers predominantly use the LMS to distribute documents, but also that many lecturers have tried to utilize the tools for interaction but then stopped using them. An explanation some lecturers have given in conversation with the authors is that their students fail to appreciate the use of dialogue and debate in their courses and just want the subject specific and testable knowledge they need to get their grades.

3.1 Questionnaire for Lecturers and Students

To supplement the data obtained from the survey of courses, two slightly different web questionnaires was distributed to students and lecturers in March to April 2019. 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 Arts and Humanities (A&H). The students were divided into four groups depending on the subject area and study time.

Responses to the question; “Should students be required to participate in online discussions?”



Figur 2: Opinion about online discussions.

In the diagram above L-A&H is lecturers in arts and humanities and L-STEM is 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, the 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 and 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”.

4 DISCUSSION

Digital educational technology, whether or not integrated in an LMS, facilitates a wide range of pedagogical methods. The impact on the educational process is different for different tools. For example, we can compare the tools for disseminating information and the tools for interaction. The former are widely used, perceived as very useful, and have replaced older, less effective methods, without eliciting change in the teacher-centered concept of education based on a view of knowledge as something coming from the lecturer or the literature and transferred to the students. This perspective tends to focus on subject specific and quantified, testable knowledge.

To fully appreciate the value of tools for interaction one has to perceive knowledge as something created by the learner in a cognitive process in interaction with other people i.e. the social constructivist perspective. This view of knowledge is more comprehensive than one that only aim to transmit and test the subject specific content of a course, as it includes generic competencies such as information handling, problem solving and social skills. From that viewpoint, it is reasonable to expect that a wider use of tools that facilitate interaction and collaboration should improve long-term results and enhance the learning experience [32]. Such methods could contribute to the creation of 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 [33].

Today most students have access to an LMS with features intended to facilitate interaction and collaboration. Few students utilize the tools for interaction provided in the LMS and about two thirds of the students and half of the lecturers are opposed to mandatory participation in online discussions. Responses from lecturers and students together with the decline in the use of OADs over time suggest that the major barrier to more student activity and collaborative efforts is that to many students fail to appreciate such approaches.

In the years 2019-2022 the implementation of a new LMS and restrictions due to the Corona pandemic was a problem to both the education process and the collection of data. Periods of mandatory distance education forced lecturers to implement on-line digital methods and to many it was a big challenge. A survey published in spring of 2022 presented the lecturers' experiences of working with a new LMS during the pandemic restrictions [34]. It is too early to tell if the wider use of on-line methods in 2020 to 2022 will be persistent over time.

In higher education, NPM drive the implementation of financial control, performance monitoring, competition and business plans in an effort to make universities more cost effective. This approach leads to an increase in the demands on lecturers to provide documentation etc. but also an increase in the numbers of bureaucrats (staff not engaged hands-on in research or teaching). If we follow the NPM spirit in higher education and measure academic activities in performative, economic and management terms the perceived usefulness of tools for interaction will decrease, and it will be hard to justify efforts to engage students in discussions and debates.

Not only administrators in universities and government accept the NPM approach and argue that the cost of higher education and research must be justified in economic terms. 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. Those lecturers also worry that the academy is giving in to pressure from industry and government to focus research and education on profitable knowledge. If they are right we can expect that more students will demand that all teachings and tasks are aligned with the explicit course requirements i.e. directly aimed at them receiving a diploma.

Another reason to refrain from using discussion as a pedagogical tool is the risk that some students may feel insecure or excluded as a lecturer suggested in a response to our questionnaire. This fear; that students may feel insecure, appears to be a growing concern in higher education [35, 36]. 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.

5 CONCLUSIONS

If we adhere to traditional values in higher education; academic freedom, free debate and free exchange of information and we embrace education as a mean for personal growth and development there are obvious benefits to reap from interaction and collaborative efforts. To provide training for students to participate in discussions and orderly debates becomes a self-evident obligation for educational institutions.

It would be tempting to interpret our results as an effect of resistance from the lecturers to changes in teaching practices, but responses from lecturers and students together with the decline in the use of OADs over time suggest that the major barrier to more student activity and collaborative efforts is that to many students fail to appreciate such approaches.

The implementation of New Public Management favors the idea that research and higher education should be justified by creation of new jobs, new products and economic growth and put demands on the universities to adapt education programs to the wishes of society, industry and commerce. The major barrier to a wider utilization of collaborative and interactive procedures in higher education appears to be the view of education as primarily a way to acquire pre-conceived testable knowledge and diplomas.

6 RECOMMENDATION

The authors of this paper hold that a commitment to promote democratic values and teach young adults to exercise freedom of expression in a constructive way is the best way to justify academic freedom and public funding. Therefore, we recommend universities and lecturers to engage in free exchange of information and stimulate critical thinking by a wide use of interactive digital tools.

REFERENCES

1. Garrote Jurado, R., *Educational Software in Engineering Education*, in *Department of Education*. 2015, Stockholm University: Stockholm.
2. Garrote Jurado, R. and R. Fjelldal, *Synpunkter på utbildning och support under bytet av l ärplattform vid Högskolan i Borås (HB) 2021-2022*. 2022, University of Borås Faculty of Librarianship Information Education and IT, University of Borås. p. 14.
3. Nawaz, A. and G.M. Kundi, *From objectivism to social constructivism: The impacts of information and communication technologies (ICTs) on higher education.* International Journal of Science and Technology Education Research, 2010. **1**(2).
4. Ouadoud, M., M.Y. Chkouri, and A. Nejjari, *Learning management system and the underlying learning theories: towards a new modeling of an LMS.* International Journal of Information Science and Technology, 2018. **2**(1): p. 25-33.
5. Anderson, T. and H. Kanuka, *Online social interchange, discord, and knowledge construction.* 1998.
6. Cronjé, J., *Paradigms regained: Toward integrating objectivism and constructivism in instructional design and the learning sciences.* Educational Technology Research and Development, 2006. **54**(4): p. 387-416.
7. Yarusso, L., *Constructivism vs. objectivism.* Performance+ Instruction, 1992. **31**(4): p. 7-9.
8. Cho, M.-H. and S. Tobias, *Should instructors require discussion in online courses? Effects of online discussion on community of inquiry, learner time, satisfaction, and achievement.* The international review of research in open and distributed learning, 2016. **17**(2).
9. Palmer, S., D. Holt, and S. Bray, *Does the discussion help? The impact of a formally assessed online discussion on final student results.* British Journal of Educational Technology, 2008. **39**(5): p. 847-858.
10. Aderibigbe, S.A., *Can online discussions facilitate deep learning for students in General Education?* Heliyon, 2021. **7**(3): p. e06414.
11. Ghadirian, H., K. Salehi, and A.f. Mohd Ayub, *Exploring the behavioural patterns of knowledge dimensions and cognitive processes in peer-moderated asynchronous online discussions.* 2018.
12. Hållsten, S. *Diskussionsuppgift på lärplattformen–redskap för att lära eller bara'en uppgift till'?* in *Svenskans beskrivning 34*. 2016.
13. Francis, G., *Replication, statistical consistency, and publication bias.* Journal of Mathematical Psychology, 2013. **57**(5): p. 153-169.
14. Alzahrani, M.G., *The Effect of Using Online Discussion Forums on Students' Learning.* Turkish Online Journal of Educational Technology-TOJET, 2017. **16**(1): p. 164-176.
15. Zacharis, N.Z., *A multivariate approach to predicting student outcomes in web-enabled blended learning courses.* The Internet and Higher Education, 2015. **27**: p. 44-53.
16. Lee, J.-E. and M. Recker, *The effects of instructors' use of online discussions strategies on student participation and performance in university online introductory mathematics courses.* Computers & Education, 2021. **162**: p. 104084.
17. Boghossian, P., *Critical Thinking and Constructivism: Mambo Dog Fish to the Banana Patch.* Journal of philosophy of education, 2012. **46**(1): p. 73-84.
18. Goldie, J.G.S., *Connectivism: A knowledge learning theory for the digital age?* Medical teacher, 2016. **38**(10): p. 1064-1069.
19. Kukla, A., *Social constructivism and the philosophy of science*. 2013: Routledge.
20. Seneviratne, C. and Z. Hoque, *Management control systems research in the public higher education sector: Current status and future research agenda*, in *The Routledge Companion to Performance Management and Control*, E. Harris, Editor. 2017, Routledge: London.
21. Berg, E., J. Barry, and J. Chandler, *The New Public Management and Higher Education: A Human Cost?* 2017. p. 161-175.
22. Boulton, G. and C. Lucas, *What Are Universities For?* Chinese Science Bulletin, 2011. **56**: p. 2506-2517.

23. Beach, D., *Changing higher education: converging policy-packages and experiences of changing academic work in Sweden.* Journal of Education Policy, 2013. **28**(4): p. 517-533.
24. Lorenz, C., *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, 2006. **44**(1): p. 123.
25. Kromydas, T., *Rethinking higher education and its relationship with social inequalities: past knowledge, present state and future potential.* Palgrave Communications, 2017. **3**(1): p. 1-12.
26. Cain, J., F. Romanelli, and K.M. Smith, *Academic entitlement in pharmacy education.* American Journal of Pharmaceutical Education, 2012. **76**(10).
27. Molesworth, M., E. Nixon, and R. Scullion, *Having, being and higher education: the marketisation of the university and the transformation of the student into consumer.* Teaching in Higher Education, 2009. **14**(3): p. 277-287.
28. *Bologna Declaration*. 1999, Conference of Ministers responsible for Higher Education in 29 European countries (June), Bologna, Italy: Towards the European Higher European Area.
29. Garrote Jurado, R., *The use of learning management systems in Engineering Education: A Swedish case study*, in *Shifting Perspectives in Engineering Education*, M.F. Christie, Editor. 2006, Chalmers Strategic Effort on Learning and Teaching (C-SELT) Chalmers University of Technology. p. 213-226.
30. Jurado, R.G., et al., *The use of computer enhanced education: twenty years of dashed hopes.* Research, Society and Development, 2022. **11**(5): p. e28311528181.
31. Garrote-Jurado, R. and T. Pettersson, *The use of learning management systems: A Longitudinal Case Study.* eleed, 2011. **8**(1).
32. Foo, S.Y., *Using EASY framework to facilitate economics students' critical thinking in asynchronous online discussions.* Asia Pacific Education Review, 2021. **22**(4): p. 637-654.
33. Adams, P., *Exploring social constructivism: Theories and practicalities.* Education, 2006. **34**(3): p. 243-257.
34. Garrote Jurado, R. and T. Pettersson, *The period of mandatory on-line education in the spring of 2020*. 2021: Journal of Praxis in Higher Education.
35. Lukianoff, G. and J. Haidt, *The coddling of the American mind.* The Atlantic, 2015. **316**(2): p. 42-52.
36. Haidt, J. and G. Lukianoff, *The coddling of the American mind: How good intentions and bad ideas are setting up a generation for failure*. 2018: Penguin UK.