Teaching Business Information Systems in 2020s: Pitfalls, Challenges and Some Methodological Ideas for Testing

Matthias Hofstetter[a], Thomas Gees[b], Reinhard Riedl[c] and Adamantios Koumpis[d]

Institut Digital Enabling, Berner Fachhochschule, Department Wirtschaft, Bern, Switzerland

Keywords: Business Information Systems, Management Information Systems, Experiential Teaching Methods, Digital Skills.

Abstract: In the paper we present experiences from the organisation and running of a Business Information Systems course for undergraduate students at the Berner Fachhochschule. Aspects related to the teaching style, the content and the process that have been defined for use are presented and discussed, while the rationale for our decisions is also outlined. An experiential approach is fostered that allows students to capitalise on their individual preferences and learning paths, combined with the idea of supporting the acquisition of digital skills that will allow better use in their current or future working environments.

1 INTRODUCTION

At the Business School of the Berner Fachhochschule there is a new ambitious programme with the codename B2020 aiming to introduce a number of changes in the structure and organisation of the curricula, not only in terms of how these are implemented but also during their early-design and conceptualisation phases. From our side we had the good luck to afford such an experimentation; as the planning for the new module coincided with an internal restructure in our Department, we had the opportunity to reconsider the teaching of the Business Information System module on a zero basis. In the following we present our ideas and motivation and also some first experiences.

2 THE QUEST FOR SENSE-MAKING IN TEACHING

2.1 The Textbook

It is not uncommon that people are resistant to changes, and adopt them only when it is late enough.

This approach has also its positive aspects, as one may adopt changes that have proven their value, leaving out the case of wasting efforts in experimentation. We have been teaching for many years courses on Business Information Systems – or as the same course appears in some institutions as Management Information Systems – and to both undergraduate and postgraduate and MBA levels.

A core question that has been tantalizing lecturers was about which textbook to use and, once one made their mind, how to use it. For sure there are best sellers and 'killer' books in this area – the most famous should be the Laudon and Laudon book now in its 16th edition (Laudon, 2019). To not appear disrespectful or ignoring the contribution that K. C. Laudon has made to the field, his first book that appeared in 1974 was rather a breakthrough offering what was at that time unexpected, namely a study of the use of computers in government (Laudon, 1974).

However, how seriously can someone consider the case of using a more than 650 pages textbook to students of generation Z that – as we are told 'demonstrate limited attention spans' exhibit a 'tremendous reliance upon technology', 'blur the physical and virtual worlds' – and are often used to 'communicate in symbols and shortcuts' (Cook, 2019)?

---

[a] https://orcid.org/ 0000-0002-9612-1557
[b] https://orcid.org/0000-0001-8183-2906
[c] https://orcid.org/0000-0002-4483-9997
[d] https://orcid.org/0000-0003-2661-7749

Especially for the book of the Laudons, a mistake that the authors made was to consider their textbook as of ephemeral nature, making new editions every now and then. This helps the business, of course, as one may see that there is an incredible amount of 'resources' apart from the book that includes amongst others an Instructor's Resource Manual, a Hands-on MIS Application Data Files, Learning Tracks and Lecture Notes, PowerPoint Presentations and also the Annotated PowerPoint Presentations, a Test Bank, Video Case Instructions and also some 'Blackboard course cartridges'. One may wonder what the lecturer's job will be – possibly to help students cope with all the various resources, while seriously running the risk of replacing the human lecturers with robots or Alexa boxes in the near future.

As mentioned above, young(er) people have learned and are now possibly irreversibly used not to spend much time in reading long texts. They may also not care much about typologies - why bother distinguishing between an executive support system or a decision support system? So all in all we considered that the best thing we could do was to abandon the idea of using a textbook.

2.2 Style Matters

2.2.1 Discussion-based

Our idea was to follow a discussion-based style throughout the entire course. Discussion-based means that the arrangement of the desks in the class shall not be the usual one with the desks set up into straight lines or in a large circle but have no desks at all - the students will thus have no 'defense line' to 'protect' them and help them to not be engaged in the discussions.

We considered that this would also help the lecturer engage better into the discussions with the student as being one of them - with the only additional power to moderate the discussion or choose the subjects to be discussed in the class. But even to this, the idea is that during the course the students shall be able to 'emancipate' themselves and co-structure the course in terms of both content and form. Especially for the seating arrangements we were prepared for the need to explain our decision or possibly also account for our choice. We know that in the academic environment and especially for matters related to pedagogic or didactic aspects, the best is to have a list of academic references to ground one's arguments. To this we can recommend amongst others (Fernandes, 2011), (Gremmen, 2016), (Marx, 1999)

and (Sommer, 1977). As one may see, the idea is not at all new or 'revolutionary' – sometimes less is more.

2.2.2. Empathy

We experience that lots of time is wasted in a course till the students develop a feeling of trust with the lecturer. Sometimes, to keep the class order is as demanding as keeping the world order – or herding cats (O'Hagan, 2000). We considered that the role of empathy would be, under certain circumstances, a catalyst for the success of our experiment.

For the scope of our work, we considered both kinds of empathy in the human experience (Gerace, 2013):

- *Emotional empathy*, also called affective empathy or primitive empathy, as the subjective state resulting from emotional contagion. It is our automatic drive to respond appropriately to another's emotions. This kind of empathy happens automatically, and often unconsciously. It has also been referred to as the vicarious sharing of emotions.
- *Cognitive empathy* as the largely conscious drive to recognise accurately and understand another's emotional state. Sometimes we call this kind of empathy 'perspective taking'.

One may now consider what this has to do with teaching in general and teaching of Business Information Systems. The WEF listed Emotional Intelligence as one of the most important skills employers require from their employees in 2020 (Beckford, 2018).

As people with highly developed Emotional Intelligence have the qualities needed to succeed in our modern workplaces, we consider it as essential to have our students exposed to this experience, offering them the opportunity to acquire such a skill that might prove useful throughout their future professional career. Apart from this, we all recognise that people with highly developed Emotional Intelligence can handle pressure healthily, they understand and cooperate with others, they are good listeners, they are more open to feedback, they are empathetic, they set an example for others to follow and they make more thoughtful and thorough decisions.

2.2.3 Narratives, Storytelling and Social Media

What does storytelling have to do with teaching of Business Information System is a good question to ask. Participation, learning and the construction of knowledge and understanding evolves on multiple

time scales (Lemke, 2000) in communities – and a class is an instance of such a community. Within the class context, every utterance and episode of interaction arises from, draws upon, and is responsive to previous experiences, but also constitutes future situations, and contexts for learning and knowledge construction.

When we study participation over longer stretches of time – as it is the case of an one or two-semester spanning course, what is significant in relation to moment-by-moment interaction is not necessarily relevant in the same way when we examine changing participation in changing practices over several years (Lave & Wenger, 1991). An important question concerns how we take time and temporality into account when examining students' participation. One theoretical solution to this methodological question can be found in the concept of trajectories of participation. In the branches of psychology, a trajectory refers to a path in and across settings which can be identified and described retrospectively, and participation is often combined with trajectories to describe the processes and results of having taken part in activities over time (Rasmussen, 2012; Ludvigsen, Rasmussen, Krange, Moen & Middleton, 2011).

For the case of teaching Business Information System the trajectory is about helping the students build an understanding of what business information systems *actually* are. So it is *not only* about ERPs or CRMs or similar – and it is *not at all* about software. And such a trajectory can take the form of a narrative.

The preoccupation with "narrative" in social and human sciences, beginning from the middle of the twentieth century, can be seen as partaking in a general philosophical reaction against objectivist or positivist philosophies, that saw the relation of the human being to the world in terms of basic correspondences, with sensory input (empiricism) or a priori idealistic constructions (rationalism).

Language — and especially extended discourse — is not just a tool, but also the 'life-world' in which we live and construct our realities (to the role of language we shall elaborate later in the next subsection). Thus for Ricœur (1990), personal identity is essentially the elaboration of a personal narrative of the self and of the other: narratives draw together disparate elements of experience and social positions of the self into a concordant 'plot', with a temporal span. Structuralism, particularly in linguistics, also had a predilection for narrative; such a narrative turn also found its correlates in psychoanalysis (Lacan, 1966; Bettelheim, 1975) — after all, what does the patient on the divan do other than produce a self-narrative? — and in social theory

(Foucault, 1971). In the transition from theory to practice as teaching in itself is about, narrative approaches have been applied in sociology and anthropology in order to elicit broad range of 'voices' of social categories (e.g. in feminist studies; studies of ethnic minorities), with a view to combating inequality (e.g. Hymes, 1996). In organisation science, group narratives of sectors of an organisation have been elicited, as a means of understanding problems with IT integration (Brown, 1998).

Narrative research has also inspired the development of digital tools for their expression and sharing. The term 'Digital Storytelling' refers to the practice of using computer-based tools to tell stories, even by combining several multimedia like photos, audio, video and graphics.

The interest in users storytelling is witnessed also by the initiative of Facebook to create personalized video of each user highlighting the most significant events in their life since joining the social network in the form of lookbacks. A similar project has been developed by Intel (museumofme) that uses Facebook resources (photos, friends, posts) to create a video of users' stories. These initiatives show the way in the evolution of storytelling, but they build the video automatically and do not allow users to choose the events to include in the story.

2.2.4 Role of Language for Student Engagement

As already mentioned, our plan was to free the course from the dependence on a textbook. To this, we aimed to build a repository of 'stories' that had relevance to the area of business information systems. These didn't limit to scientific bibliography or academic literature but, mainly if not primarily, included case studies and opinion articles. For this we have used the open access online archive of the business magazine brand eins (www.brandeins.de), but we encourage the students to build their own resources repositories. This is not a trivial task and forms a tangible outcome for the students as by the end of the course they may have achieved to have designed and operated their own 'business information system' that may vary greatly in the degree of technology employment and in its structure, but may serve the common purpose to support students throughout the semester for all their learning needs.

A first aim for exposing students to read stories is to make them develop an understanding for the field with questions like:

- Why do companies actually need business information systems?

- What should one understand about a business information system (apart from supporting accounting and bookkeeping operations)?
- How is knowledge transferred amongst employees by using the business information system as backbone?
- How can a company build value from its business information system? (Or is it only an 'empty phrase' with no real meaning and if yes, then how can someone make sense out of it and truly build value?)
- Bureaucracy – how much is it supported by the introduction of business information systems? And help get 'cemented' into Bureaucracy 2.0?

The idea from the story-telling part is to extract meaning out of them. Is there something that one should care about before introducing a new information system? Is there something that went wrong in Company X and we should explore more?

One may see here that many textbooks offer plenty of *use cases* or *case studies*. But as we all know, these are most of the times presented in a didactic perspective –like: a company in business sector X and with a corporate profile Y faces problems with delayed production, loss of customers base, an unexpected and unexplainable increase of defect products, etc. and a the introduction of a new business information system, a new module to the existing business information system or an App as extension to a legacy system comes to the rescue. And though we are all aware that the Harvard Business School Cases are world renowned for their extensive and thorough exploration of strategic issues, the question is how these world-renowned cases will be useful to our students?

Stories have to be *personal* and related to the student's personal experience sphere. To our luck, most of our students are also working in parallel to their studies, so they have a plethora of own experiences. Or, alternatively, stories have to be accessible in a form that allows the students to get close to the surrounding environment and the overall context that let it happen. The question is how to organize this unexploited and yet unstructured wealth of information.

It is to this aim that we consider the role of language as essential as the students will be able to reproduce their own experiences and the sense they make out of them in written or spoken form. Once a student may decide for a topic they may then start to specialize on it. To this we may need to elaborate more in the following section by means of presenting our didactic concept.

2.3 About the Didactic Concept

Students need to build, as result of the teaching process, their own individual mental models (Jones, 2011) that reflect the basic notions they were communicated during the course, and how relationships between them were suggested by the tutors. This necessitates from our side the need to define a basic didactic concept that is based on a structure like the one presented in Table 1 below.

We are sure that there are many ways to approach this issue – what was important from our side was to have the flexibility to stay at a level that is preferred by each individual tutor. Some of us prefer to teach higher level content and come up with less abstract or practical concepts, which are then reflected into specific competences that need to be developed by the students, while other tutors prefer to stay at a very practical level. To this we firmly believe what a colleague of us once said: "flight altitude depends on the state of knowledge". The latter relates to the knowledge that exists in general for a field but also to the knowledge 'possessed' by the tutor and the knowledge that is aimed to be communicated and promoted to the students.

Table 1: Example of didactic concepts related to the teaching of business information systems.

Content	Interconnected through concepts	Combined with competences

Below in Tables 2 and 3 we present two content listings planned for a 6-week course structure (a normal undergraduate course takes 14 semester weeks). As it is easy to see, there is a rather wide degree of differentiation between the two of them. However, and as long as the content is tightly coupled with concepts that are reflected into specific competences, the coherence of the teaching process is ensured. This means that we have the opportunity to assess not only the acceptance of a teaching element

Table 2: Example of content related to the teaching of business information systems.

Content
About processes and business process essentials.
Corporate and Organisational Information Management strategies. Typology of BIS systems. Design and implementation issues.
Knowledge Management aspects of BIS usage. BIS and the users / user experience aspects.
BIS economies and BIS economics: costing, pricing, budgeting, financing and valuation aspects.
The corporate BIS as corporate asset and collective intellectual capital.
Culture(s) and future of BIS.

Table 3: Example of alternate content related to the teaching of business information systems.

Content
Implementation failures.
Total system vs modular system implementation; Customization.
Cost budgeting in ERP systems; Intangible and hidden factors.
The value of reengineering; Vendor best practices vs firm competitive advantage.
ERP risk; Installation options and comparative advantages; External sources of ERP.
ERP installation project management; ERP Implementation and maintenance; Training.

by the students, but also to improve it given the state of the art in the field, good practice from other colleagues within our institution or also work together with colleagues in other institutions and countries to co-create value for the particular teaching subject.

2.3.1 A Word on Assessment

The role of the assessment is, as expected, key. Adapting and applying learning practices to new audiences is not as easy or straightforward as it may seem. Sometimes too much is nothing and too little is good. The degree of experience of the tutor does not also guarantee a good learning experience for the students. In this context, assessing, sharing and validating good practices and learning experiences is something that needs to be done in a continuous fashion and with some type of what we call 'seamless collection of data'. This does not need to take the form of formal evaluations that usually take place when it is too late but build on informal exchanges with the students from the start of the course and during the warm-up phases. It is for this reasons that we firmly believe that a discussion-based style for the entire course with a circular arrangement of the desks is important as it promotes a spirit of welcoming the exchange of ideas.

Having in mind the trends towards combining education and entertainment, one may now wonder how much of each these two ingredients should be apparent when teaching business information systems. For example, for the second example in Table 3, the first content item is about 'Implementation failures'. There one may build a rather boring 2-hour course of all possible things that can go wrong during a business information system implementation – or try to find relevant scenes from movies on YouTube and show them during the class. In this case, the students might discuss them together and come up to conclusions that will be co-created during the course. It will be less boring and also more fun. One may, however, only judge the efficacy of the

approach by the individual learning paths that the students will build and follow in the weeks after. To this, short tests that take the form of quizzes can help the students see if they have achieved the expected level of competence. Regarding the latter, we are aware that several institutions use the differentiator, namely a tool to formulate and organise learning goals, offered as a moodle plugin and based on the Differentiator by Ian Byrd, which is based on Bloom's Taxonomy (Anderson, 2000).

3 FOCUS AND LEGACY OF THE COURSE

The focus of such a business information systems course is usually put on the *information system* part – leaving out the term *business* as trivial or self-explanatory. For us it is important to let the students examine in all necessary depth and breadth the notion of a business. Sometimes a business is related to a repeated process: Uber drivers run their business in a similar fashion like conventional taxi drivers do – or not? But sometimes we have to also arrange a business only once and we are done with it: leaving our home to go to a nursing home is also a 'business' – it needs some type of an informal information system to be set up.

With some students we have explored the case of a *diaper information system* – so imagine that you are having your first baby and you have to set up all necessary processes (which we can comfortably call *business processes*) that will let you better plan, program, budget and execute all relevant actions. So one may see that there is no need to consider the case of a multinational company that (apart from torturing the natives and destroying the environment in some exotic country) introduces some plan for controlling their costs – there is the opportunity to study the same aspects also when considering your own *diaper information system* (which no doubt also pollutes the environment).

Teaching business information system doesn't need to be *incomprehensibly* upscaled to something bigger for which the students may have no clue. It can be studied in a smaller scale, letting the students understand the dynamics of some basic notions like the concept of information, how we acquire them and process them and possibly store them in order to be retrievable in the future. How we organize information flows amongst the different units of a company, is the same as how we organize basic

information flows at home with the other family members.

Do we stick to policies at home, like the automated order of toilet paper rolls, when the number of supplies falls below some number? Probably not, as we are relaxed for some aspects. But it is good for a business to not run out of essential supplies (and toilet paper rolls) as they may risk getting out of business. A complicated automotive manufacturers supply chain with several supplier tiers for contractors and subcontractors may seem more exciting to teach – but we all know that a Späti (late night grocery shop) or a 'boring' corner shop may have an equally exciting grid of suppliers. And most probably, as a young professional someone may not be offered a position to re-design the suppliers network of Volkswagen. Teaching our students to find complexity in what appears as simple or trivial is, we think, the highest service we can offer to them for their future careers – there are many people out there in positions that 'run the show' without having any idea about what they are doing. And worst of all: there is little or no hope that they will ever learn.

Learning is a simple process that may be *seriously hindered or even disabled* if people fall victims of the impostor syndrome and develop a persistent internalized fear of being exposed as frauds. The only way they can then manage to not lose their professional face is to pretend and fake complexity because they have never learned the simple basic things that would allow them to develop a clear understanding.

4 COMPUTER-SUPPORTED ASPECTS

One may doubt that teaching like the one we have been describing may not need at all the use of computer support – this is not true. Quite the opposite: there is plenty of space for experimentation and learning assisted with tools that may help the students acquire essential digital skills. Here we only mention two of them and elaborate with some examples:

- balsamiq is a graphical user interface website wireframe builder application. It allows the designer to arrange pre-built widgets using a drag-and-drop editor. It allows students to build relatively easy mockups and prototypes of all possible types of information systems – so even the aforementioned diaper information system. Of course user interface design is not equal to

business information systems, but as we all know, the latter can only communicate with the end users through the user interface.

- basecamp is a web-based project management tool with main features such as to-do lists, milestone management, forum-like messaging, file sharing, and time tracking. Here the idea is not to train our students in the use of basecamp – this is something they may learn in the future when they *actually* need it. What is of importance in the course is to have students experimenting with the need to make the transition from other forms of information organization and flow to some form that brings together several features as parts of an application.

One may see that in work environments people used email in the past to communicate information and exchange files. Then people started using skype for both – and many more use WhatsApp for the same functions. In such a fast-moving field, why not consider that the engineers involved in the design of some components of a new car model should not use Instagram? And follow on Twitter for every communication that may have appeared in the past on a notice board?

The technology fads are one thing – they may come and go – some of them stay with us longer than expected and some others that we thought would stay for ever disappear quickly. What is important for the students to understand is the underlying needs that can help a company create or build value through the supported processes and activities. Below we present the result of a student's project for a quite interesting hypothetical though *not at all* unrealistic scenario: imagine a company that needs to build their own Data Science made easy system. The end users themselves need to define the operations and the user interface. So, it has to look like something that makes sense for the users themselves. The students were able to design the screens on paper – the same as people would have done some fifty or hundred years before, and at any point they felt comfortable they were able to make the transition to use balsamiq. The transition was not easy: balsamiq is very easy but needs time to get familiar with. And the first designs were literally horrible and frustrating.

To achieve a good level of mastering the tool, students needed to spend sometimes more than 40 hours. Not all students had this time – and we considered that teaching the students of business information systems how to use balsamiq would be wrong.
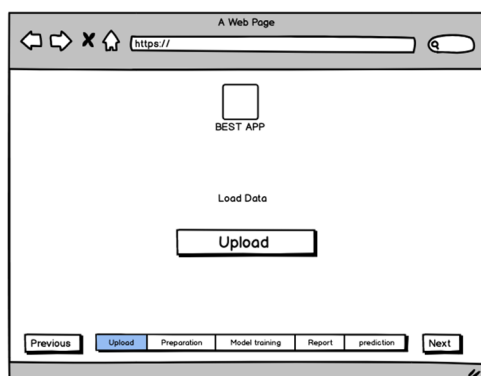
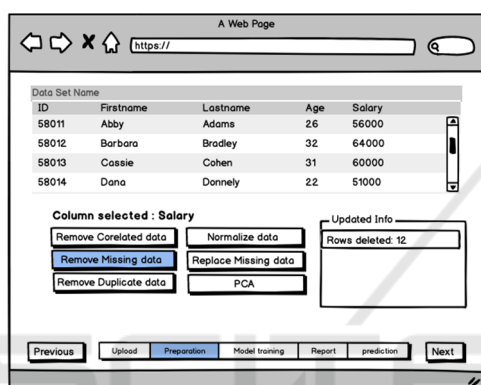Figure 1: The initial screen of the 'Data Science Made Easy' environment.

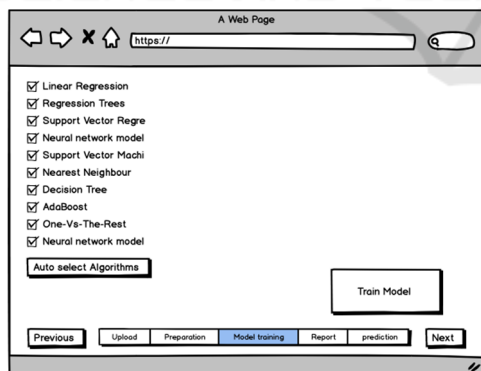Figure 2: What are the meaningful operations to include for the preparation of the data processing tasks?

Figure 3: And how should the model training step take place?

5 DISCUSSION AND CONCLUSIONS

We all know the proverb that says: *give a man a fish and you feed him for a day - teach him how to fish and you feed him for his life time*. This was good but only

for the past times. Apart from the undeserved gender bias that only men were worth to be fed or taught how to fish, nowadays we should rephrase it as follows: *give a person a fish and you feed them for a day - teach them what fishing is about and you feed them for their life time*.

Teaching business information systems – as other courses – may become thrillingly exciting if liberated from the cliché of following what the textbook industry provides us with. There are of course several risks and failure possibilities – but this is not an excuse to use material that has been developed for some other students. Harvard Business School Cases may be world renowned for their extensive and thorough exploration of strategic issues but may be of little or no value to our students. What is important to them is to find a narrative that will allow them to build, during the course lifetime, the necessary levels of self-confidence so that they will be able to interpret needs of their business and professional environments in a sense- and value-making way. Digital skills can be developed sometimes more successfully by using analog means.

Many of us use or have to use moodle for teaching purposes. What we may not know is that Moodle's founder and main developer Martin Dougiamas grew up in the Australian 'outback', the vast, remote interior of Australia, in the late 1970s, and had taken lessons from the School of the Air, giving him from a young age an insight into distance learning. While he may be praised for his achievement and his devotion to the free and open-source software movement, it is a pity to a priori keep distance with students especially when the opportunity to offer a superb teaching and learning experience is so close to us.

As one of our anonymous reviewers mentioned in their review, it is an open issue 'if in academic education we should stop asking students to develop skills on reading long and scientific texts', adding that 'I do not think that students would ever be able to write or think scientifically, if they are not asked to practice reading and understanding such texts (provided a good choice of such texts is made)', and concluding with a remark that 'this might lead to the banality of the absence of thought, to paraphrase Hannah Arendt'. We have also from our side made similar if not the same thoughts and what we see is that there are no easy answers to give. However, there is a need to keep alive a continuous dialogue that will include all sides, so not only the students and the lecturers but also other stakeholders: education policy makers as well as companies and organisations of both the private and the public sector that shall eventually employ our students. Such a dialogue shall

not give any definitive answers – for the future we shall all be ready for continuous experimentation. To this we shall need to develop fast reflexes and change something that doesn't work – but also improve something that already works to work better.

One may possibly wonder how some potentially superficial information from a (non scientific) magazine can offer scientific insight to students. Here we have two things to say: Firstly for those that are not familiar with the brand eins magazine, it needs to be noted that the magazine offers insightful and quite distinctive (to not risk to name them intellectually elitist) views to problems and phenomena of the society, the economy and the business which can initially trigger and continuously enrich the dialogue on the various course topics. Each of its issues is focused on some theme that is then elaborated with essays and analyses. Secondly, the entire idea about not following a textbook orthodoxy for teaching a subject like business information systems is that the subject on its own calls for experimentation and offers all the opportunities to test unexplored waters. In the end same like journalism may better get taught with use of newspapers, business can in a similar fashion be taught by using as content stories from the actual frontline.

ACKNOWLEDGEMENTS

REFERENCES

Anderson L. W., Krathwohl D. R., Airasian P. W., Cruikshank K. A., Mayer R. E., Pintrich P. R., Raths J., Wittrock M. C. (2000) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*, Pearson.

Beckford A. (2018) *The Skills You Need To Succeed In 2020*. Forbes, August 2018, access: 10 February 2020, https://www.forbes.com/sites/ellevate/2018/08/06/the-skills-you-need-to-succeed-in-2020/

Bettelheim, B. (1975) *The Uses of Enchantment: The Meaning and Importance of Fairy Tales*, New York: Vintage Books.

Brown, A.D. (1998) Narrative, politics and legitimacy in an IT implementation. *Journal of Management Studies*, 35(1), 35-58.

Cook V. S. (2019) Generation Z Engaged in the Classroom, WCET Frontiers, accessed: February 3 2020,

https://wcetfrontiers.org/2019/03/06/generation-z-engaged-in-the-classroom/

Fernandes, A. C., Huang, J., & Rinaldo, V. (2011). Does where a student sits really matter? The impact of seating locations on student classroom learning. *International Journal of Applied Educational Studies*, 10(1), 66-77.

Foucault, M. (1974) Die Ordnung des Diskurses: Inauguralvorlesung am Collège de France, 2. Dezember 1970, Hanser, München 1974.

Gerace A., Day A., Casey S., Mohr P. (2013) An exploratory investigation of the process of perspective taking in interpersonal situations. *Journal of Relationships Research*. 4: e6, 1–12.

Gremmen, M. C., van den Berg, Y. H., Segers, E., & Cillessen, A. H. (2016). Considerations for classroom seating arrangements and the role of teacher characteristics and beliefs. *Social Psychology of Education*, 19(4), 749-774.

Hymes, D. (1996) *Ethnography, Linguistics, Narrative Inequality: Toward an Understanding of Voice*, London, Taylor & Francis.

Jones, N. A. et al. (2011) Mental Models: an interdisciplinary synthesis of theory and methods, *Ecology and Society*,16 (1): 46.

Lacan, J. (2006) *Écrits: The First Complete Edition in English*, New York, W.W. Norton & Co.

Laudon K. C. (1974) Computers and Bureaucratic Reform: The Political Functions of Urban Information Systems, John Wiley and Sons, 1974.

Laudon K. C. and Laudon J. P. (2019) Management Information Systems: Managing the Digital Firm, 16th edition, Pearson

Lave, J. & E. Wenger (1991) *Situated learning: Legitimate peripheral participation*. NY: Cambridge University Press.

Lemke, J. L. (2000) Across the Scales of Time: Artifacts, Activities, and Meanings in Ecosocial Systems. *Mind, Culture, and Activity*, 7 (4), 273-290.

Ludvigsen, S., Rasmussen, I., Ingeborg, K., Moen, A. & Middleton, D. (2011) Intersecting trajectories of participation: temporality and learning. In S. Ludvigsen, A. Lund and R. Säljö (Eds). *Learning Across Sites: New tools, infrastructures and practices*, pp. 105-121. London: Pergamon.

Marx, A., Fuhrer, U., & Hartig, T. (1999). Effects of classroom seating arrangements on children's question-asking. *Learning Environments Research*, 2(3), 249-263.

Mintzberg H. (1994) *Rise and Fall of Strategic Planning*, Simon and Schuster.

Moodle (2019) *About Moodle - History*, accessed: February 11 2020, https://docs.moodle.org/38/en/History

O'Hagan J. (2000) *Cat Herders*, accessed: February 3 2020, https://adage.com/videos/eds-cat-herders/897

Rasmussen, Ingvill (2012) Trajectories of participation: temporality and learning, In Norbert M. Seel (ed.), *Encyclopedia of the Sciences of Learning*. Springer. ISBN 978-1-4419-1428-6. Part 20/T. s 3334 - 3337

Ricœur, P. (1992) *Oneself as Another (Soi-même comme un autre*, Chicago, University of Chicago Press.

Sommer, R. (1977). Classroom layout. *Theory into Practice*, 16(3), 174-175.