

BLENDED LEARNING TO ENHANCE DIGITAL AND ENTREPRENEURIAL COMPETENCIES IN SMART EDUCATION

Introduction

Smart technologies and digital transformation are topics charged with emotion, and for all that, filled with opportunities and threats for citizens, corporations and government. Technologies like Artificial Intelligence, 3D-Printing, Augmented/Virtual Reality, Cloud Computing, Robotics have the potential to instrument, interconnect and infuse anything with smart design (Zhu 2016). Education is no exception from that. On the contrary, smart technologies are not only changing the learning environment, but also challenging learning theories and learning objectives. It is the task of the 21st century to enhance digital competencies and the skills needed to design the future, i.e. entrepreneurial competencies. The authors contribute to the development of smart education by discussing a relatively new approach in learning theories called connectivism, introducing the European digital and entrepreneurial competence framework to smart education and discussing key features of smart learning environments.

State of the Art

Using technology for educational purposes is as old as learning is and can be rooted back to ancient times. Generally, ‘smart’ in smart education can be substituted by adjectives like intelligent, personalized and adaptive (Zhu et al. 2016). In terms of designing learning arrangements making use of different approaches one have to think of **smart learning theories and objectives as well as about key features of a learning environment.**

Regarding smart education one has to admit that the classic individual learning theories such as behaviorism, cognitivism or constructivism can not be stretched into the digital era without a hitch. Therefore, the relatively new approach of connectivism (Siemens 2005) picks up the concepts of knowledge networks and

connectivity to explain learning. The main idea of connectivism is that individual learning does not happen isolated but in organizations, communities or networks. More important than the content are so called knowledge pipelines (Siemens 2006). Because the environment is changing constantly, the connection to a network and the flow within has to be serviced. That means for smart education that our ability to learn what we need for tomorrow is more important than what we know today. It is important to recognize when change happens. Connectivism describes learning as a process in an untransparent context of constantly changing elements. Thus, smart education has to focus on the meta-competence of learning to learn.

When it comes to the objectives of smart education digital competencies (DigiComp) and entrepreneurial competencies (EntreComp) are essential.

The DigiComp Framework of the European Commission (Carretero 2018) has five dimensions:

Competence area 1: **Information and data literacy**

- 1.1 Browsing, searching, filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content

Competence area 2: **Communication and collaboration**

- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.3 Engaging in citizenship through digital technologies
- 2.4 Collaborating through digital technologies
- 2.5 Netiquette
- 2.6 Managing digital identity

Competence area 3: **Digital content creation**

- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licences
- 3.4 Programming

Competence area 4: **Safety**

- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment

Competence area 5: **Problem solving**

- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses
- 5.3 Creatively using digital technologies
- 5.4 Identifying digital competence gaps

The EntreComp Framework of the European Commission comprises three dimensions:

Competence area 1: **Ideas and opportunities**

- 1.1 Spotting opportunities
- 1.2 Creativity
- 1.3. Vision
- 1.4 Valuing ideas
- 1.5 Ethical and sustainable thinking

Competence area 2: **Resources**

- 2.1 Self-awareness and self-efficacy
- 2.2 Motivation and perseverance
- 2.3 Mobilizing resources
- 2.4 Financial and economic literacy
- 2.5. Mobilizing others

Competence area 3: **Into action**

- 3.1 Taking the initiative
- 3.2 Planning and management
- 3.3 Coping with uncertainty, ambiguity and risk
- 3.4 Working with others
- 3.5. Learning through experience

As we know from research in marketing science the digital era fuels expectations regarding the user experience (Novak et al. 2000). Thus, smart learning environments have to provide rich, personalized and seamless learning experiences (Spector 2014). Zhu et al. (2016) propose ten key features as following:

1. Location-Aware: Sense learner's location in real time;
2. Context-Aware: Explore different scenarios and information of activity;
3. Socially Aware: Sense social relationship;
4. Interoperability: Set standard between different resource, service and platform;
5. Seamless Connection: Provide continuous service when any device connects;
6. Adaptability: Push learning resource according to learning access, preference and demand;
7. Ubiquitous: Predict learner's demand until express clearly, provide visual and transparent way to access learning resource and service to learner;
8. Whole Record: Record learning path data to mine and analyze deeply, then give reasonable assessment, suggestion and push on-demand service;
9. Natural Interaction: Transfer the senses of multimodal interaction including position and facial expression recognition;
10. High Engagement: Immersing in multidirectional interaction learning experience in technology-rich environment.

Based on connectivism, digital and entrepreneurial competencies, educators have to design the learning experience taking the key features of smart learning environments into account. The following figure shows the variety of designing smart education.

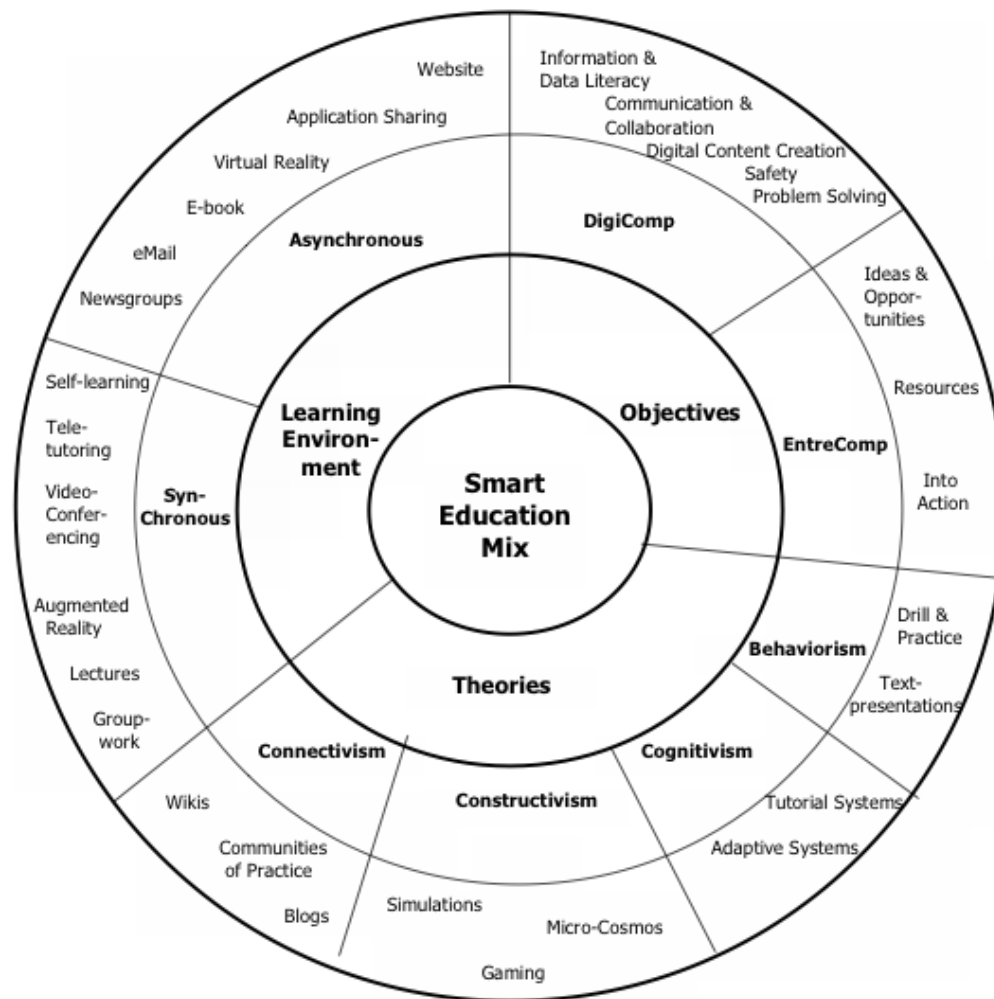


Figure 1: Blended Learning Variety to Design Smart Education (cf. Wiepcke 2006)

Conclusion

As mentioned in the introduction, the application of technology in education is nothing new. Nevertheless, smart technologies are creating new opportunities in global education. The paradigm is to improve learner's learning experience in order to help him or her to life long learning. Smart education is contextual, personalized and seamless learning. Because citizens are confronted with a turbulent, constantly changing world with increasing ambiguity, entrepreneurial competencies are a kind of future skills. Educators have to design blended learning scenarios and need to know and to be capable of handling a great variety of learning arrangements.

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Abstract

The authors contribute to the development of smart education by discussing a relatively new approach in learning theories called connectivism, introducing the European digital and entrepreneurial competence framework to smart education and discussing key features of smart learning environments.

‘Smart’ in smart education is interpreted in the paper as intelligent, personalized and adaptive (Zhu et al. 2016). To design learning arrangements in smart education it is essential to make use of different approaches, take into account **smart learning theories and objectives as well as key features of a learning environment.**

The approach of connectivism (Siemens 2005) picks up the concepts of knowledge networks and connectivity to explain learning. The main idea of connectivism is that individual learning does not happen isolated but in organizations, communities or networks. Since the environment is changing constantly, the connection to a network and the flow within has to be serviced. That means for smart education that our ability to learn what we need for tomorrow is more important than what we know today. Thus, smart education has to focus on the meta-competence of learning to learn.

When it comes to the objectives of smart education digital competencies (DigiComp) and entrepreneurial competencies (EntreComp) are essential. The authors present competence areas of The DigiComp Framework and the EntreComp Framework of the European Commission, key features of smart learning environments. Based on connectivism, digital and entrepreneurial competencies, taking into account the key features of smart learning environments, the authors come up with a figure, displaying a great variety of learning scenarios and arrangements in smart education.

Key words: Smart education, digital competencies, entrepreneurial competencies, connectivism, smart learning environment

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ЗМІШАНЕ НАВЧАННЯ ДЛЯ ВДОСКОНАЛЕННЯ ЦИФРОВИХ КОМПЕТЕНЦІЙ У SMART-ОСВІТІ

Анотація

Автори роблять свій внесок у розвиток теорії smart-освіти, розглядаючи у своєму дослідженні порівняно нове для теорії навчання поняття «коннетивізму», їх робота також знайомить читача із системою Європейських цифрових і підприємницьких компетенцій і з основними ознаками smart-середовища в освіті.

Значення *smart* автори пропонують інтерпретувати як розумний, індивідуалізований, адаптивний. Організація навчальної діяльності в smart-освіті – це комбінація різних підходів із урахуванням теорій і цілей smart-навчання, а також основних ознак навчального середовища.

«Коннетивізм» як підхід ґрунтується на поняттях «мережі знань» і «пов'язаності» в навчанні. Його основна ідея полягає в тому, що індивідуальне навчання не відбувається ізольовано, окремо від інституцій, професійних товариств і мереж. У постійно змінному середовищі приналежність до певної мережі й розвиток усередині мережі – те, чому необхідно приділяти увагу. Це означає, що для smart-навчання здатність навчатися тому, що знадобиться завтра, є важливішою за знання, які людина має сьогодні, отже, воно націлене на формування мета-компетенції – уміння навчатися.

Формування цифрових і підприємницьких компетенцій є також найважливішою метою smart-освіти. Стаття знайомить із системою цифрових і підприємницьких компетенцій, запропонованих Європейською Комісією, а також з основними ознаками smart-середовища в освіті. Ґрунтуючись на принципі «коннективізму», системі цифрових і підприємницьких компетенцій, із урахуванням основних ознак освітнього smart-середовища, авторами запропоновано схему, що демонструє всю різноманітність можливих сценаріїв і способів організації навчання в системі smart-освіти.

Ключові слова: smart-освіта, цифрові компетенції, підприємницькі компетенції, smart-середовище в освіті.