The impact of constructivist and cognitive distance instructional design on the learner’s creativity

Mahnaz Fatemi Aqda a, *, Farideh Hamidi b, Farhad Ghorbandordinejad c

a MA in Instructional Technology, Department of Education
b Assistant Professor of Psychology, Department of Education
c Assistant Professor of English Language, Department of Language. P.O. Box 167855-163, Tehran-Iran

Shahid Rajaei Teacher Training University P.O. Box 167855-163, Tehran, Iran

Abstract

Creativity is at the heart of the 21st century educational work. Learner’s creativity or learner’s creative thinking skills are among the most important skills they need to be prepared for the knowledge society. The rapid development of technology in the modern era sheds light on the place and importance of creativity in education. Technology also has brought change in the way the students learn (collaboration strategy) and recently the computer-based instruction associated with electrical technologies has been a popular way of instruction that learning is no longer confined to classrooms (distance learning). Also in the case of the students if they want to take effective advantage of technology, they have to use the constructivist and cognitive skills (psychological learning theory). Recently education experts have tried to show how a distance instructional can be designed. The main question of this paper is what effects the distance instructional design based on the views of constructivism and cognitivism have on the learners’ creativity. The definition of distance education (e-learning), the instruction design based on constructivist view and its function in education and distance learning (e-learning), the instruction design based on cognitive view and its function in education and distance learning (e-learning), the factors affecting the creativity development and accommodation (comparison) the characteristics of the instructional context, and the impact of the appropriate learning on the creativity development according to these settings are among the other main points of this review.

Keywords: Instructional Design, Distance Education, E-learning, Creativity, Cognitivism, Constructivism

1. Introduction

The field of creativity as it exists today emerged largely as a result of the pioneering efforts of J. P. Guilford[1] and E. Paul Torrance[2]. It is wholly fitting to dedicate a special issue of the Creativity Research Journal to Torrance because of his seminal contributions to thinking about creativity. To this day, the Torrance Tests of Creative Thinking[2] remain the most widely used assessments of creative.

Although creativity - creative thinking - is considered as a key competency for the 21st century, it is not confined to the modern time. It is said that in the ancient world, Plato discussed society’s need for creative people in his Ion, and suggested ways of fostering their development[3]. Nowadays creativity has been viewed as the ultimate economic resource[4] and as essential for addressing complex individual and societal issues[5][6]
2. Creativity

Generally, creativity is defined as the ability to offer new perspectives, generate novel and meaningful ideas, raise new questions, and come up with solutions to ill-defined problems[7][8][9]. Also Guilford[10] defined creativity as divergent thinking. Divergent thinking involves production of ideas from given information, with an emphasis on variety and quantity of output, divergent thinking encompasses several forms of creative thought, including the generation of ideas, the divergence from typical answers, the improvements to ideas. In fact, creativity is a mental activity performed in situations where there is no prior correct solution or answer[11].

3. Creativity components

Sternberg and Lubart[12] argued that there are six main elements that converge to form creativity: intelligence, knowledge, thinking styles, personality, motivation, and the environment. According to the theory, three aspects of intelligence are key for creativity: synthetic, analytical, and practical abilities. Eleni Sefertzi[13] believes creativity is not an innate quality of only a few selected people. Creativity is present in everyone. It can be learned, practised and developed by the use of proven techniques which, enhancing and stimulating the creative abilities, ideas and creative results.

In another attempt Sternberg[14][15] and Sternberg and Lubart[9] showed that creative work consists of the application and melding of three types of thinking, all of which they contend can be learned or enhanced. They feel that creativity is a balance between these three forms of thinking: synthetic ability includes divergent thinking as it is the ability to think of or generate new, novel, and interesting ideas. But it is also the ability to spontaneously make connections between ideas, or groups of things. Analytical ability includes the ability to think convergently in that it requires critical thinking and appraisal as one analyzes and evaluates thoughts, ideas, and possible solutions. This type of thinking is key in the domain of creative work because not all ideas are good ones, some need to be culled. Creative people use this type of thinking to consider implications and project possible responses, problems, and outcomes. Commonly we think of this ability as "critical thinking" at its best. Practical ability includes the ability to use practical thinking. This is the ability to translate abstractions and theories into realistic applications. It is the skill to sell or communicate one's ideas to others, to make others believe that ideas, works, or products are valuable, different, useful, innovative, unusual, or worthy of consideration. The following creative activities help the students to explore all aspects of their intelligence.

<table>
<thead>
<tr>
<th>analytical ability</th>
<th>creative ability</th>
<th>practical ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>to analyze</td>
<td>to create</td>
<td>to apply</td>
</tr>
<tr>
<td>to critique</td>
<td>to invent</td>
<td>to use</td>
</tr>
<tr>
<td>to judge</td>
<td>to discover</td>
<td>to put into practice</td>
</tr>
<tr>
<td>to compare/contrast</td>
<td>to imagine if ...</td>
<td>to implement</td>
</tr>
<tr>
<td>to evaluate</td>
<td>to suppose that ...</td>
<td>to employ</td>
</tr>
<tr>
<td>to assess</td>
<td>to predict</td>
<td>to render</td>
</tr>
</tbody>
</table>

Figure No. 1: Creative Abilities

The above creative activities and skills are necessary for the learners to explore all aspects of their intelligence. So an appropriate instructional design in advance education needs addressing these activities and skills.

Instructional design

When planning an instructional design, the following procedures[16] can improve creativity: building creativity objectives into your subject-specific objectives; looking for opportunities to promote creativity in your existing schemes of work and lesson plans, and devising activities that are personally and culturally authentic based on the pupils’ interests and experiences.

Plan for a range of teaching and learning styles so that as many pupils as possible have the opportunity to show their creativity. Role play can increase pupils’ imaginative engagement and give them freedom to explore ideas. Hands-on experimentation, problem solving, discussion and collaborative work all provide excellent opportunities for creative thinking and behaviour.

4. Distance education

Distance education researchers, especially in America[17][18][19][20][21], have claimed that distance education requires specific instructional design strategies, interactions, and skills, which can fit the particular characteristics of distance learning programs and courses. In addition to these strategies and skills, some researchers claim that a theoretical instructional design base is essential. For instance, McIsaac and Koymen[22] stated that, "there is a need
for a theoretical base for teaching effectively in distance education to help the educational developer and instructional designer” (p. 247). In the same sense Moore and Thompson stated that it must be understood that distance education is much more than simply adding a new communications technology to an existing educational organization. Major pedagogical, instructional, and philosophical implications result from the learner or learners being more or less permanently separated from the teacher[23]. Instructional design in the field of distance education provides a process and framework for systematically planning, developing, and adapting instruction based on identifiable learner needs and content requirements. This process is essential in distance education, where the instructor and students may share limited common background and typically have minimal face-to-face contact[24]. The diverse instructional design models used in distance education are built around the main components and variables of the instructional process itself, such as (a) instructional analysis; (b) identification of learning objectives and goals; (c) analysis of instructional content; (d) selection and implementation of instructional strategies and delivery; (e) selection of learning materials; (f) instructional management; and (g) evaluation and assessment[25]. Although different instructional design models used these components in varying ways, all of these models match the basic set of constituents of instructional design, which are conditions, methods, and outcomes[26].

Besides these central instructional design constituents some authors[27][17] observed that instructional design in distance education deals also with other important key elements, such as instructor interactions, communication skills, and learning principles for the design of distance learning programs and courses.

There is a third dimension is the instructor's paradigmatic approach (e.g., Behaviorist, Constructivist, or Critical Theory), which also affect how interaction and design influence instruction at a distance. These paradigmatic approaches have major consequences for instructional design and learner outcomes, and they "serve as conceptual and communication tools for analyzing, designing, creating, and evaluating, ranging from broad educational environments to narrow training applications"[28]. Therefore, in distance education, the different instructional design models are influenced by diverse factors (e.g., instructional design components, instructors' strategies, and educational paradigmatic approaches) which determine the amount and quality of interaction and instruction between instructors and their distant learners.

Distance learning provides a unique context in which to infuse constructivist principles where learners are expected to function as self-motivated, self-directed, interactive, collaborative participants in their learning experiences by virtue of their physical location.

5. Constructivism and Instructional Design

Bednar et al.[29]. (1992) suggests that instructional design and development must be based upon some theory of learning and/or cognition; effective design is possible only if the developer has developed reflexive awareness of the theoretical basis underlying the design. And Lebow[30] (1993) talks about the shift in values when one takes a constructive perspective. He notes that “Traditional educational technology values of replicability, reliability, communication, and control[31] contrast sharply with the seven primary constructivist values of collaboration, personal autonomy, generatively, reflectivity, active engagement, personal relevance, and pluralism.”

According to the constructivist views of learning, as individuals bring different background knowledge, experience, and interests to the learning situation, they make unique connections in building their knowledge. Students and teachers both play a role in facilitating and generating knowledge. Students are encouraged to question each other’s understanding and explain their own perspectives. These opportunities help hand over responsibility for knowledge generation to the learners[32]. Further, constructivism encourages active, rather than passive learning and the use of group-based cooperative learning activities, which can be best mediated through telecommunication technologies.

Such constructivist views of learning correlate nicely with the philosophy of open and distance learning. If learning truly depends on the unique base of experience and knowledge brought to the learning environment by the learner, the learner then certainly should play a role in determining the learning goals, strategies, and methods for building on his or her base of knowledge and understanding. The autonomy called for by open and distance learning advocates is reflected in the constructivist views to encourage active, collaborative and responsible learners.

Second, distance education should exploit further the potentials and capabilities of information technologies to foster two-way, interactive communication and collaboration between the instructor and learners and among the learners themselves. Jonassen et al.[33]. believe that a constructivist approach to knowledge construction and learning can be well supported in distance education settings through a variety of technologies. Technology-supported environments - computer-mediated communication, computer-supported collaborative work, case-based
learning environments, and computer-based cognitive tools, for example - can offer the field of distance education alternative approaches to facilitating learning. These constructivist environments and tools can replace the deterministic teacher-controlled model of distance instruction with contextualized work environments, thinking tools, and conversation media that support the knowledge constructions process in different settings.

Duffy and Jonassen[34] (1992) began defining characteristics of constructivistic instructional design by clarifying the contrasting instructional paradigm assumptions of paradigms between traditional learning and constructivist learning environments. Using the tenants of symbolic reasoning and situated learning, they compared six mental processes: 1) knowledge acquisition; 2) learning process; 3) memory configuration; 4) knowledge representation; 5) instruction processes; and 6) the computational model. After studying student responses to initial distance education offerings in two courses, Driscoll[35] (1994) also defined five constructivist characteristics that should form the pedagogical foundation for designing learning.

1. Provide complex learning environments that incorporate authentic activity.
2. Provide for social negotiation as an integral part of learning.
3. Juxtapose instructional content and include multiple modes of representation.
5. Emphasize student-centered instruction.

Jonassen[36] suggests that in order for technology (distance education) to accommodate constructivistic assumptions, changes in instructional design practices would have to occur. Some of these changes would include:

- Instructional goals and objectives would be negotiated, not imposed.
- Task and content analysis would focus less on identifying and prescribing a single, best sequence for learning.
- The goal of the systems design process would be less concerned with prescribing specific instructional strategies necessary to lead learners to specific learning behaviors.
- Evaluation of learning would become less criterion-referenced.

Conclusion

In this study we review the performed research projects in the field of the effectiveness of educational design in distance education based on the views of cognitivism and constructivism on the learners’ creativity. We can say that creativity involves the generation of new ideas or the recombination of known elements into something new, providing valuable solutions to a problem. Cognitivism supports the practice of analyzing a task and breaking it down into manageable chunks, establishing objectives, and measuring performance based on those objectives. Constructivism, on the other hand, promotes a more open-ended learning experience where the methods and results of learning are not easily measured and may not be the same for each learner.

The learning environment should provide the learner with opportunities to test and try out his new conceptual understanding in various applied circumstances like problem solving[37][38]. The guiding principle of constructivist learning theories is the learner’s own active initiative and control in learning, and personal knowledge construction, i.e. the self-regulation of learning. The student does not passively take in knowledge, but actively constructs it on the basis of his/her prior knowledge and experiences (30). Constructivism might be broad learning theory because it is synthesized with multiple theories into a single form. Thus it is evident that the method of instruction using technology can be applied with various approaches.

References

25. The American Journal of Distance Education, 8(2), 30-42. Kodali, S. Instructional strategies used to design and deliver courses online (1998).
37. David Chan, The Role of ICT in a Constructivist Approach To the Teaching of Thinking Skills, Director, School of Information & Communications Technology, Ngee Ann Polytechnic.
38. When Teaching Meets Learning: Design Principles and Strategies for Web-based Learning Environments that Support Knowledge Construction, Ron Oliver, School of Communications and Multimedia, Edith Cowan University, AUSTRALIA r.oliver@cowan.edu.au