SCAFFOLDING IN CONNECTIVIST MOBILE LEARNING ENVIRONMENT

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ABSTRACT

Social networks and mobile technologies are transforming learning ecology. In this changing learning environment, we find a variety of new learner needs. The aim of this study is to investigate how to provide scaffolding to the learners in connectivist mobile learning environment:

- **to learn in a networked environment,**
- **to manage their networked learning process,**
- **to interact in a networked society, and**
- **to use the tools belonging to the network society.**

The researcher described how Vygotsky's "scaffolding" concept, Berge's "learner support" strategies, and Siemens' "connectivism" approach can be used together to satisfy mobile learners' needs. A connectivist mobile learning environment was designed for the research, and the research was executed as a mixed-method study. Data collection tools were Facebook wall entries, personal messages, chat records; Twitter, Diigo, blog entries; emails, mobile learning management system statistics, perceived learning survey and demographic information survey. Results showed that there were four major aspects of scaffolding in connectivist mobile learning environment as type of it, provider of it, and timing of it and strategies of it. Participants preferred mostly social scaffolding, and then preferred respectively, managerial, instructional and technical scaffolding. Social scaffolding was mostly provided by peers, and managerial scaffolding was mostly provided by instructor. Use of mobile devices increased the learner motivation and interest. Some participants stated that learning was more permanent by using mobile technologies. Social networks and mobile technologies made it easier to manage the learning process and expressed a positive impact on perceived learning.

Keywords: **Connectivism, mobile learning, scaffolding.**

INTRODUCTION

A New Learning Paradigm: Connectivism

The theories of behaviorism, cognitivism, and constructivism provide an effect view of learning in many environments. However, learning moves into an informal, networked, technology-enabled arena (Kesim & Ozan, 2010). Connectivism is a learning theory for the digital age (Siemens, 2005).

According to Siemens (2006), learning is a process of connecting specialized nodes or information sources and a learner can exponentially improve their own learning by plugging into an existing network. Some of the main principles of connectivism (Siemens, 2006):

- **Learning happens in many different ways, courses are not the primary for learning;**
- **Learning (in the sense that something is known, but not necessarily actuated) can rest in a community, a network, or a database;**
- **Currency (accurate, up-to-date knowledge) is the intent of all connectivists learning.**
- **Learning is a knowledge creation process not only knowledge consumption, learning tools and design methodologies should seek to capitalize on this trait of learning.**
- **Personal Learning Environments (PLEs) and Open Network Learning Environments (ONLEs) are new enablers of connectivist learning.**

According to Tu, Blocher, & Roberts (2008), PLEs are the new technologies enable individuals to personalize the environment in which they learn, by connecting and managing learning network and appropriating a range of tools to meet their learning interests and needs.

To afford learners to build PLEs, Open Network Learning Environments (ONLEs) must be established rather than LMS. ONLEs are digital environments that permit learners the opportunity to participate in creative endeavors, conduct social networking, organize/reorganize social contents, and manage social acts by connecting people, resources, and tools through integrating Web 2.0 tools.

A New Learning Platform: Mobile technologies

Today mobile technologies and mobile content have become an integral part of the learning activities; opportunities are emerging for learners, teachers and institutions from the increasing availability of low-cost mobile and wireless devices.

Some of the opportunities that mobile learning provides are listed as follows (Yamamoto Telli , Ozan, & Demiray, 2010):

- **Because mobile learning is highly situated, personal and collaborative, it will be truly learner-centered environment in long term.**
- **Mobile learning can be used to encourage both independent and collaborative learning experiences.**
- **Mobile learning can help learners to identify areas where they need assistance and support.**

New Learning Environment: Connectivist mobile learning

Connectivist mobile learning environment covers mobile content and learning management systems, blog platform apps, social bookmark apps, picture apps, social video and audio apps, mobile versions of wikis, event and document apps, aggregation apps, location-based applications, professional networks, friend and community networks, short message service (SMS), voice and email messaging through mobile technologies and mobile augmented reality (Ozan & Kesim, 2013) as shown in Figure: 1.

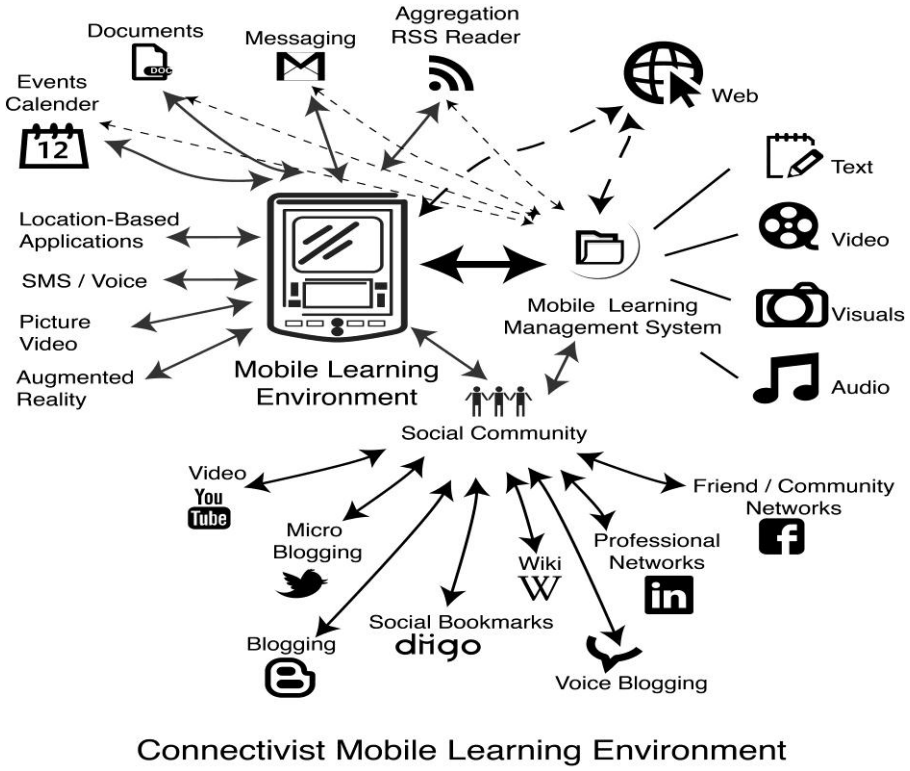

Figure: 1
Connectivist mobile learning environment, (Ozan & Kesim, 2013)

New Learner Needs

In this changing learning environment learning support is changing as well. Since the learning environment has become mobile, social and networked, the methodology of helping learners is changing shell and it is becoming mobile, social and networked, too. Emerging learner needs can listed as follows: How to learn in a networked environment, how to manage networked learning process, how to interact and exist in a networked society, and how to use the tools belonging to the network society.

PURPOSE OF THE STUDY

This study investigated the use of connectivist mobile learning environment in scaffolding for learners:

- **to learn in a networked environment,**
- **to manage their networked learning process,**
- **to interact in a networked society, and**
- **to use the tools belonging to the network society.**

The following research questions guided this study:

- **What are the learner preferences for mobile connectivist scaffolding?**
- **What do learners think about mobile learning?**

METHODOLOGY

Theoretical Background

The author of this article believes that Vygotsky's "scaffolding" concept, Berge's "learner support" strategies, and Siemens' (2005) "connectivism" approach can be used together to satisfy connectivist mobile learners' needs (Ozan & Kesim, 2013) Vygotsky's (1978) "scaffolding" concept tells us how we can provide just-for-me and just-enough help and guidance to learners in a social context. Berge's (1995) "learner support" strategies help us understand always-connected mobile learners' needs. Siemens' "connectivism" approach provides us the context of a new learning paradigm, and the connectivist mobile platforms allow us instant communication and enable just in time learner support.

Therefore, theoretical framework of the study was developed by using three approaches together as shown in Figure: *2*.

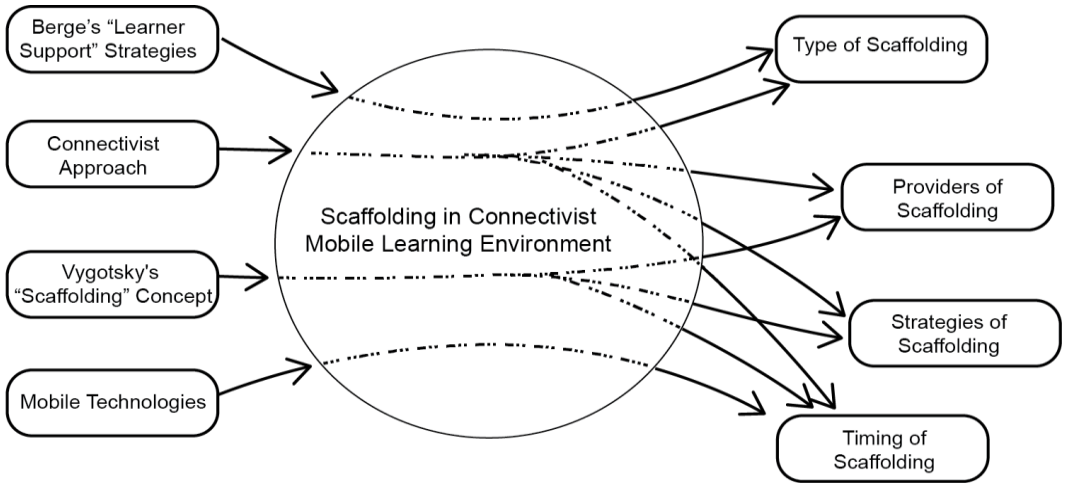

Figure: 2
Theoretical Background

There are four types of scaffolding in this study: Instructional, social, technical and managerial. The aim of instructional scaffolding is to help students to learn in a network. Social scaffolding aims to help students to promote human relationships and work together. Technical scaffolding aims to ensure students' comfort and ease in using the system. Managerial scaffolding aims to help students to manage their own learning in connected environment. Provider of scaffolding refers to someone, who has a better understanding or a higher ability level than the learner with respect to a particular task, or a course material, which includes solutions for predefined problems such as FAQ. In this study scaffolding providers are instructor, peer, and course materials. Scaffolding strategies are methods or techniques for providing scaffolding such as direct instruction, pushing to explore, encouraging reflection and cognitive explanation, making suggestions, notifying, reminding, giving feedback, motivating. The aim of the strategies is to facilitate learning process. Timing of scaffolding should be instant according to Vygotsky (1978). In this study, mobile platforms were used to provide instant communication and scaffolding. However, scaffolding was sometimes provided with a delay because of connection problems.

Research Design

The research was executed as a mixed-method study incorporating with holistic single-case study and descriptive statistics. The research was conducted in *Educational Graphics and Animation* course. iPod Touch was given to each participant during the research.

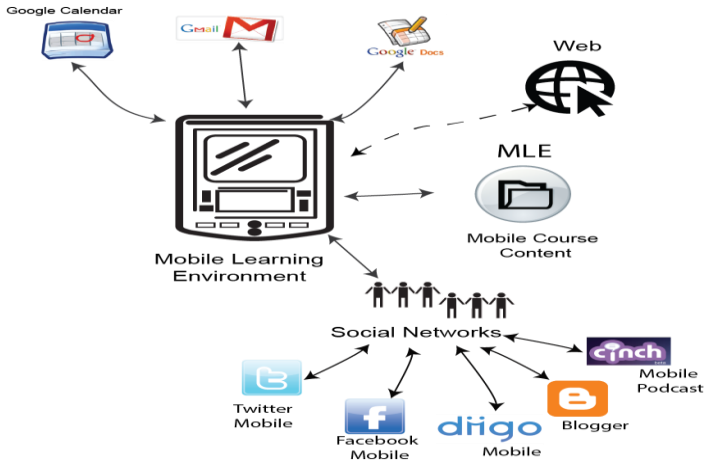

Figure: 3
Mobile connectivist learning environment which was designed for the research

A connectivist mobile learning environment, which is shown in Figure 3, was designed for the research to provide mobile connectivist scaffolding via iPod Touch. Facebook, Twitter, Diigo, Cinch, Google Docs, Google Calendar and mobile learning management system were used to provide scaffolding for the course through mobile technologies. Facebook and Diigo grups, a twitter account, a Google Calender and a Cinch account were created for the course. Course content delivered through both mobile learning management system and Google Docs.

Participants

The study was carried out during the spring semester of 2010-2011 academic year, 14 weeks, with a population of 48 sophomore students enrolled in *Educational Graphics and Animation* course of Department of Computer Education and Instructional Technology in a state university in Turkey. 45.83% (22) of participants were male, 54.16% (26) of participants were female.

Data Sources

In view of descriptive and interpretive nature of the case, both qualitative and quantitative data were collected. Multiple and different sources of data were used in order to provide corroborating evidence (Glesne & Peshkin, 1992; Lincoln & Guba, 1985; Merriam, 1988; Miles & Huberman, 1994). Data collected through Facebook wall entries, personal messages, chat records; Twitter, Diigo, blog entries; emails, mobile learning management system statistics, demographic information survey, semi-structured interviews, and a Likert type survey was used for the assessment of survey respondents' perceived learning. Individual items in Likert's type survey had seven response alternatives from 1 to 7. 1 means the tools, which was used to provide scaffolding, was not helpful for learning; 7 means the tool, which was used to provide scaffolding, was very helpful for learning.

Data Analysis

Descriptive statistics and content analysis were used in the analysis of the data obtained. Content analysis was conducted by utilizing Atlas.ti 7. SPSS software was used for descriptive statistics.

Content analysis includes 819 posts on Facebook wall of the course group, 2 chats between instructor and learners, 15 personal Facebook messages from learners to instructor, 108 Twitter entries, 133 blog entries, 19 Diigo entries, 6 Google Calendar events, 25 e-mails from learners to instructor.

Descriptive statistics was used for analyzing the data gathered through mobile learning management system statistics, demographic information survey, and perceived learning survey.

RESULTS

41 (85.42 %) of the participants used Facebook group of the course, 21 (43.75 %) students followed Twitter account of the course, 10 (20.83%) of the participants used Diigo group of the course. Cinch was not preferred since Turkish language option is not available.

All of the participants used Google Docs and Google Calendar. 27 (56.25%) of participants made blog entries.59 files shared via Google Docs. 17 (35.42%) of participants used mobile learning management system.

Learner Preferences for Mobile Connectivist Scaffolding

As seen from the

, the majority of the postings were related to the need for social scaffolding, followed by instructional, managerial, and technical scaffolding. The analysis of postings reflected that mobile connectivist scaffolding was mostly provided by peers (52.65%), followed by instructor (44.16%) and course material (3.19%).

Table: 1 Mobile connectivist (M.C.) scaffolding type according to its provider

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M.C. Scaffolding Provider / M. C. Scaffolding Type	Peer		Instructor		Course Material	
	N	%	n	%	n	%
Instructional	117	19.66	129	25.85	21	58.33
Social	259	43.53	112	22.44	0	0.00
Technical	82	13.78	78	15.63	6	16.67
Managerial	z137	23.03	180	36.07	9	25.00
Total	595	100.00	499	100.00	36	100.00

tabulated results in Table 2 summarize scaffolding strategies used in mobile connectivist learning environment by peers and instructor during active participation. Mostly used strategy for instructional scaffolding was "Asking for help or explanation" (21.59%). "Giving feedback" was mostly used strategy for social (70.23%), technical (33.14%), and managerial (31.73) scaffolding.

Table: 2
Mobile connectivist scaffolding strategies according to its type

M. C. Scaffolding Type / M. C. Scaffolding Strategies	Instructional		Social		Technical		Managerial	
	n	%	n	%	n	%	n	%
Asking for help or explanation	65	21.59	2	0.51	30	17.14	52	15.57
Direct Instruction	35	11.63	0	0.00	13	7.43	0	0.00
Pushing to explore								
Provide resources	59	19.60	1	0.25	6	3.43	2	0.60
Refer to course material	7	2.34	0	0.00	0	0.00	1	0.30
Sharing good examples	11	3.65	3	0.76	0	0.00	2	0.60
Sharing innovations	0	0.00	1	0.25	10	5.71	0	0.00
aging								
Reflection	5	1.66	9	2.29	19	10.86	14	4.19
Cognitive explanation	17	5.65	3	0.76	4	2.29	5	1.50
Making suggestions	28	9.30	4	1.02	11	6.29	19	5.69
Notifying	2	0.67	0	0.00	12	6.86	94	28.14
Reminding	5	1.66	0	0.00	0	0.00	22	6.59
Collaboration	11	3.65	1	0.25	3	1.71	0	0.00
Giving feedback	46	15.28	276	70.23	58	33.14	106	31.73
Group communication and sharing	0	0.00	73	18.58	1	0.57	1	0.30
Discussions	2	0.66	18	4.58	7	4.00	13	3.89
Motivating	8	2.66	2	0.52	1	0.57	3	0.90
Total	301	100.00	393	100.00	175	100.00	334	100.00

As shown in the Table: 3, most frequently used social network was Facebook, followed by Twitter, Google Calendar and Diigo. Facebook mostly used for social scaffolding, Twitter and Google Calendar mostly preferred for managerial scaffolding, Diigo mostly used for instructional scaffolding.

Table: 3
Social media use according to mobile connectivist scaffolding type

Used social network / M.C. Scaffolding Type	Facebook		Twitter		Google Calendar		Diigo	
	n	%	n	%	n	%	n	%
Instructional	149	18.2	25	23.1	0	0	16	84.2
Social	317	38.7	34	31.5	0	0	0	0
Technical	120	14.7	8	7.4	0	0	1	5.3
Managerial	233	28.4	41	38	6	100	2	10.5
Total	819	100	108	100	6	100	19	100

According to 7 point likert type Perceived Learning survey results, Table 4, a majority of the participants found Facebook, Google Docs, iPod Touch and Mobile Learning Management System (MLMS) helpful to learn.

In the survey 1 means the tool, which was used to provide scaffolding, was not helpful for learning; 7 means the tool, which was used to provide scaffolding, was very helpful for learning.

Twitter and Diigo were not found helpful to learn as scaffolding tools, since Twitter has 140 character limitations and Diigo doesn't have Turkish language support.

Table: 4
Perceived learning survey results

		Facebook	Google Docs	iPod Touch	MLMS	Google Calendar	Cell Phone	Twitter	Diigo
N	Valid	48	48	48	48	48	48	48	48
Mean		5.88	5.79	5.29	4.13	3.56	3.46	2.96	1.92
Std. Deviation		1.645	1.650	1.487	1.886	2.211	2.000	1.967	1.397
Variance		2.707	2.722	2.211	3.559	4.890	3.998	3.871	1.950

Learners' Thoughts on Mobile Learning

The question "How do you define mobile learning" was asked to participants at interviews. As shown in Table: 5, most frequently made definition for mobile learning was "Using mobile devices for learning", followed by "Place independent learning".

Table: 5
Mobile learning definitions of participants

	Freq.	%
Using mobile devices for learning	11	35.48
Place independent learning	9	29.03
Learning independent learning	7	22.58
Social learning	2	6.45
Part of distance education	1	3.23
Next generation learning	1	3.23
Total	31	100.00

As shown in Table 6, a majority of the participants (65.39%) stated that mobile technologies had positive effect on learning performance.

Table: 6
Participants' thoughts about effects of mobile technologies on learner performance

	Freq.	%
Mobile technologies had positive effect on learning performance because		
It provided instant and fast access to information	12	23.08
It increased motivation and participation	6	11.54
It provided permanent learning	3	5.77
It facilitated to manage learning process	3	5.77
It provided instant access to social networks	3	5.77
It improved communication among peers	3	5.77
It provide opportunity to carry the learning materials with me	2	3.85
It provided instant communication with instructor	1	1.92
It improved our design vision	1	1.92
Mobile technologies had negative effect on learning performance because		
It is distracting and time consuming	8	15.38
Mobile technologies had no effect on learning performance because	10	19.23
Total	52	100.00

Participants developed an emotional attachment to mobile devices during the research. This was an unexpected result.

Table: 7
Participants' Statements about emotional aspect of their mobile learning experience

	Freq	%
Checking iPod touch becomes a twitch	16	17.20
I'm addicted to my iPod touch!	14	15.05
IPod touch is my friend(to overcome the feeling of loneliness perceive iPod as a friend)	4	4.30
Deprivation statements		
I feel deprived when I don't have my IPod touch with me.		
deprived of time independent information access	9	9.68
deprived of space independent information access	8	8.60
deprived of using a prestigious product	4	4.30
deprived of entertainment (games, music, etc.)	5	5.38
deprived of effective time management	1	1.08
deprived of ease of use	7	7.53
Emotional connection statements		
I miss it	5	5.38
I love it very much	3	3.23
I feel happy when I receive it*	5	5.38
I feel sad when I return it*	12	12.90
Total	93	100.00

* Participants used iPod Touch devices for duration of 14 weeks.
After the research was completed, they returned the devices.

As shown in .

***Table: 77*, Participants stated that mobile technologies (iPod Touch in the study) created a kind of twitch and addiction; they felt they should check it frequently, feel deprived when they don't have the iPod Touch with them, and they perceive the mobile device as a friend.**

CONCLUSION

Findings of the research summarized in Figure 4. According to the findings of the study, learning has changed over the last several decades. Learning moves into an informal, networked, technology-enabled arena. As a consequence of this, learner needs have changed.

Vygotsky's scaffolding, which depends on socio-cultural psychology, within the light of Siemen's connectivism approach and Berge's categorization of learner needs provides us a new point of view about how we should support learners in this networked and mobile environment. Learning in a network, managing learning process in a network, interacting in a network and using tools belonging to networked society are new skills that individuals should have in 21st century. These new skill set reveals new learner needs and requires new approaches to provide scaffolding for learning. Therefore, in this study learning environment re-designed according to emerging learner needs. Researcher created networks to keep learners current in their field. In addition the researcher provided instant and continuous access to information, mobile access to course content and access to resources from learners' Personal Networked Environment. The basic scaffolding strategies, which came forward during the research, were as follows:

- **Increase access to resources**
- **Sent brief information and notifications to learners to keep them focused at work**
- **Provide feedback when learners need**
- **Encourage to reflect, ask questions, and sharing**
- **Strength the communication and interaction among learners**
- **Provide opportunities for self-evaluation and peer evaluation**

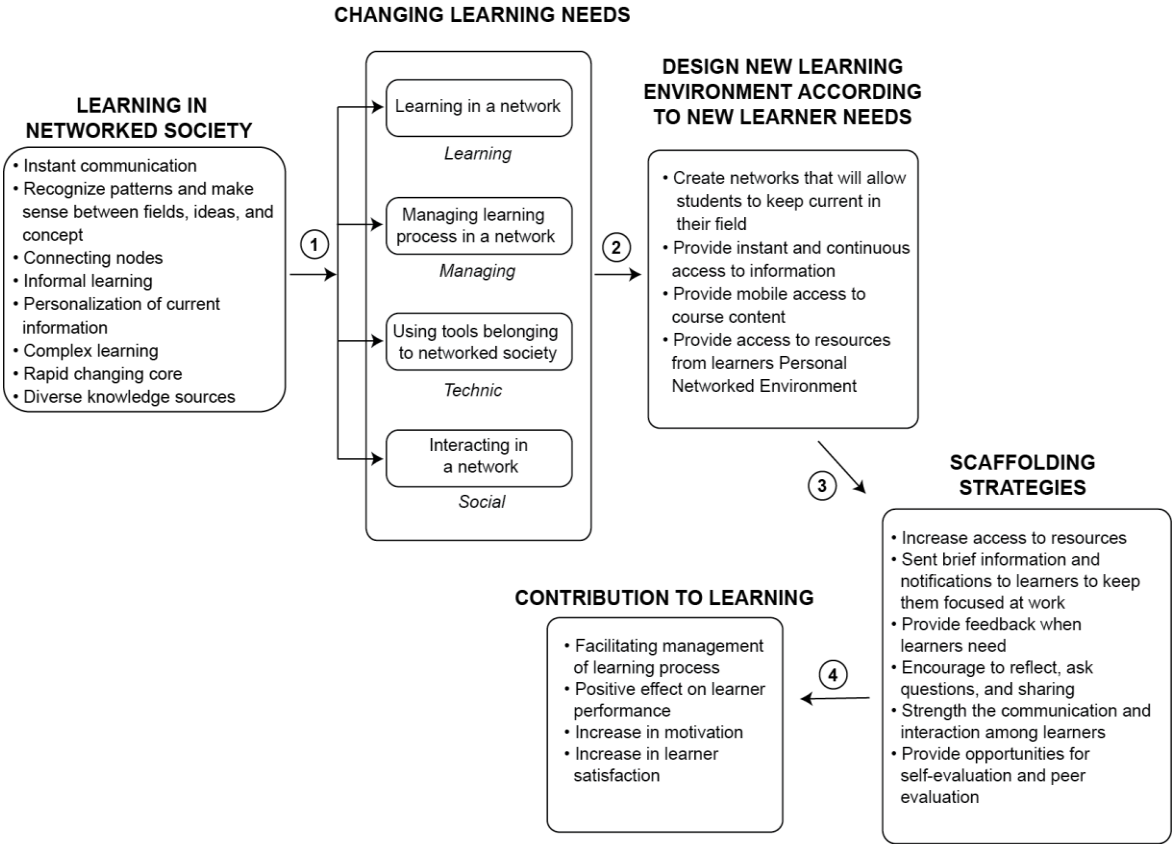

Figure: 4
Research results

Mobile connectivist scaffolding used in this research increased learners' motivation and satisfaction, facilitated management of learning process and made positive effect on learners' performance.

In this study, generally, participants had positive perceptions toward the mobile connectivist scaffolding activities that support them and allowed them to share their knowledge in authentic contexts.

The students also indicated that the knowledge shared by their peers to support each other via mobile apps inspired their work and provide permanent learning. The author hope the study presented here represents a promising example of mobile connectivist learning in a higher education course.

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