Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 3, pp: (1309-1325), Month: September - December 2019, Available at: www.noveltyjournals.com

Effect of Web 2.0 Tools Application on Nursing Administration Students' Self-Directed Learning

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Abstract: **Technology is required to design learning experiences that increase educational quality and prepare graduates for complex nursing practice at diverse health care settings, which stimulate learning outcomes, and improve student satisfaction.** ***Aim of the study:*** **to explore the effect of Web 2.0 tools application on nursing administration students' self-directed learning.** ***Methods:*** **An experimental research design was conducted by all nursing administration students (N = 120), enrolled in the 4th year – first term, at the Faculty of Nursing – Damanhour University, Egypt. Tools: three tools: Students' Web 2.0 tools Acceptance and Assimilation Questionnaire; Self-rating Scale of Self-directed learning (SRSSDL); Students' Satisfaction Questionnaire; and students' demographic data. It proved valid and reliable to measure study variables.** ***Results:*** **The present study revealed that highly significant differences were found between experimental and control nursing administration students' groups for both total Web 2.0 tools acceptance and assimilation and all its factors and for total self-directed learning and all its domains, after web 2.0 tools application. Additionally, highly significant differences were found between experimental nursing administration students' groups, at pre- and post-Web 2.0 tools application for both total Web 2.0 tools acceptance and assimilation and all its factors and for total self-directed learning and all its domains.** ***Conclusion:*** **it was concluded that positive effect on nursing administration students' self-directed learning was assumed after Web 2.0 tools application, at Faculty of Nursing – Damanhour University. Recommendations: Hands-on training about using web tools, develop institutional policies and guidelines on Web 2.0 technologies uses, redesign learning experiences, and inclusion of Web 2.0 tools technologies for nursing curriculum.**

Keywords: **Nursing Administration, Web 2.0 tools, Self-directed learning.**

1. INTRODUCTION

Nursing education has experienced plentiful changes and progressions in technology. As the occurrence of these changes, the expectation is that nurse educators, working in higher education, should incorporate online technology into their teaching methods (Paul et al., 2016). There has been a demand for an essential nursing education transformation that helps nursing educators to design learning experiences that increase educational quality and guarantee preparation of graduates for today's complex nursing practice at diverse health care settings (Youssef & Mansour, 2012). The National League for Nursing (NLN, 2017) called for a nursing education progression essential for the preparation of a nursing workforce for the up-coming healthcare system. The rapid growth of technologies presents a great opportunity for educators to plan courses that expand student's willingness, desire and obligation to participate in, and be fruitful in the learning process when used properly (Johnson, 2013). Technology can improve student involvement in the learning process, which stimulate learning outcomes, and improve student satisfaction (Gilboy et al., 2015).

Nursing students are exposed to a huge volume of reading material and information that is very technical, precise, and new to them. Nursing students must have the ability to link learned facts, concepts and principles with new knowledge to make comprehensive rational decisions in nursing practice (Youssef & Mansour, 2012). Students' attention drops quickly, they too often feel disconnected, the lecture bound do not outfit all students, and retaining of the presented material in typical lectures is low (Johnson, 2013). Li and Pitts (2009) state that ―the use of Web-based learning technologies has increased dramatically over the past decade providing new opportunities and avenues for students to interact with their professors virtually using computer-mediated communication technologies. Web-based learning includes, but not limited to: online and offline computer-based learning, E-learning, simulations, online courses and mobile learning (Pu et al., 2016). Employing innovative teaching strategies to improve clinical reasoning skills; one of these promising strategies is the use of Web 2.0 tools (McLaughlin et al., 2014). An increasing number of institutions on higher education are relying on Web 2.0 technologies for teaching and learning purposes (Li & Pitts, 2009).

The term Web 2.0 was founded by O'Reilly (2006) referring to a new generation of worldwide web tools that enable users to create and share their own content. Web 2.0, known as the ―second generation of the Web – is a group of web-based technologies (Chiou, 2011). It can be described as technologies that facilitate online collaboration, communication and interaction with the behavior of users, who need to be more active, collaborative, generative and interactive (Anastasiades & Kotsidis, 2013). Adding on to this definition, Barnatt (2009) defines Web 2.0 as ―a second age of the Internet in which the worldwide web is becoming a platform for interpersonal content sharing and service delivery. Web 2.0 tools also help people build online communities for creativity, collaboration, and sharing. Web 2.0 tools were defined as interactive social web applications that allow users to share, create, collaborate, and/or publish web-based content. These tools include, but are not limited to, blogs, podcasts, tagging, wikis, and social bookmarks accessed by using personal computers (PC) and mobile devices; such as a personal digital assistants (PDA) or smart phones (Davison et al., 2013). Gaffar et al. (2011) noted that the rapid uptake of internet technologies, especially Web 2.0, around the world is astounding especially with the number of new users increasing daily. The rise of affordable handsets and broadband connectivity drives the fast penetration and use of the Web 2.0 technologies and social networks. Web 2.0 technologies have made learning environments more interactive, productive, and contextual than ever before (Mutula, 2013).

Web 2.0 is classified into two broad categories of competencies, necessary competences and supplementary competences (Rich, 2008). Necessary competences are vital for learner to utilize Web 2.0 resources and include components such as accurate searching abilities and the ability to judge the authoritativeness of the material. ―They need to recognize that a range of types of publication exists on the web and that some of these mirror types also exist on paper (Rich, 2008). Supplementary competences permit users to search Web 2.0 resources in more depth and possibly make contributions to these Web 2.0 resources and include having the structural knowledge of how Web 2.0 content is designed, having the ability to synthesize information from various resources, and actively participating in discussions or creating their own resources (Rich, 2008).

Since Web 2.0 applications consist of computer applications, Websites or user interfaces, and profiles, as other technologies, acceptance and adoption of Web 2.0 technologies as learning tools can be determined by the following seven attributes: *(1)* ***voluntariness****:* the extent to which a person believes that using the system will enhance his or her job performance (Venkatesh & Davis, 2000); *(2)* ***relative advantage****:* the degree to which a technology is considered as a better alternative to the current available tools; *(3)* ***compatibility****:* the degree of consistency with the existing values, past experiences, and needs of potential adopters (Rogers, 2003); *(4)* ***ease of use and familiarity****:* the extent to which a person believes that using the system will be free of effort (Venkatesh & Davis, 2000); *(5)* ***result demonstrability****:* it focuses on the tangibility of the results of using the innovation, including their observability and communicability; *(6)* ***visibility****:* the degree to which the results of an innovation are visible and clear to and communicable to others; and finally, *(7)* ***trialability****:* the degree to which an innovation can be experimented before committing to use it (Rogers, 2003).

Additionally, the use of Web 2.0 applications in learning and teaching environments provide valuable pedagogical tools. For instance, Newland and Byles (2014) argued that the use of Web 2.0 applications can create a different pedagogical approach through collaborative learning and the social creation of knowledge. Learning and teaching with Web 2.0 requires new teaching and learning approach, called "learning 2.0", requiring teachers, who can act as guides, coaches, facilitators, and moderators, and who provide a supportive, collaborative and interactive learning environment that draw heavily upon Web 2.0 tools and services, which is called "Pedagogy 2.0", and can be described as a learning ecology that

unlocks the benefits of participatory technologies (Farkas, 2012). Such an environment allows for the creation of a learning environment among students who can contribute to and discuss collaborative thinking and understanding of the topic (Dumitrescu, 2015). Schools, colleges, and universities are increasingly turning their traditional classrooms into digitized technology rooms (Weyant & Gardner, 2010) and it is becoming ―a transition from academic broadcasting to collaborative facilitation, from linear to student-directed learning delivery (Barnatt, 2009). Nursing Education programs should replicate a change in teaching methods through shifting from content-driven curricula to learner-centered approach, as no single teaching approach will fulfill the learning needs of every student (Canipe & Brochett, 2003).

Self-directed learning has gained attention for nursing education in the last decades because of the complexity and changes in nursing professional development (Safavi et al., 2010). This approach attracts several nurse educators due to its humanistic orientation and its association with many skills needed for nursing students, such as: professional autonomy, confidence in their own ability, their capacity to learn, accountability, responsibility and assertiveness that are essential attributes for the nurse graduates (Jones, 2005; Bastable, 2008). Self-directed learning is crucial skill for students to remain lifelong learners. Self-directed learners are viewed as proactive, purposeful, initiated with greater motivation leading to longer retention from the self-disciplining process of their learning (Williamson, 2007). In Self-directed learning approach, learning occurs in formal educational settings and in informal settings (Tabatabaei, 2012).

The integration of self-directed learning approaches within nursing curricula could offer nursing students' opportunities to develop lifelong learning capacity and contribute to improvement in their ability to function effectively as registered nurses (Abdullah et al., 2018). Self-directed learning is viewed as a process in which learners are responsible for planning, implementing, and evaluating their own learning and are expected to work independently or with others, in order to achieve pre-set learning goals. Self-directed learning deals with five domains, namely: (1) ***awareness:*** relating to learners' understanding of the factors contributing to becoming self-directed learners; (2) ***learning strategies:*** explaining the various strategies self-directed learners should adopt in order to become self-directed in their learning processes; (3) ***learning activities:*** specifying the requisite learning activities learners should actively engage in order to become self-directed in their learning processes; (4) **evaluation:** revealing learners' specific attributes in order to help monitor their learning activities; and finally, (5) **interpersonal skills:** relating to learners' skills in inter-personal relationships, which are pre-requisite to their becoming self-directed learners (Williamson, 2007).

Significance of the study:

The traditional method of teaching was controlled by the instructor, where the instructor was the expert in the course materials; whereas in the current method of teaching the student is responsible for understanding the materials (Gottwald, 2005). For literally centuries, professors needed only themselves and a place to lecture to carry out the educational mission (Alsaady, 2007). Normally, lecturers go to class loaded with course content to deliver to students while being mindful of the limited time they are assigned per week, month or term, leaving a class confident that teaching has taken place, if not always learning (Jones, 2005). For the past thirty years, information technologies have revolutionized the way faculty members teach and students learn (Weyant & Gardner, 2010). In today's economy institutions of higher education must constantly produce at the human and technological levels in order to remain competitive (Fillion et al., 2006). The rapidly growing technology infrastructure at institutions of higher education to meet the instructional and research needs of faculty, staff, and students (Alsaady, 2007) is making faculty development with the use of technology a requirement. Institutions of higher education are now playing catch up because the students already have more knowledge about content sharing and Web 2.0 technologies than their professors do (Barnatt, 2009).

In order for faculty members to remain competitive and sustainable in this digital age, professional development on the use of technology and how to infuse technology into course curricula is a requirement (Alsaady, 2007). The traditional college students grew up in the digital world of computers and are used to this technology (Weyant & Gardner, 2010). In order to get the faculty members up to speed on these technologies so they are not only knowledgeable of the technology, but able to infuse the technology into their curriculums, faculty development programs are critical. In 2000, the use of technology in instruction was ranked as the second most significant issue confronting public education; by 2020 it is expected to be the most significant issue to confront public education (Hikmet et al., 2008). Internet usage among 18-29 years old college students is at a staggering 93% and ―44% of the nearly 53 million Internet users produce and share digital content online. Not only are these college students ahead of the faculty when it comes to technical skills and

utilization, but the organizations that are waiting for these students to graduate so they can employ them are expecting familiarity of Web 2.0 technologies (Weyant & Gardner, 2010). Consequently, these tools have the potential to revolutionize health care education because of the ability to "reach" many individuals at a distance (Hansen & Erdley, 2009).

Aim of the study:

The aim of this study was to explore the effect of Web 2.0 tools application on nursing administration students' self-directed learning, at Faculty of Nursing – Damanhour University.

Research hypotheses:

H1: The application of Web 2.0 tools will significantly and positively improve nursing administration students' self-directed learning, at Faculty of Nursing – Damanhour University.

2. MATERIALS AND METHODS

Research design:

An experimental research design was used.

Setting:

The study was carried out in the Nursing Administration Department, at the Faculty of Nursing – Damanhour University, El-Beheira - Egypt. The faculty has nine scientific nursing departments, namely: Medical & Surgical, Critical care & Emergency, Obstetrics & Gynecology, Pediatrics, Community Health, Psychiatric & Mental Health, Gerontological, Nursing Administration and Finally, Nursing Education departments. The faculty possess an undergraduate library, equipped with a wide variety of nursing textbooks, in addition to computers connected to digital libraries through the internet.

Subjects:

Subjects of the study comprised all undergraduate 4th year nursing students, who were enrolled in the course "nursing administration", for the academic year 2018-2019, during the first term (N = 120), whom was divided randomly into two groups (experimental and control group); (N = 60) students for each group. Nursing Administration is one of the main courses taught for the students enrolled in the fourth year. Each term consists of 15 weeks, where theoretical hours (4 hours/week); and practical hours (12 hours/week). None of the students reported previous experience in Web 2.0 tools. The experimental class utilized Web 2.0 tools in teaching and learning; whereas the control class continued normal traditional curriculum activities. The teacher (the researchers) and the textbooks for both classes were the same to avoid confusing effects on the experiment.

Tools of data collection:

Three tools were used in this study:

Tool I: **Students' Web 2.0 tools Acceptance and Assimilation Questionnaire**: It was developed by researchers after thorough review of related literature (Venkatesh & Davis, 2000; Rogers, 2003; Barnatt, 2009; Lee, 2010; Zakaria et al., 2010; Chiou, 2011; Boza & Conde, 2015), to measure nursing students' attributes that influence their perceptions and acceptance of adopting Web 2.0 technologies as learning tools. It is composed of 35 items encompassing seven factors: (1) voluntariness (5-item); (2) relative advantage (5-item); (3) compatibility (5-item); (4) ease of use and familiarity (5-item); (5) result demonstrability (5-item); (6) visibility (5-item); and (7) trialability (5-item). Responses were measured on 5–point Likert scale, ranging from (1) strongly disagree to (5) strongly agree. Score ranged from 35 to 175. The highest score indicates high acceptance and assimilation of nursing students to use the Web 2.0 technologies as learning tools.

Tool II: Self-rating Scale of Self-directed learning (SRSSDL): it was developed by Williamson (2007), to enhance the requisite skills for becoming independent and lifelong learners of university students. It comprised 60 items categorized under five domains of self-directed learning: (1) ***awareness*** (12-item); (2) ***learning strategies*** (12-item); (3) ***learning activities*** (12-item); (4) ***evaluation*** (12-item); and finally, (5) ***interpersonal skills*** (12-item). Responses were measured

on 5-point Likert scale, ranging from (5) always to (1) never. The minimum and maximum scores ranged from 60 to 300. The scoring range indicates the respondents' level of self-direction in learning and on their individual scores. The higher scores indicate more self-directed learning (Table 1).

Table (1): The scoring range of nursing students' level of self-directed learning, on their individual scores and the corresponding interpretation (Williamson, 2007).

Scoring range	Level of self-directed learning	Interpretation
60-140	**Low**	Guidance is definitely needed from the teacher. Any specific changes necessary for improvement must be identified and a possible complete re-structuring of the methods of learning.
141-220	**Moderate**	This is half way to becoming a self-directed learner. Areas for improvement must be identified, evaluated and a strategy adopted with teacher guidance when necessary.
221-300	**High**	This indicates effective self-directed learning. The goal now is to maintain progress by identifying strengths and methods for consolidation of the students' effective self-directed learning.

Tool III: **Students' Satisfaction Questionnaire:**

This tool was developed by the researchers after thorough review of related literature (Majhi & Maharana, 2011; Newland & Byles, 2014; Kivistö, 2017; Lee & Park, 2018). It was designed to examine the experimental students' satisfaction towards adopting Web 2.0 tools in teaching and learning nursing administration course. The questionnaire consisted of 10 items, such as: "Web 2.0 tools helped me in learning Nursing Administration course"; "it helped me to enhance my interest to learn Nursing Administration course"; "it can be a new teaching and learning approach"; "this approach can be easily used in other curricula"; "it made me satisfied when learning Nursing Administration course"; "it assisted me when learning Nursing Administration course"; "I can quickly adapt to it"; "it is very creative"; "it saved my time"; and finally, "It is very challenging to use it". Responses were measured on 3-point Likert rating scale ranging from (1) disagree to (3) agree. Students were considered satisfied if their score were ≥60%.

In addition to, Students' demographic data was developed by researchers, such as: age, gender, residence and previous training courses on Web 2.0.

Methods:

- An authorized approval was obtained from Dean, Faculty of Nursing-Damanhour University, and the head of Nursing Administration department, in which the study was conducted. Researchers held meeting with the faculty of Nursing Administration department and nursing students to clarify the purpose of the study and to gain the cooperation and support during data collection.

Content Validity and Reliability:

- The study tools (I, II and III) were presented to nursing students in English language.
- Tools (I and III) were revised by panel of five experts (two professors of Nursing Education and three assistant professor of Nursing Administration), to test its content and face validity. Their comments were considered for ensuring accuracy and validity of the study.
- The three study tools were examined for reliability by measuring the internal consistency of items using Cronbach's Alpha Coefficient test. The three tools proved good reliability: Students' Web 2.0 tools Acceptance, Assimilation and Barriers Questionnaire (α =0.91); Self-rating Scale of Self-directed learning (SRSSDL) (α =0.89); and Students' Satisfaction Questionnaire (α =0.93), at a statistical significance level where $p \leq 0.05$.

Pilot study:

- Pilot study was carried out randomly (10 %) (N=12) on experimental group students, to assess the content validity, clarity, comprehensiveness of the tool and reliability and they were included to the main study sample since no modifications were performed to the study's tools.

Procedure:

Data was performed through three consecutive phases (preliminary, implementation and evaluation):

Preliminary phase:

- Before the beginning of the academic year 2018-2019, the researchers prepared the nursing administration lectures that were delivered to experimental nursing administration students, namely: role of head nurse, documentation, staff development, performance appraisal, leadership and team building and teamwork.

- The researchers divided randomly all 4th year nursing students – Damanhour University, enrolled at the academic year 2018-2019 (first term) into two groups; control and experimental group, each group (N= 60).

- None of the students reported previous experience in Web 2.0 tools, as a type of learning.

- The researchers started to assess both experimental and control group of nursing administration students' Web 2.0 tools Acceptance and Assimilation Questionnaire and self-directed learning by using self-administered questionnaires (tool I and II).

Implementation phase:

- The researchers attended a training program on "Web 2.0 tools and applications in higher education", at Senghor University; then, they created the website that was ready to be used by the experimental group including Web 2.0 tools. The control group participated in the normal traditional course.

- The website was designed by the researchers and consisted of homepage address, how to get in, training contents, and the activation of their university emails was individually applied to each user (experimental nursing students' group) guidance on how to consult.

- Various Web 2.0 tools were created to stimulate and promote the experimental nursing administration students' learning, such as: Edmodo, Google Class, Google Docs, Mind Meister, Padlet, and Emaze.

- The website was designed to provide students with contents including: concept maps, videos, quizzes, textual descriptions, checklists, images, videos, evaluation issues and additional comments.

- An awareness introductory session of the Web 2.0 tools, as a type of innovative learning, was conducted to the experimental group prior to the beginning of the nursing administration course to ensure clarity, understanding and applicability of using the created website; to confirm the access time for the completion of the course.

- The researchers acted as facilitators, who stimulated students towards self-directed learning.

- The time and methods of applying the course were arranged according to the time available for the teachers and students at each date.

- The learning activities performed, by the experimental nursing administration students' group, during learning sessions were: discussion on topic, comments on photos, develop concept map, brochure and write a video reaction to easily understand and pretend.

Evaluation phase:

- the experimental nursing administration students' group were asked to fill out the study tools to rate their perceptions and degree of satisfaction towards their experiences of using Web 2.0 tools by using self-administered questionnaires, namely: Web 2.0 tools Acceptance and Assimilation Questionnaire, self-directed learning and Students' Satisfaction Questionnaire (tool I, II and III).

Data were collected through self-administered questionnaires from nursing administration students. The needed time to fill the questionnaires was (25-35) minutes. It took 12 weeks, starting from the 21st of September to the 15th of December 2018.

Ethical considerations:

- All nursing administration students were informed about the purpose of the study and given brief explanation; consequently, oral informed consent was obtained from each of them.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 3, pp: (1309-1325), Month: September - December 2019, Available at: www.noveltyjournals.com

- The right to refuse to participate or withdraw from the study was emphasized after reassuring students that their responses would have no impact on their grades.

- Data Anonymity and confidentiality were considered.

Statistical Analysis

Data were collected, tabulated, and analyzed statistically using an IBM personal computer with Statistical Package of Social Science (SPSS) version 22. The following statistics were applied. ***1. Descriptive statistics:*** in the form of frequencies, percentages, mean and standard deviation. ***2. Analytical statistics:*** The chi-square and Monte Carlo exact probability test was used to study the significance of the difference between proportions to analyze the significance between the two variables; T-test was used to compare between means of two groups, and **Correlation coefficients** are used to measure the strength of the relationship between two variables. All statistical analysis was done using two tailed tests and alpha error of 0.05. Regarding P value, it was considered that: non-significant (NS) if P> 0.05, Significant (S) if P< 0.05 and Highly Significant (HS) if P<0.01.

3. RESULTS

Table (1): Distribution of nursing students' demographic data at the Nursing Administration department – Damanhour Faculty of Nursing.

Students' demographic data	Experimental group (N=60)		Control group (N=60)	
	No.	%	No.	%
Age				
19 - <21	28	46.6	31	51.6
21 – 23	32	53.4	29	48.4
$\bar{x}$±SD	20.2±1.64		19.9±1.55	
Gender				
Male	10	16.6	13	21.6
Female	50	83.4	47	78.4
Residence				
Rural	18	30	19	31.6
Urban	42	70	41	68.4
Attending previous training courses about Web 2.0 tools				
Yes	10	16.6	9	15
No	50	83.4	51	85

Table (1) illustrated that nearly half (46.6%) of experimental group had less than 21 years old; compared to 51.6% of the control group. The mean age was 20.2±1.64 for experimental group and 19.9±1.55 for control group. As for gender, the majority of both experimental and control groups were female (83.4%, 78.4%), respectively. Considering residence, above two thirds of both experimental and control groups were from urban areas (70%, 68.4%), consecutively. The majority of both groups did not attend any previous training courses about Web 2.0 tools.

Table (2): Comparison means between nursing administration students' experimental and control groups according to students' Web 2.0 tools acceptance and assimilation after Web 2.0 tools application.

Students' Web 2.0 tools acceptance and assimilation factors	Experimental group (N=60)	Control Group (N=60)	T. test	P. value
Voluntariness	24.72	9.56	8.361	.004**
Relative advantage	23.91	10.31	9.325	.001**
Compatibility	24.87	8.21	7.356	.000**
Ease of use and familiarity	24.54	15.49	5.261	.001**
Result demonstrability	23.72	9.64	8.479	.002**

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Vol. 6, Issue 3, pp: (1309-1325), Month: September - December 2019, Available at: www.noveltyjournals.com

Students' Web 2.0 tools acceptance and assimilation factors	Experimental group (N=60)	Control Group (N=60)	T. test	P. value
Visibility	24.82	10.12	5.324	.004**
Trialability	23.26	9.34	8.252	.003**
Total students' Web 2.0 tools acceptance and assimilation	102.34	65.36	13.354	.000**

*Significant at P< 0.05; **highly significant at P<0.01

Table (2) indicated that highly significant differences were found between experimental and control nursing administration students' groups for total Web 2.0 tools acceptance and assimilation and all its factors, namely: voluntariness, relative advantage, compatibility, ease of use and familiarity, result demonstrability, visibility and trialability (where P<0.01).

Table (3): Comparison means between nursing administration students' experimental group according to students' Web 2.0 tools acceptance and assimilation, at pre- and post-Web 2.0 tools application.

Students' Web 2.0 tools acceptance and assimilation	Experimental group (N=60)		T. test	P. value
	Pre-Web 2.0 application	Post-Web 2.0 application		
Voluntariness	15.24	24.72	9.001	.002**
Relative advantage	14.36	23.91	10.398	.001**
Compatibility	15.47	24.87	10.276	.004**
Ease of use and familiarity	16.21	24.54	11.137	.003**
Result demonstrability	14.33	23.72	9.821	.000**
Visibility	15.18	24.82	10.453	.001**
Trialability	14.69	23.26	10.762	.002**
Total students' acceptance and assimilation	90.34	102.34	12.876	.000**

*Significant at P< 0.05; **highly significant at P<0.01

Table (3) indicated that highly significant differences were found between experimental nursing administration students' groups, at pre- and post-Web 2.0 tools application for total Web 2.0 tools acceptance and assimilation and all its factors, namely: voluntariness, relative advantage, compatibility, ease of use and familiarity, result demonstrability, visibility and trialability (where P<0.01).

Table (4): Comparison between means of nursing administration students for both experimental and control groups according to self-directed learning after Web 2.0 tools application.

Self-directed learning domains	Experimental group (N=60)	Control Group (N=60)	T. test	P. value
Awareness	56.40	40.24	18.61	.000**
Learning strategies	57.94	44.80	13.90	.001**
Learning activities	52.80	43.21	8.17	.003**
Evaluation	53.22	37.80	17.33	.000**
Interpersonal skills	59.38	36.12	12.16	.002**
Total self-directed learning	289.11	212.24	34.06	.000**

*Significant at P< 0.05; **highly significant at P<0.01

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ISSN 2394-7330

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Table (4) indicated that highly significant differences were found between nursing administration students both experimental and control groups for total self-directed learning and all its domains (where P<0.01). As for the experimental group, the first domain was interpersonal skills, followed by, learning strategies, awareness, evaluation and learning activities (59.38, 57.94, 56.40, 53.22, 52.80), respectively. On the other hand, the first domain for the control group was learning strategies, then, learning activities, awareness, evaluation, and finally, interpersonal skills (44.80, 43.21, 40.24, 37.80, 36.12), consecutively.

Table (5): Comparison between means of nursing administration students' experimental group according to self-directed learning, at pre- and post- Web 2.0 tools application. (N=60)

Self-directed learning and its domains	Experimental group		T. test	P. value
	Pre-Web 2.0 application	Post-Web 2.0 application		
Awareness	43.21	56.40	16.91	.000**
Learning strategies	41.70	57.94	12.95	.000**
Learning activities	44.90	52.80	9.21	.003**
Evaluation	39.85	53.22	15.63	.002**
Interpersonal skills	35.14	59.38	12.58	.001**
Total self-directed learning	217.61	289.11	35.19	.000**

*Significant at P< 0.05; **highly significant at P<0.01

Table (5) mentioned that highly significant differences were found between nursing administration students' experimental group for total self-directed learning and all its domains, at pre- and post-Web 2.0 tools application (where P<0.01).

Table (6): Relationship between nursing administration students' demographic data (experimental and control groups) and their total Web 2.0 tools acceptance and assimilation (n=120).

Nursing Administration students' demographic data		Total Students' Web 2.0 tools acceptance and assimilation											
		Experimental group (N=60)						Control group (N=60)					
		High (N=48)		Moderate (N=9)		Low (N=3)		High (N=13)		Moderate (N= 10)		Low (N=37)	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age	19 - <21	20	41.6	7	77.7	1	33.3	11	84.6	7	70	13	35.1
	21 - 23	28	58.4	2	22.3	2	66.7	2	15.4	3	30	24	64.9
χ2 calculated P-Value		11.467 .000**						7.390 .002**					
Gender	Male	8	16.6	1	11.1	1	33.3	8	61.5	4	40	1	2.8
	Female	40	83.4	8	88.9	2	66.7	5	38.5	6	60	36	97.2
χ2 calculated P-Value		13.659 .000**						10.221 .001**					
Residence	Rural	9	18.7	6	66.6	3	100	3	23.1	2	20	14	38.9
	Urban	39	81.3	3	33.4	0	0	10	76.9	8	80	23	62.1
χ2 calculated P-Value		9.313 .001**						12.978 .000**					
Training courses	Yes	9	18.7	1	11.1	0	0	8	61.5	1	10	0	0
	No	39	81.3	8	88.9	3	100	5	38.5	9	90	37	100
χ2 calculated P-Value		10.012 .002**						13.764 .000**					

*Significant at P< 0.05; **highly significant at P<0.01

Table (6) demonstrated that highly significant differences were found between total nursing administration students' (experimental and control groups) Web 2.0 tools acceptance and assimilation, and all the demographic characteristics: age, gender, residence, and attending training courses (where P<0.01).

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 3, pp: (1309-1325), Month: September - December 2019, Available at: www.noveltyjournals.com

Table (7): Relationship between nursing administration students' demographic data (experimental and control groups) and their total self-directed learning (N=60).

Nursing Administration students' demographic data		Total Self-directed learning											
		Experimental group (N=60)						Control group (N=60)					
		High (N=45)		Moderate (N=10)		Low (N=5)		High (N=7)		Moderate (N= 23)		Low (N=30)	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age	19 - <21	15	33.3	8	80	5	100	1	14.2	8	34.7	22	73.3
	21 - 23	30	66.7	2	20	0	0	6	85.8	15	65.3	8	26.7
χ2 calculated P-Value		9.354 .000**						6.369 .002**					
Gender	Male	8	17.7	2	20	0	0	5	71.4	6	26.1	2	6.6
	Female	37	82.3	8	80	5	100	2	28.6	17	73.9	28	93.4
χ2 calculated P-Value		8.312 .001**						14.325 .000**					
Residence	Rural	10	22.2	5	50	3	60	0	0	9	39.1	10	33.3
	Urban	35	77.8	5	50	2	40	7	100	14	60.9	20	66.7
χ2 calculated P-Value		10.019 .000**						11.753 .000**					
Training courses	Yes	9	20	1	10	0	0	7	100	2	8.7	0	0
	No	36	80	9	90	5	100	0	0	21	91.3	30	100
χ2 calculated P-Value		7.648 .002**						9.887 .001**					

*Significant at P< 0.05; **highly significant at P<0.01

Table (7) demonstrated that highly significant differences were found between total nursing administration students' (experimental and control groups) self-directed learning, and all the demographic characteristics: age, gender, residence, and attending training courses (where P<0.01).

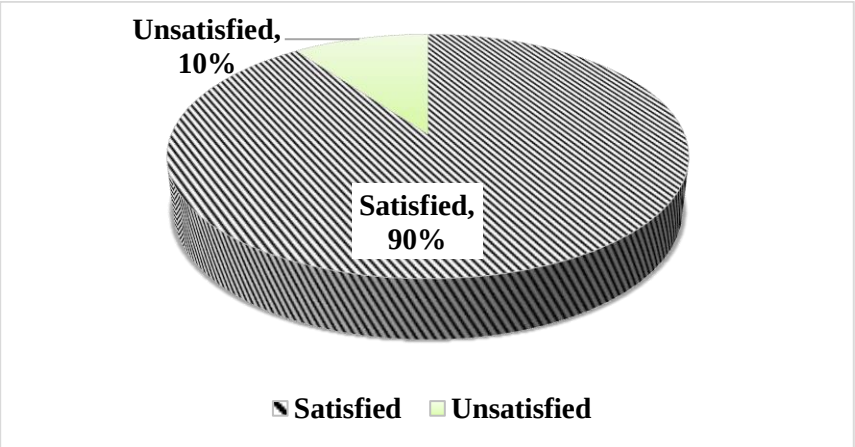

Fig. (1): Experimental nursing administration students' satisfaction after Web 2.0 tools application (N=60).

Fig. (1) revealed that the majority of nursing administration students' experimental group (90%) were satisfied after the Web 2.0 tools application.

Novelty Journals

ISSN 2394-7330

International Journal of Novel Research in Healthcare and Nursing
Vol. 6, Issue 3, pp: (1309-1325), Month: September - December 2019, Available at: www.noveltyjournals.com

Table (8): Correlation matrix between Web 2.0 tools acceptance and assimilation and self-directed learning, for nursing administration students' experimental group (N=60).

			Students' Web 2.0 tools acceptance and assimilation factors						
			Voluntariness	Relative advantage	Compatibility	Ease of use and familiarity	Result demonstrability	Visibility	Trialability
Students' Web 2.0 tools acceptance and assimilation	Voluntariness	r P							
	Relative advantage	r P	.539 .018*						
	Compatibility	r P	.736 .003**	.763 .002**					
	Ease of use and familiarity	r P	.482 .040*	.676 .000**	.723 .002**				
	Result demonstrability	r P	.5467 .022*	.901 .000**	.641 .000**	.539 .015*			
	Visibility	r P	.912 .000**	.418 .012*	.742 .021*	.845 .003**	.637 .013*		
	Trialability	r P	.736 .003**	.863 .000**	.645 .000**	.761 .003**	.676 .027*	.431 .001**	
Self-directed learning domains	Awareness	r P	.873 .003**	.974 .000**	.645 .001**	.875 .002**	.432 .002**	.612 .002**	.377 .011*
	Learning strategies	r P	.488 .031*	.792 .001**	.970 .000**	.875 .000**	.763 .001**	.567 .003**	.901 .000**
	Learning activities	r P	.632 .001**	.678 .002**	.479 .020*	.587 .020*	.447 .013*	.539 .018*	.863 .000**
	Evaluation	r P	.567 .003**	.901 .000**	.861 .000**	.927 .001**	.586 .012*	.369 .031*	.900 .000**
	Interpersonal skills	r P	.586 .009**	.462 .014*	.763 .002**	.676 .000**	.743 .000**	.970 .000**	.876 .000**

*Significant at level P< 0.05; **highly significant at P<0.01

r = Pearson coefficient value: weak from 0.0 to 0.25- moderate from > 0.25 to 0.5- strong from > 0.5 to 1.00

table (8) revealed that highly significant positive correlations existed between Web 2.0 tools acceptance and assimilation factors and self-directed learning domains, as follows: voluntariness factor with awareness, learning activities, evaluation and interpersonal domains (.003, .001, .003, .009), respectively; relative advantage factor with awareness, learning strategies, learning activities and evaluation domains (.000, .001, .002, .000), consecutively; compatibility factor with awareness, learning strategies, evaluation and interpersonal skills domains (.001, .000, .000, .002), respectively; ease of use and familiarity factor with awareness, learning strategies, evaluation and interpersonal skills domains (.002, .000, .001, .000), consecutively; result demonstrability factor with awareness, learning strategies and interpersonal skills domains (.002, .001, .000), respectively; visibility factor with awareness, learning strategies and interpersonal skills domains (.002, .003, .000), consecutively; lastly, trialability factor with learning strategies, learning activities, evaluation and interpersonal skills domains (.000, .000, .000, .000), respectively.

4. DISCUSSION

Attributable to the growing use of information and computing technologies as learning tools throughout the world, emerging technologies, such as Web 2.0 applications, recently have become pervasive in the academic environment too. Nowadays, many students are using the interactive Web to communicate, socialize, entertain and share information. These students are empowered with the resources provided by the Web, which is leading towards a technological culture that produces content for learning and sharing, reflection and participation. It was expected that Web 2.0 applications empower active participation, promote opportunities for student's writing and reflection, and encourage a collaborative and active community of learners (Ferdig, 2007). Moreover, the use of Web 2.0 technologies, as one of the dominant sources for supplying information to students, has emerged as a major approach to ameliorate learning, information

sharing, and collaboration between students and teachers (Ackermann & Hartman, 2014). Therefore, the present study investigated the effect of Web 2.0 tools application on nursing administration students' self-directed learning, at Faculty of Nursing – Damanhour University.

The findings of the present study revealed that highly significant differences were found between experimental and control nursing administration students' groups for total Web 2.0 tools acceptance and assimilation and all its factors. Additionally, highly significant differences were found between experimental nursing administration students' groups, at pre- and post-Web 2.0 tools application for total Web 2.0 tools acceptance and assimilation and all its factors, namely: voluntariness, relative advantage, compatibility, ease of use and familiarity, result demonstrability, visibility and trialability. This may be related to the nature of undergraduate nursing students, who are from the Millennial Generation that is often criticized for being spoiled, impatient, and most of all, for having a sense of entitlement. They also view that the Web 2.0 technologies are matching their generational features. This is in line with Su and Beaumont (2010), who emphasized that Web 2.0 can encourage active collaborative learning, confidence, informative versus subjective self and peer evaluation by enabling rapid feedback, indirect learning through observing others' contributions while enabling tracking of student learning.

Moreover, An and Williams (2010) mentioned that Web 2.0 enables higher education students to become creators of knowledge and create content instead of just listening to lectures, as well as encourages them to take responsibility for their learning. Additionally, Boza and Conde (2015) emphasized that students who spend time online were more likely to highlight the positive aspects of Web 2.0 use, although they are familiar with the tools and tend to use them. This coincides with the research carried out by Alba and Carballo (2005), in which the students perceived the advantages of Web 2.0 in day-to-day academic practice. Janossy (2007) also reported that students felt that they understood and retained course information better. This is supported by Edirisingha et al. (2007), who stated that students, who utilized the technology were generally positive about the integration of the new technology. Furthermore, Smart and Cappel (2004) found that ease of use was one the themes students found to describe their online experiences using Web 2.0 tools. Ulrich (2009) indicated that knowledge of Web 2.0 applications can predict instructor interest and awareness in those applications and that this can be transmitted to their students. On the other hand, Kala et al. (2010) found that the use of technology alone will not guarantee that students have the learning outcomes desired.

The findings of this study mentioned that highly significant differences were found between nursing administration students both experimental and control groups for total self-directed learning and all its domains. In addition to that, highly significant differences were found between nursing administration students' experimental group for total self-directed learning and all its domains, at pre- and post-Web 2.0 tools application. This may be attributed to the students' generation that is characterized by instant gratification, short attention spans and multitasking. Students are born into an emerging world of technology having grown up surrounded by cell phones, laptops, tablets and other gadgets. They often choose to communicate quickly and effectively via Web 2.0 technologies, because they often found that face-to-face communication and interactions with others difficult. This is in accordance with AlGahtani (2011), who found a statistically significant difference in students' interaction with contents, colleagues and teachers in KSA. Contrarily, Majhi and Maharana (2011) stated that the usage of Web 2.0 tools is not very significant in the two studied universities in Odisha, despite using frequently of Wiki and social networking sites.

The findings also stated that highly significant differences were found between total nursing administration students' (experimental and control groups) Web 2.0 tools acceptance and assimilation, self-directed learning and all the demographic characteristics: age, gender, residence, and attending training courses. This may be contributed to their younger age with impeding technology usage that is suitable for their generation, as they learn and adapt faster to technology. Students also believed that it was much easier for them to learn on their own and not as an obligation to study in formal academic setting. They also have the chance to access internet to use Web 2.0 tools, at any place either urban or rural, through any device, as personal computer, smart phones, tablet…etc. This was in line with Lee and Park (2018), who found that nursing students had an improvement in their skills, are aware of self-needs, engaging in learning strategies and activities and self-evaluation despite their demographic characteristics. Park and Park (2017) also stated that students, who use Web 2.0 via smart phones had greater improvement in their learning abilities. Furthermore, Zakaria et al. (2010) indicated that young students have significant unawareness with certain Web 2.0 technologies, such as social tagging and bookmarking. On the other hand, Ulrich (2009) found how important was the knowledge of Web 2.0

application on the interest of using the applications despite their gender. Salaway et al. (2007) also found that males reported higher technology ownership levels, adoption profiles, and confidence, while females tended to have lower self-perceptions of technical skills and ownership.

Additionally, the majority of nursing administration students' experimental group were satisfied after the Web 2.0 tools application. This may be due to the students' agreement that it helped them to learn nursing administration course effectively and clarified the inter-relationships and applicability among curriculum contents. This is consistent with the findings of Kivistö (2017), who found that students agreed that using Web 2.0 tools refresh the mind, when exhausted and is easier than traditional methods, as it stimulates lateral thinking. This was supported by Missildine et al. (2013), who revealed that students had positive and satisfying feedback regarding using Web 2.0 tools and they have expressed that if this method was used from the first year, it had been one of the best methods to learn.

The findings of the present study concluded that highly significant positive correlations existed between approximately all the Web 2.0 tools acceptance and assimilation factors and self-directed learning domains. This is the same as Anton and Zubillaga del Rio (2008), who concluded that university training in Web 2.0 may not be the result of institutional measures, but instead of personal interest and self-learning. Simonson et al. (2000) also described that Web 2.0 tools as more convenient than traditional classroom learning because of availability of materials and 24-hour access to self-learning. This is also supported by Allen and Seaman (2013), who concluded that over 30% of all college students take one or more courses through using one or more Web 2.0 technology tools by themselves. Moreover, Usleul and Mazman (2009) suggested that Web 2.0 technologies has the ability to allow online users to come together, share information, and are beneficial because they encourage collaborative learning, provide and receive feedback, and facilitate active student-learning. Thiele et al., (2014) concurred stating that the use of Web 2.0 technologies should be used to make the learning environment student-centered and social. Going beyond traditional delivery formats and developing more learner-centered classes through the use of Web 2.0 technologies can benefit the student (Faizai et al., 2015).

Finally, students enrolled in colleges and universities today are accustomed to Web 2.0 technologies usage in their daily lives (Meehan & Salmun, 2016). Therefore, applying Web 2.0 tools in nursing education is a promising educational strategy that needs training for both teachers and students, to raise educational quality and gain its benefits. Consequently, institutions of higher education need to put improving teaching and learning using Web 2.0 technologies as a priority in their strategic plans so faculty members can learn not only how to use Web 2.0 technologies, but how to successfully infuse Web 2.0 technologies into their curriculums to improve learning (Weyant & Gardner, 2010).

5. CONCLUSION

It is concluded that a significant positive improvement was found on nursing administration students' self-directed learning after web 2.0 tools application, at Faculty of Nursing – Damanhour University. Additionally, the majority of nursing administration experimental group were satisfied with the application of web 2.0 tools.

6. RECOMMENDATIONS

In light of the findings of this study, the following recommendations are suggested:

Faculty administrators should:

- Hands-on training about using web tools: in depth training to faculty and students is very essential to gain the confidence to use the tools aptly.
- Develop institutional policies and guidelines on Web 2.0 technologies uses, taking into considerations the following: the availability and visibility of the tools; systems monitor; encouragement methods to use …etc.

Faculty members should:

- Redesign and reconceptualization of learning experiences, learning environments considering the issue of Intellectual Property Rights for the instructional resources that are used in Web 2.0 based teaching.
- Inclusion of Web 2.0 tools technologies as new strategy for teaching nursing curriculum for different nursing courses.

Further studies to investigate the impact of Web 2.0 tools on nursing students' creativity in nursing education and academic achievement. Additionally, replication of this study for postgraduate nursing students.

ACKNOWLEDGEMENTS

Our deepest thanks to the nursing administration department at Faculty of Nursing – Damanhour University for their support and encouragement. Researchers are also, extremely grateful to nursing administration students, who participated in this study, for without them, this research would never have been completed.

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