ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ В ОБРАЗОВАНИИ

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USING CLOUD COMPUTING TO DEVELOP TEACHING SELF-LEARNING COMPETENCIES AMONG THE FACULTY MEMBERS AT JOUF UNIVERSITY

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Abstract. *Introduction.* Cloud computing is a new model of computing based on network technology where computer-related technologies are provided as services that are permanently available for use. This technology saves faculty members' time, and increases their interaction and communication with colleagues and students. Moreover, cloud computing solutions help faculty members finish and follow up all the required courses, in addition to allowing the faculty members to store and retrieve information comprehensively and immediately. As a result, using cloud computing provides practical, interactive solutions to deal with the academic tasks which a faculty member needs to perform his/her current academic work.

Aim. The current study *aimed* to uncover the reality of using cloud computing to develop the teaching competencies.

Methodology and research methods. The study relied on applying the survey method based on a descriptive approach using two types of questionnaire as the main tools for data collection. The sample of the study includes 48 faculty members and 103 students from the College of Education at Jouf University.

Results and scientific novelty. The results showed that self-assessment of using cloud computing to develop self-learning teaching competencies among faculty members is of a high level, while the teaching competencies for the application of cloud computing in self-directed learning among faculty members are of an average level according to their students. The results also demonstrated no significant relationship between these two main types of assessment.

Practical significance. The current study is significant in light of the fact that it facilitates to understand the impact of utilising cloud computing to accomplish proficient and educational abilities for faculty members at Jouf University.

Keywords: cloud computing, teaching competencies, self-learning, education technologies, e-learning, cloud storage.

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ИСПОЛЬЗОВАНИЕ ОБЛАЧНЫХ ВЫЧИСЛЕНИЙ ДЛЯ ФОРМИРОВАНИЯ УЧЕБНЫХ КОМПЕТЕНЦИЙ САМООБРАЗОВАНИЯ СРЕДИ ПРЕПОДАВАТЕЛЕЙ УНИВЕРСИТЕТА АЛЬ-ДЖУФА

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Аннотация. *Введение.* Облачные вычисления – это новая модель, основанная на сетевых технологиях, где компьютерные технологии предоставляются как услуги, которые постоянно доступны для использования. Облачные вычисления экономят время преподавателей и увеличивают их взаимодействие и коммуникацию с коллегами и студентами. Кроме того, помогают преподавателям проходить и заканчивать все необходимые курсы, а также позволяют им хранить и оперативно извлекать информацию в полном объеме. В результате использование облачных вычислений предоставляет практические интерактивные решения для выполнения академических задач, которые необходимы преподавателям в текущей работе.

Цель. Настоящее исследование было направлено на раскрытие реальности использования облачных вычислений для развития педагогических компетенций.

Методология и методы исследования. Исследование основано на применении метода опроса на базе описательного подхода с использованием двух типов анкет в качестве главных инструментов для сбора данных. Выборка исследования включает 48 преподавателей и 103 студента из Педагогического колледжа Университета Аль-Джуфа.

Результаты и научная новизна. Результаты показали, что преподавательская самооценка при использовании облачных вычислений для развития компетенций самообразования находится на высоком уровне, в то время как студенты оценили данные компетенции педагогов средне. Результаты также не продемонстрировали существенной взаимосвязи между этими двумя оценками.

Практическая значимость. Данное исследование помогает оценить влияние использования облачных вычислений для достижения профессиональных и образовательных способностей среди преподавателей Университета Аль-Джуфа.

Ключевые слова: облачные вычисления, компетенции преподавателя, самообразование, образовательные технологии, электронное обучение, облачное хранилище.

Для цитирования: Аланази С. М. Использование облачных вычислений для формирования учебных компетенций самообразования среди преподавателей Университета Аль-Джуфа // Образование и наука. 2021. Т. 23, № 9. С. 169–185. DOI: 10.17853/1994-5639-2021-9-169-185

Introduction

Cloud computing is a new model of computing based on network technology where computer-related technologies are provided as services that are permanently available using computers without risk and with low cost [1]. It is also a model for enabling ubiquitous, convenient, on-request network admittance to a common pool of configurable IT resources, such as networks, server, storage and applications that can be quickly provisioned and released with negligible administration effort. Cloud computing relies upon on digital processing technology and the extra space related with it on the PC to what in particular can be characterised by the term cloud [2], which is a server that can be accessed through the Internet [3].

In addition, cloud computing provides unlimited storage for storing data [3, 4], as well as capabilities identified with IT gave over the Internet. Consequently, it is a creative specialised model through which numerous applications and data are given with IT environment [5]. Users themselves provision the resources from the pools, as and when required, without the need to interact with the provider during the process. The resources are returned to the pool when they are released [4, 6].

On the other hand, self-learning is the singular's obtaining of data, the vital abilities [7], and many experiences freely without the need to utilise a particular instructive organisation and independence is in any case [8], as it is considered an action interaction that stems from the conviction and inward intentions of the person that push him/her towards improving and creating himself/herself [7, 9].

Cloud computing empowers faculty members to utilise their innovative energies to build interactive learning enlivenments using different instructive works, educational documents [10], scientific movies, and sound records [11]. The use of cloud computing can also help reducing the chance of losing many documents from storage devices, and gives the faculty members various capacities for working collaboratively anywhere, whenever and through other devices. [12]. As a result, adopting cloud computing develops the workplace and expands the opportunities for precise work through participation among all partners in an adaptable and limitless manner without time or space limits [13, 14].

In addition, cloud computing permits admittance to resources accessible for information and offer it from anyplace through Internet in a convenience way without need for broad preparing [15]. As a result, numerous educational foundations all throughout the world have affirmed that cloud computing is an extremely appealing and incorporated framework for educational use [16].

Through the past introduction, it is feasible to understand the significance of faculty members' utilisation of cloud computing innovation to rehearse and apply the essential abilities of the educational cycle. This is done through getting to all stored information that adds to the educational cycle, and subsequently recovering and dealing with the information and accomplishing educational capabilities to accomplish the information stream and increment the ability of faculty members to educate and learn.

Therefore, the current study is significant in light of the fact that it expects to understand the impact of utilising cloud computing to accomplish proficient and educational abilities for faculty members at Jouf University.

Study Objectives

The study aims to accomplish a significant objective addressed in understanding the effect of the faculty members in the College of Education at Jouf University utilising cloud computing tools to accomplish teaching skills through self-learning and fostering their capabilities [17], and competencies identified with utilising these tools and adjusting them to work on the educational cycle at the University [18].

Research Hypotheses. The current research hypotheses are the following:

– Self-assessment of utilising cloud computing in the development of self-learning teaching competencies for faculty members is of a high level.

– Teaching competencies for utilising cloud computing applications in self-directed learning among faculty members is of an average level according to their students.

– There is no significant relationship between self-assessment of utilising cloud computing in the development of self-learning teaching competencies for faculty member and their teaching competencies for utilising cloud computing applications in self-directed learning according to their students.

Literature Review

The study of Chowdhury [19] focused on the need to pay attention to the adoption of cloud computing in all academic and industrial fields. As arising, related technologies have strong connections between cloud computing and big data technology, which make the big data technology in the digital environment rely upon the utilisation of cloud computing in business enterprises. The study was enthusiastic to develop a future model for embracing cloud computing that incorporates many variables associated with big data technology, along with other variables of the Technology Acceptance Model (TAM). The environment of

the technology organisation, which led to the inclusion of many variables related to data technology in order to expand the approach to adopting the theory of computing mix. The data gathered from the study were examined from 182 experts or administrators working in the field of IT in the United States utilising the methodology of binary logistic regression. The outcomes showed that the model that incorporates the quantity of six free variables was statistically significant for forecast by taking on the specialisation of cloud computing with a high goal of 92.1 %.

The study of Shahzad [6] likewise expected to give an assortment of cloud computing services to a sample of students by concentrating on educational materials in a few places and times utilising any technical device. This prompts working on educational execution and attempting to reinforce the relationship between both educator and students through a real exchange of information. The study was based on the technological, organisational and environmental framework, which intends to identify a set of factors that principally affect the adoption of cloud computing in the educational environment. The study built a model concept supported by experimental analysis of 232 individuals, and reasoned that there are particular relationships between each of technology and regulatory attitudes towards cloud computing applications.

The study of El-Attar [20] sought to assess the performance of a comprehensive set of e-learning services to provide an effective e-learning system in educational institutions. The e-learning system is facing numerous difficulties, such as the learning design, difficulties in learning content, and numerous technical issues. Consequently, the current study provides a distinct e-learning environment that depends on cloud computing to improve coherent services of e-learning forms that rely upon the course material that relates to students' knowledge, experiences, and requirements.

Methodology

The current research is based on the descriptive survey method, in order to understand the reality of utilising cloud computing to accomplish proficient and educational abilities for faculty members at the College of Education at Jouf University.

The Research Sample

The research sample consisted of 48 faculty members and 103 students from the College of Education at Jouf University. Table 1 shows their classification in terms of gender.

Table 1

Distribution of the sample according to gender

	Gender	Frequencies	Percentage %
Faculty Members	Males	29	60.4
	Females	19	39.6
	Total	48	100
Students	Males	42	44.8
	Females	61	55.2
	Total	103	100

Research Tools

The current research includes two tools: Self-assessment scale of teaching competencies for self-directed learning by Williamson [21], a questionnaire of teaching competencies for using cloud computing applications in self-directed learning based on the Staged Self-Directed Learning model by Grow [22]. The tools are addressed and validated as follows:

Self-assessment scale of self-directed learning by Williamson was used for teaching competencies in using cloud computing applications in self-directed learning. Such scale is one of the prominent measures used in determining the skills of teaching competencies for using different types of technology in self-directed learning. The scale contains 60 items, and a five-point response scale (always, often, sometimes, rarely, never). It includes five sub-dimensions representing the basic skills of teaching competencies for using cloud computing applications in self-directed learning by 12 items for each sub-dimension, i.e. skills of self-awareness, using learning strategies, applying learning activities, assessment, and interpersonal skills. A score of 60–140 is identified as a directed learning level. The score of 141–220 is identified as average level. The score of 221–300 is identified as high level.

The validity and reliability of the Self-Assessment Scale of Teaching Competencies for using Cloud Computing Applications in Self-Directed Learning by Williamson were also verified through two types of validity.

The survey was reviewed by three experts to confirm the validity of the content of the scale. Validity of the internal consistency of the scale items was also verified, after applying it to the study sample, by calculating the Pearson correlation coefficients in terms of the scores of each item and the total score of the sub-scale to which such paragraph belongs. Table 2 shows the results.

Table 2

Correlation coefficients (R) between the scores of the scale items and the degree of the dimension to which it belongs

Item	R	Item	R	Item	R
1	0.545**	21	0.767**	41	0.639**
2	0. 577**	22	0.614**	42	0.675**
3	0.585**	23	0.635**	43	0.557**
4	0.619**	24	0.767**	44	0.593**
5	0.594**	25	0.577**	45	0.584**
6	0.582**	26	0.657**	46	0.637**
7	0.763**	27	0.719**	47	0.764**
8	0.864**	28	0.592**	48	0.617**
9	0.583**	29	0.544**	49	0.617**
10	0.597**	30	0.766**	50	0.577**
11	0.529**	31	0.866**	51	0.655**
12	0.676**	32	0.583**	52	0.619**
13	0.588**	33	0.673**	53	0.594**
14	0.637**	34	0.571**	54	0.582**
15	0.765**	35	0.672**	55	0.763**
16	0.617**	36	0.547**	56	0.864**
17	0.775**	37	0.586**	57	0.583**
18	0.559**	38	0.672**	58	0.577**
19	0.618**	39	0.579**	59	0.629**
20	0.597**	40	0.676**	60	0.676**

Pearson correlation coefficient between the scores of all five sub-dimensions and the total score of the scale was calculated. Table 3 shows the significance of all correlation coefficients between the scale items and the sub-dimensions at the level of p = 0.01, which indicates a high level of internal consistency.

Table 3

Correlation coefficients (R) between the scores of the five sub-dimensions and the total score of the scale

	Self-awareness skill	Using learning strategies skill	Applying learning activities skill	Assessment skill	Interpersonal skill
The total score of the scale	0.576**	0. 627**	0.606**	0. 568**	0.618**

Reliability

Cronbach's alpha coefficient for the sample scores of the test was used. The value of the alpha coefficient was 0.74. Such value proves the scale's stability. Further, the stability of the sub-dimensions of the scale was calculated in the same way. Table 4 shows that values of the reliability coefficients of the sub-dimensions of the scale are significant at the level of significance 0.01. This indicates that the scale has a good degree of stability and thus can be relied upon in the field application of the current research.

Table 4

Cronbach's alpha coefficient sub-dimensions of the scale

	Self-awareness skill	Using learning strategies skill	Applying learning activities skill	Assessment skill	Interpersonal skill
Cronbach's alpha coefficient	0.663**	0.632**	0.671**	0.647**	0.592**

In addition, a questionnaire on teaching competencies for using cloud computing application in self-directed learning based on the Staged Self-Directed Learning model by Grow [22] was applied on the students.

	Student	**Teacher**	**Examples**
Stage 1	Dependent	Authority, Coach	Coaching with immediate feedback. Drill. Informational lecture. Overcoming deficiencies and resistance.
Stage 2	Interested	Motivator, Guide	Inspiring lecture plus guide discussion. Goal setting and learning strategies.
Stage 3	Involved	Facilitator	Discussion facilitated by teacher who participates as equal. Seminar. Group projects.
Stage 4	Self-directed	Consultant, Delegator	Internship. Dissertation. Individual work on self-directed study group.

Table 2.1 The Staged Self-Directed Learning (SSDL) model
Source: Grow (1991, p. 130)

Fig. 1. The Staged Self-Directed Learning model

This questionnaire consists of 22 items. It includes a five-point response scale (always, often, sometimes, rarely, never). It includes four sub-dimensions as shown in Figure 1, and each of which represents a level of teaching competencies for using cloud computing applications in self-directed learning. They are related to the teacher's roles in self-directed learning. They are represented in the levels of Coach Authority, Motivator, Facilitator, Consultant delegator. The score is interpreted as follows: The score of 22–50 is a low self-directed learning level. A score of 51–80 is the average level and a score of 81–110 is a high level.

To verify the validity, the questionnaire was reviewed by three experts to confirm the validity. The internal consistency of the questionnaire dimensions was also verified by calculating the correlation coefficients (R) between scores of the sub-dimensions and the overall score of teaching competencies questionnaire scale of teaching competencies for using cloud computing applications in self-directed learning.

Table 5

Correlation coefficients (R) between the scores of the sub-dimensions and the total score of the teaching competency questionnaire scale of teaching competencies for using cloud computing applications in self-directed learning

	Coach, Authority	Motivator	Facilitator	Consultant, Delegator
Total score	0.595**	0.643**	0.666**	0.740**

Table 5 reveals the significance of the correlation coefficients (R) between the scores of the sub-dimensions and the overall score of the teaching competency questionnaire scale for using cloud computing applications in self-directed learning at the level of significance 0.01, ensuring the internal consistency of the questionnaire dimensions.

Results and Discussions

The first hypothesis states that self-assessment of self-directed learning skills of the faculty members of the College of Education is of a high level. The hypothesis was examined by calculating the mean, standard deviation, and percentage to calculate the level of each dimension of self-regulated learning of faculty members. Table 6 illustrates the results.

Table 6

Mean, standard deviation, and percentage of self-regulated learning dimensions of faculty members

No.	Skill	Mean	Standard Deviation	Percent	The level
1	Self-awareness	56.08	2.18	93.5	High
2	Using learning strategies	54.38	2.21	90.6	High
3	Applying learning activities	51.00	2.30	85.0	High
4	Assessment	52.13	1.87	86.9	High
5	Interpersonal skill	52.40	2.05	87.3	High
Total score		266.28	5.75	88,7	High

As shown in Table 6, the self-assessment of self-directed learning skills of faculty members of the College of Education is of a high level on all dimensions of self-regulated learning. It is a logical result, as a faculty member has gone through a long journey of learning and teaching, and they have a high degree of self-control and self-management. In addition, they have distinct mental capabilities that qualify them to carry out the responsibility of the university's learning and teaching mission at such high evaluation.

On the other hand, the second hypothesis states that teaching competencies for using cloud computing applications in self-directed learning among faculty members of the College of Education is of an average level according to their students. The hypothesis was examined by calculating the mean, standard deviation, and percentage to calculate the level of teaching competencies in self-regulated learning of faculty members of the College of Education according to their students. Table 7 demonstrates the results.

Table 7

Mean, standard deviation, mean standard error, and percentage of teaching competencies in self-regulated learning among faculty members of the College of Education

Level	No.	Competencies	Mean	Standard Deviation	Percent	Level
Coach, Authority	1	Gives traditional lectures centered on the study material.	3.66	1.04	73.2	Average
	2	Offers structured exercises.	3.02	0.87	60.4	Average
	3	Offers very specific assignments and tasks.	3.43	0.83	68.6	Average

Level	No.	Competencies	Mean	Standard Deviation	Percent	Level
Coach, Authority	4	Provides standard exercises as previously presented.	3.88	1.03	77.6	Average
	5	Offers intensive one-on-one lessons.	3.47	0.64	69.4	Average
	Total score for the first level		17.46	1.78	69.8	Average
Motivator	6	Gives lectures in an inspiring manner.	3.49	1.04	69.8	Average
	7	Provides discussions under his leadership.	3.54	0.77	70.8	Average
	8	Offers skill-based training programmes.	3.25	0.67	65.0	Average
	9	Provides teaching presentations as an expert followed by student-oriented practice.	3.22	0.90	64.4	Average
	10	Provides project-based learning with predictable results under close supervision and with encouraging and abundant feedback.	3.70	0.92	74.0	Average
	11	Combines the two elements of strong personal interaction with a strong focus on the topic of the lesson	3.44	0.71	68.6	Average
	The total score of the second level		20.64	2.11	68.8	Average
Facilitator	12	Participates with his students in the lecture as a participant in a seminar.	3.43	0.85	66.5	Average
	13	Adopts group projects which he facilitates for students (but does not direct them)	3.64	0.96	66.5	Average
	14	Develops group projects using structured assignments and standards checklists into open-ended group projects to be developed and implemented by students without close supervision.	3.15	1.13	63.0	Average
	Total score for the third level		10.22	1.26	68.1	Average

Level	No.	Competencies	Mean	Standard Deviation	Percent	Level
Consultant, delegator	15	Consults with learners to develop written standards, an assessment checklist, timeline, and management blueprint for each project they develop.	3.41	0.83	68.2	Average
	16	Holds regular meetings so that students can plan, discuss work development, and discuss problems.	3.31	0.78	66.2	Average
	17	Encourages students to collaborate and consult with each other without relinquishing responsibility.	3.06	0.92	61.2	Average
	18	Focuses on the production process and the product and encourages more advanced and meaningful student projects outside the classroom.	3.45	0.86	69.0	Average
	19	Emphasises continuous progress in life, through stages such as trainee, novice, explorer, learning master, and teacher.	3.65	0.90	73.0	Average
	20	Presents students as speakers representing each of these stages.	3.19	1.00	63.8	Average
	21	Offers biographies of role models.	3.36	0.91	67.2	Average
	22	Gives students an opportunity for self-assessment.	3.23	0.67	64.6	Average
	Total scores for the fourth level		26.66	2.62	66.7	Average
The total score of the scale			74.98	6.73	68.2	Average

Table 7 shows that self-assessment of self-directed learning skills of the faculty members of the College of Education has an average level for all teaching competencies in self-regulated learning. This is due to the diversification of methods and levels of teaching through self-regulated learning to take into account individual differences based on the learner's ability to follow self-learning activities and assignments provided by a faculty member. The teacher will reach a certain level that enables him/her to achieve the learning goals of his/her students.

Finally, the third hypothesis states that there is no significant relationship between self-assessment of utilising cloud computing in the development of self-learning teaching competencies for faculty member and their teaching competencies for utilising cloud computing applications in self-directed learning according to their students. The hypothesis was examined by calculating the correlation coefficients between the scores of faculty members using the two scales of self-assessment of teaching competencies for using cloud computing applications in self-directed learning and the scale of teaching competencies for using cloud computing applications in self-directed learning among faculty members of the College of Education. The results are presented in Table 8.

Table 8

Correlation coefficients between skills of self-directed learning and teaching competencies for using cloud computing applications in self-directed learning among faculty members of the College of Education

No.	Self-directed learning skills	Correlation coefficient Teaching competencies for using cloud computing applications in self-directed learning	Statistical significance
1	Self-awareness	0.188	non-statistically significant
2	Using learning strategies	0.193	non-statistically significant
3	Applying learning activities	0.154	non-statistically significant
4	Assessment	0.167	non-statistically significant
5	Interpersonal skill	0.152	non-statistically significant

From Table 8, it can be noticed that the correlation coefficients between teaching skills to develop self-directed learning and teaching competencies for using cloud computing applications in self-directed learning among faculty members of the College of Education are all non-statistically significant. The values of the correlation coefficients fluctuated between 0.152 and 0.193, which

are non-statistically significant values, meaning that the third hypothesis has not been achieved. The faculty member's possession of self-regulated learning skills does not necessarily mean that he/she has the competencies of using the self-regulated learning approach in teaching.

Conclusion and Recommendations

The current study aimed to uncover the reality of using cloud computing to develop the teaching competencies of a selected sample consisting of 48 faculty members working in the College of Education at Jouf University. The study also includes 103 students from the same college. The study uses the descriptive method by applying the questionnaire as the main tool for data collection. The results shows that self-assessment of using cloud computing to develop self-learning teaching competencies among faculty members is of a high level, while the teaching competencies for the application of cloud computing in self-directed learning among faculty members are of an average level according to their students. The results also shows no significant relationship between self-assessment of teaching competencies for using cloud computing applications in self-directed learning and their teaching competencies for using cloud computing applications in self-directed learning among faculty members according to their students. Based on these results, the recommendations of the study include:

1. It is necessary to hold regular specialised training courses and workshops on the importance of acquiring skills of using cloud computing applications in self-directed learning for faculty members of the College of Education.

2. Encouraging colleagues in the department to participate in assessing the performance of fellow faculty members concerning the development of skills to use cloud computing applications in self-directed learning.

3. The university must strive to rely on the skills of using cloud computing applications in self-directed learning to provide faculty members with sustainable research capabilities through educational courses, providing modern technical tools, and continuous training.

4. There must be cooperation between each of the supporting deanships which provide adequate training on acquiring skills for using cloud computing applications in self-directed learning and faculty members of the College of Education.

5. There must be continuous training on the use of all modern educational technologies to enable faculty members to obtain information permanently.

6. Providing and making available specialised databases and electronic dictionaries for faculty members to provide easy and quick access to information.

7. Providing faculty members with permanent access to the Internet to access electronic information tools on an ongoing basis.

8. It is necessary to provide a combination of recognised forms of education and tools of information technology in the lectures given within the College of Education.

9. It is necessary to allow sufficient time for a faculty member to conduct scientific research through the acquisition of the skills of using cloud computing applications in self-directed learning.

10. Giving privileges to faculty members who improve their teaching performance based on the skills and abilities they have acquired due to the use of cloud computing applications in self-directed learning.

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