The Eighth Study

Self-Directed Learning as a method of Professional Development for Computer Science Teaching

التعلم الذاتي كطريقة للتنمية المهنية لتدريس الحاسب

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Abstract

Fast changes in education exceed the capacity of formal educational practices to reply to new learning requirements. Therefore, the future of education will frequently include an emphasis on skills and activities such as Self-Directed Learning. This research investigates the self-directed learning of Computer Science teaching among Computer Science teachers in Saudi Arabian schools as a way of professional development. This study aims at investigating the relationship between Self-Directed Learning and Computer Science teachers' practice in school settings.

The study was conducted using a questionnaire inspired by previous literature and the research question: Why do Computer Science teachers engage in Self-Directed Learning professional development? The questionnaire was answered by 352 teachers from Saudi Arabian schools with both sexes represented.

The questionnaires were evaluated by virtual honesty, factor analysis and Cronbach-Alpha. Six hypotheses were tested at the 0.05 level of significance.

The data shows that among the Computer Science teachers participating in the study: (a) female teachers are more engaged in self-directed learning than male teachers.; (b) the participants agreed on the total of average scores of the questionnaire on learners' self-directedness in the workplaces and self-reflection, planning, reasons and professional development for Computer Science teachers. The recommendation ended to supply Computer Science teaching internet material resources and make them easy and accessible for all Computer Science teachers' communities.

المستخلص:

التغييرات السريعة في التعليم تتجاوز قدرة الممارسات التعليمية الرسمية على الاستجابة لمتطلبات التعلم الجديدة. لذلك سيتضمن مستقبل التعليم في كثير من الأحيان التركيز على المهارات والأنشطة الذاتية. هذا البحث يعرض أسلوب التعلم الذاتي الموجه كطريقة للتنمية المهنية في تدريس علوم الحاسب بين المعلمين في مدارس المملكة العربية السعودية. تهدف هذه الدراسة إلى التحقق من العلاقة بين التعلم الذاتي الموجه وممارسة معلمي علوم الحاسوب في البيئات المدرسية.

أجريت الدراسة باستخدام استبانة مستوحى من الأدب السابق وكان سؤال البحث: لماذا ينخرط معلمو علوم الحاسب في التطوير المهني للتعلم الذاتي؟

تمت الإجابة على الاستبانة من قبل ٣٥٢ معلمًا ومعلمة من مدارس المملكة العربية السعودية. تم تقييم الاستبيانات من خلال الصدق الافتراضي وتحليل العوامل ومعامل Cronbach-Alpha. تم اختبار ست فرضيات عند مستوى دلالة ٠.٠٥.

تظهر البيانات أنه من بين معلمي علوم الحاسب المشاركين في الدراسة: (أ) تشارك المعلمات في التعلم الذاتي أكثر من المعلمين الذكور. (ب) وافق المشاركون على إجمالي متوسط درجات الاستبيان حول أهمية التعلم الذاتي للمعلمين. من التوصيات ضرورة توفير موارد مفتوحة المصدر ومتاحة في الإنترنت لمهارات وأساليب تدريس علوم الحاسب وجعلها سهلة وفي متناول جميع معلمي علوم الحاسب.

Keyword

I. Background

Teachers occupy an important and influential position in any society. Accordingly, educational researchers pay attention to the development and growth of teachers' professional performance. This is shown in the several understandings of the concept of professional development posited by the previous studies (Borko, 2004), (Bubb & Earley, 2007), (Mansour, Alshamrani, Aldahmash, & Alqudah, 2013), (Quste, 2012) which includes self-improvement of teacher planning, continuous learning and long-life learning to improve their educational practices. Computer Science (CS) improves technical capacity in people's lives, and there is currently an exceptional interest in making CS a core topic in K-12 schools (Cuny, 2012). All Education agencies want to increase the quality of teaching with the aim of influencing students' learning outcomes. Teachers at the beginning of their teaching career have different aims for learning, due to differences in their study background. Hopefully, teachers should plan a personal learning study in order to identify the skills needed during the teaching career.

It is required of all teachers to gain points while they are in their journey in professional teaching development. One way to achieve this is to take part in Self-directed learning. Self-directed learning is known as a tool for continuous learning or long-life learning. It is a teacher-centric method of learning. Teachers assume to achieve their professional growth and performance gradually in all aspect's pedagogy, core knowledge of a subject. Researchers have shown that self-directed learning transforms professional knowledge into practices, and this has been successful in a community school (Bubb & Earley, 2007). Teachers' professional development opportunities available within and outside the schools, either aims to assess and develop the professional performance of teachers and this suffices for professional needs. Professional development is a way to achieve growth in a career. A positive impulse is needed in order to achieve such career growth. Teachers should adopt self-directed learning as one way to make a change in professional teaching, being sensitive to professional responsibilities and the audacity of its teaching influence on students. The school principals, educational supervisors, parents, experts, and educational specialists must facilitate the possibility of leading the development of teachers self-directed learning in professional development and make sure they have the capacity to sustain this strategy.

Menekse, who did a review study on CS teacher Professional Development (PD) in the US, opined that there was a limited number of collaborations between schools and universities. Indeed, all of the CS professional developments period was less than a week and the training program lacked focus on pedagogical

content (Menekse, 2015). Alakeel stated the lack of quality of teaching CS in Saudi Universities due to the insufficient professional development in teacher training, especially in the CS domain (Alakeel, 2015). Aldogry stated that CS teachers in SA need more training programs in the form of face-to-face learning or distance learning to increase the capacity of computer engineering and computer mathematics competencies (Aldgry, 2018). Almazroa and Alshamrani identified five recommendations as a critical analysis of the situation of Saudi science teachers' professional development. The five points are reforming a teacher community of practice, distinguishing between learning and training, encouraging the long-term learning process, understanding curriculum through inquiry and offering support to teachers (Almazroa & Al-Shamrani, 2015). The Ministry of Education in SA should start partnering with universities, international institutions or specific companies to get the latest experiences in professional development and involve the teachers in designing and evaluating the processes (Alghamdi & Li, 2011).

In this study, the researchers were influenced by the Self-Directedness in the Workplace which was developed BY (Hogg, 2008) and modified into CS teaching. The questionnaire assessed CS teachers' readiness for self-directed learning as part of teachers' PD.

II. Teachers Professional Development in SA

Professional Development (PD) is one important mechanism not only in teaching career but also in a different area of the human profession for advancing a higher standard. The American Association for the Advancement of Science classified the most important of PD, especially in pedagogy, into four points. First, helping teachers to understand the special expertise related to their teaching. Second, PD requires learning the skills needed. Third, encouraging teachers to develop professionally and, finally, motivating teachers to raise teaching quality (Borko, 2004).

Researchers focus on the importance of PD targeting teachers to the quality of the program.

In SA, under the General Administration of Teacher Preparation Programs In 1975, the teachers' PD programs were started. Then, in 1981, it became the General Administration of Educational Guidance and Training. Seventeen years later, the name was changed to the General Administration for Educational Training and Scholarships. There were two types of PD programs: Teacher Coaching and Scholarships for teachers to complete their study. In 2003, a department for training and scholarship was launched in each of the forty-nine educational offices throughout the SA. Since 2017, the National Educational Center for Professional Development, (NECPD) has been taking this path. The NECPD is an independent agency and placed under the Ministry of Education. The main goal is to improve the quality of teacher performance and educational leadership, through the organization of professional development processes in accordance with an effective scientific methodology. This is to ensure continuous professional growth based on specific professional standards, meet the needs of the school as a professional learning community, build its competence and achieve a high level of student success. The NECPD was established on a four-point agenda in relation to teachers' professional development: First, control the quality of professional development in the educational sector. Second, conducting research and scientific studies related to professional development. Third, counselling the stakeholders in the educational sector. Fourth, providing specific programs for a special subject (The Education Evaluation Commission, 2018).

Nowadays, in Saudi Arabia, the new system of teachers' license is being approved under the Education and Training Evaluation Commission (ETEC). The teacher's license aims to increase the quality of teaching practices, motivate self-directed learning, ensure adherence to the national teaching standards and emphasize the minimum professional competence. In order to be certified as a teacher, the appointed teacher must get a teacher's license. There are four categories of teacher's license, these are the graduate teacher, the practitioner teacher, the advanced teacher, and the expert teacher.

The graduate teacher is the newly appointed teacher and considered as a training arena for a new entrant into the teaching profession. The practitioner teacher is

the one who completed the period of experiment successfully and is being licensed. The advanced teacher is the one who has a wide understanding of teaching and shows high-quality practices. The expert teacher is the ideal teacher who has a broad understanding of teaching and is a leader of initiatives. The graduate teacher's license refers to graduates who are qualified to enter the teaching profession temporarily after being licensed following the successful completion of induction programs from teacher training institutions. The practitioner teacher's license includes those who have successfully obtained the full license, gained experience in teaching practices and in subject content knowledge, possess the skills to continually develop as they are experience and expectations in the classroom and the school, and continually expand the effectiveness of their teaching strategies and enhance student growth and achievement. The advanced teacher's license includes those who demonstrate a comprehensive understanding of the complex nature of teaching, continue to enhance their knowledge and skills, employ advanced teaching methodologies to deepen and improve students' learning, support and mentoring others, and contribute to the professional development of their colleagues. The expert teacher's license refers to those who play a leadership role at the school, neighborhood and professional level, and lead the initiatives and work actively to evaluate and improve programs at the school level (The Education Evaluation Commission, 2018).

The Education Evaluation Commission announced that it will begin issuing the vocational license for teachers by the middle of this year (2020) to include all teachers over the next four years. The requirements include obtaining an academic qualification, qualification assessment, a certain rate and passing a test based on the teachers' professional standards and the teacher qualification tests. In addition to the requirement, ability and competence in teaching would be ascertained through the supervision of teachers in the field within a specified period.

III. Self-Directed Learning (SDL)

The concept of Self-Directed Learning (SDL) is drawn from adult learning theory. It was developed by Knowles in 1968. The adult learning theory study shows how and why adults learn. Knowles identified five key assumptions which are Self-Concept, Adult Learner Experience, Readiness to Learn, Motivation to Learn and Orientation of Learning. Four central sources of SDL are explaining how to train adults. First, adults need to be involved in how their training is executed, planned, presented and they need to know what, when, and how contents are used. Second, they want to expand past experiences into new knowledge. Third, adults need to use reasoning and solve problems. Finally, they want to apply what they learnt immediately (Knowles, 1978). Recognizing that adults have their own, individual way of learning and the SDL support the idea that adults express their needs and then guide their learning. When self-directed Learning is being prepared, an individual adult will choose their own

learning strategies and an appropriate time. Similarly, in the learning spaces, where SDL often occurs, focus on the areas where learners learn based on shared interests and learn without an explicit teaching goal (Cuny, 2012). Previous studies on self-directed learning in schools opined that students were motivated but also afraid that they may have been missing important parts of the learning outcomes (Duncan, 2010).

Problems that usually accompany in PD programs are stated as follow; The presentation of the program is traditionally monotonous, a top-down model, do not actually relate to daily classrooms, ignores previous knowledge of teachers and ignores their beliefs and attitudes (Louws, Meirink, Veen, & Driel., 2017).

The training courses are the main source of teachers' PD in SA, but these courses on the ground do not deal with teachers' needs directly (Mansour, Alshamrani, Aldahmash, & Alqudah, 2013). PD requires understanding the adult learning theory. It occurs through learning to continuously meditate on teaching practices, and by providing multiple opportunities in the means of continuous professional development. The educational experts agree that the practices of SDL in PD match the contemporaneous trends, self-assessment, development needs, self-development methods, and self-development techniques. This study only considered English teachers and English supervisors as participants. Also, Qesty stated that the culture of SDL as PD among teachers is well known. This study considered all subjects, and the participants are supervisors who work in the Ministry of Education in SA (Quste, 2012). Weir and Martin stated the benefits of SDL at giving meaningful teaching and learning practices for teachers and students (Weir, 2017) (Thomas, 2013). There are studies understanding SDL from student perspectives such as (McCartney, et al., 2016), (McCartney, et al., 2010) and others understand the SDL as a way to learning style that will be used in teaching such as (Mansour, Alshamrani, Aldahmash, & Alqudah, 2013), (Patitsas, 2013), and (Postholm & Rokkones, 2015).

IV. Research Question

The goal of this study is to understand CS teachers' perception of Self-Directed Learning as a way of Professional Development in CS teaching. Indeed, the study seeks a better understanding of how CS teachers can be supported in their SDL throughout their career. This research answers the question of Why CS teachers were influenced by self-directed professional development in CS teaching?

The following questions were divided into six hypotheses as followed:

1. There is no statistically significant difference between the average of female teachers' grades and male teachers' grades after applying the SDL questionnaire.

2. It is statistically significant between the average of teachers' grades and the workplace setting factor after applying the SDL questionnaire.

3. There is statistically significant between the average of teachers' grades and the professional development factor after applying the SDL questionnaire.

4. There is statistically significant between the average of teachers' grades and the self-reflected factor after applying the SDL questionnaire.

5. There is statistically significant between the average of teachers' grades and the planning factor after applying the SDL questionnaire.

6. There is statistically significant between the average of teachers' grades and the reasons factor after applying the SDL questionnaire.

V. The questionnaire

a. Sample

The total number of CS teachers in SA is 12,228 (The General Authority for Statistics, 2019). According to the Steven K. Thompson equation to get the sample size of such a figure, the participants would be 372 (Thompson, 2012). The researchers contacted the directors of CS teachers in the Ministry of Education to distribute the questionnaire through the CS teachers mailing list. Also, there are two groups of CS teachers on Twitter and Telegram with more than 5000 members contacted for this study. Finally, only 352 questionnaires were completed. See table (1).

Table (1) The Sample Size

Sex	Male	female	Total
Total	6091	6137	N=12228
%	49%	51%	100%
Sample size	185	187	372
Data Collection	241	111	352

b. Ethics.

The researchers contacted CS teachers in SA schools for this study. Throughout this engagement, all ethics processes that were identified in Sweden and Saudi Arabia's research environment were respected accordingly. The researchers sent the official letter to the Ministry of Education in Saudi Arabia (see appendix. No. 2) to help the first author to distribute the questionnaire to all CS teachers' mailing list. The questionnaire itself was web-based (google forms). Its first page clearly stated the purpose of the study and optional participation. It was also stated that the data will only be used for scientific research.

c. The study Instrument

The questionnaire contains two parts. The first part has demographic information like age, experience, sex, weekly hours for self-directed learning and which district office that CS teacher belong to. The second part has 42 items as follows (see the appendix. No. 1):

- The first 13 statements were inferred from the development of an instrument to measure tendencies toward self-directedness in learning within a workplace setting (Almazroa & Al-Shamrani, 2015).
- From the previous literature and experts' submissions in this field the researcher developed and categorized statements from 14 to 19 as the professional development (PD).
- Also, from 20 to 27 the researchers developed and categorized statements as self-reflected.
- Also, from 28 to 36 the researchers developed and categorized statements as to planning.
- Also, from 37 to 42 the researchers developed and categorized statements as reasons.

In the validity of the scale, the researchers relied on four steps:

1) Virtual Honesty:

This concerns the general appearance of the scale or external image in terms of the type of vocabulary and how to formulate, the extent of clarity and accuracy, the correctness of the order, the clarity of instructions and the extent of the suitability of the scale for the purpose for which it was developed. It was considered the content of sincerity which is an indicator of the sincerity of the scale (Vandenberg & Lance, 2000).

The scale was presented and discussed in its initial form with a few selected experts specialized in computer education schools in SA. (See appendix. No. 3). This is done in order to note their views on the validity and comprehensiveness of the phrases to measure what it was developed for and the appropriate scale for the answer. In addition, the discussion was meant for the clarity of the wording of each phrase for teachers, and the possibility of modifying the wording or delete or add new phrases, so that the scale becomes more realistic to achieve the goal for which it was developed. Since the target sample is Saudi Arabia CS teachers and their English Language proficiency is low, all items in the questionnaire were translated to the Arabic Language by the first author and its accuracy was confirmed by a specialist in English Language teacher.

2) Factor Analysis:

Factorial analysis was applied to questions regarding the PD of teachers using the "Components Method Principal" (Hotelling, 1933). This was done in an orthogonal rotation using the Rotation Varimax method to determine the global

composition of the scale. This is one of the best methods of factor analysis in terms of accuracy in which each factor extracted the maximum possible variation. The Kaiser test proposed by Guttmann was used to take the factors whose root is Eigen value equal to or greater than the correct one to achieve the psychological clarity and clarity of the saturation. Phrases on factors as mentioned by the Statistical Software Package in Social Sciences (SPSS 25) on the study sample (Safwat, 1991). Some phrases and factors were reorganized in the light of a set of the following:

1. Maintaining the factors rooted by latent Eigen value ≥ 1.
2. Statements that have not been saturated by any factor have been saturated to an acceptable level of $\geq + 0.3$.
3. Statements that have been saturated on more than one factor of saturation reaching the acceptable level (+0.3) have been deleted.
4. Some phrases were deleted according to the omission of the factor that saturated it.
5. Factors in which only one or two phrases have been saturated are satisfactorily saturated.
6. Factors with three or more phrases are saturated, with a minimum saturation value of (+ 0.3).

This ensures better global purity of the obtained factors. Considering the previous deletions, the total number of factors was five, and the number of phrases extracted (42) distributed among these factors. The five factors derived from the factor analysis absorbed a variation of (60%) of the total variance of the variables of the global matrix.

It is noted from the table (2) that the first factor is saturated by (13) statements with an underlying root (13.47), and the ratio of variance (32.07%), and these phrases revolve around the Learner Self-Directedness can be called this dimension after the Learner Self-Directedness in the school.

Table (2) Phrases with saturation function of the first factor

Statement NO	Statement	Component
1	I go out of my way to improve my work-related skills.	.560
2	I motivate myself to learn something new about my work.	.660
3	I make a special effort to keep up with developments in my job.	.712
4	I am constantly on the lookout for courses or books about my work.	.665
5	I often read to improve my work-related knowledge and skills.	.692
6	I frequently investigate opportunities to learn more about my work.	.718
7	It is exciting to learn new things that widen my work-related skills.	.621
8	I enjoy reading about different aspects of my work.	.634
9	I am keen to develop my work-related knowledge and skills.	.749
10	I get excited when I learn new skills.	.599
11	I enjoy learning new things that contribute to my work performance.	.593
12	I often choose to learn new things about work even if it does not form part of formal learning situations.	.634
13	I constantly try to keep up with development in my field of work.	.626
Initial Eigen values		13.47
% of Variance		32.07

It is noted from the previous table (3) that the second factor is saturated with (7) phrases rooted potential (4.21), and the ratio of variance (10.27%), and these

phrases revolve around the Reason can be called this dimension after the reasons for the Reason.

Table (3) Phrases with saturation function of the second factor

Statement NO	Statement	Component
36	I used SDL to develop my knowledge in the field of teaching and learning theories.	.876
37	I engage in SDL as one way to fulfil the requirement in PD.	.868
38	Meeting students' needs is one of the reasons for a teacher to practice the SDL.	.881
39	Teachers' plan for PD is also a reason for a teacher to practice SDL.	.795
40	Lack of other ways for PD such as training program, master program, Kabaret, etc makes teachers practice SDL.	.829
41	The STCS is another reason for teachers to practice SDL	.876
42	Preparing to apply for Teacher's award encourages teachers to practice SDL	.793
Initial Eigen values		4.21
% of Variance		10.27

It is noted from the previous table (4) that the third factor is saturated with (8) phrases with a potential root (3.10), and the ratio of variance (7.39%), and these phrases revolve around planning and can be called this dimension after planning.

Table (4) phrases with a saturation function of the third factor

Statement NO	Statement	Component
28	I used SDL to develop my professional skills in a student's assessment.	.883
29	I use SDL to develop my professional skills in technology usage	.876
30	I take part in SDL to develop my knowledge of CS.	.861
31	I take part in SDL to develop my knowledge in CS teaching.	.781
32	I use SDL to develop my professional skills in classroom management	.760
33	I used SDL to develop my professional skills in planning the lessons	.741
34	I used SDL to develop my professional skills in effective classroom communication	.709
35	I usually try out new teaching methods in my class	.717
Initial Eigen values		3.10
% of Variance		7.39

It is noted from the previous table (5) that the fourth factor is saturated with (6) phrases rooted in potential (2.37), and the proportion of variance (5.64%), and these phrases revolve the professional development can be called this dimension after self-learning and professional development.

Table (5) phrases with saturation indicating the fourth factor.

Statement NO	Statement	Component
14	The National Center for Vocational Education Development, NCVED motivates me to adopt SDL.	.824
15	I sometimes participate in a pedagogy program (conference, workshop, e-training and teachers' meeting)	.671
16	I sometimes use a teacher's book to equip me with the necessary knowledge that I need in CS teaching.	.712
17	I develop my teaching practices through reading books	.886
18	I develop my teaching practices through education sites on the internet	.882
19	I develop my teaching practices by discussing with colleagues	.871
Initial Eigen values		2.37
% of Variance		5.64

It is noted from the previous table (6) that the fifth factor is saturated with (8) statements with a potential root (2.00), and the ratio of variance (4.74%), and these phrases revolve around self-evaluation and can be called this dimension after self-evaluation.

Table (6) phrases with saturation indicating the fifth factor.

Statement NO	Statement	Component
20	I need to learn how I manage SDL professionally	.704
21	I sometimes do a critical reflection on my teaching experiences	.501
22	I take the supervisor's feedback into account when I plan to develop my practices.	.571
23	I take students' feedback into account when I plan to develop my practices	.592
24	I take principal' feedback into account when I plan to develop my practices	.676
25	I take colleague' feedback into account when I plan to develop my practices	.600
26	I take parents' feedback into account when I plan to develop my practices	.634
27	I use other materials (worksheet, presentation, etc) in my lessons.	.709
Initial Eigen values		2.00
% of Variance		4.74

Thus, the final number of questionnaire phrases (42) becomes five-dimensional, indicating the theoretical structure behind the scale and this is an indication of charity. (see the appendix no.4) the questionnaire after FA.

3) Internal consistency:

To verify the internal consistency, a Pearson correlation coefficient was calculated between each questionnaire statement and the overall degree of the dimension to which it belongs, to find out the correlation and consistency of the questionnaire statements. In table (7) the correlation coefficients between the dimension and the total score of the questionnaire is displayed.

Table (7) correlation coefficients between the dimensions

Dependent Variable	The Learner Self-Directedness	PD	Self-reflected	planning	Reason
Correlation coefficient	.831**	.674**	.695**	.785**	.612**

* (0.05), ** (0.01)

It is clear from the previous tables that the terms of the professional development questionnaire have strong correlation coefficients and statistically significant with the overall degree of the dimension to which they belong, and this indicates that the questionnaire in his words has a high internal consistency.

4) Cronbach- Alpha stability:

The value of the alpha coefficient for the test was calculated at 0.942. This is sufficient evidence that the test has a high stability coefficient, as shown in the following table (8):

Table (8) Alpha-Cronbach coefficient for each dimension and total score of the scale

Dependent Variable	The Learner Self-Directedness	PD	Self-reflected	planning	Reason	Total
Cronbach's Alpha	0.912	0.922	0.823	0.905	0.947	0.942

VI. The Results

In this chapter, the researchers significantly present the empirical results raised in the study. Besides, it also checks the validity of the research hypotheses. In order to complement the area in which the current study took place, the following is a breakdown:

Verify the first hypothesis, which states: " There is no statistically significant difference between the average of female teachers' grades and male teachers' grades after applying the self-directed learning questionnaire". The researcher used the "T" test for two independent samples T-Test Two.
 The presence of statistically significant differences at the level of significance (0.01) in the self-orientation between the average scores of teachers after the application of the self-directed questionnaire in favor of females, where the value of "T" (2.628). Indeed, there were statistically significant differences at the level of significance (0.05) between the average scores of CS male and female teachers after applying the self-directed questionnaire in favor of females (planning and scale as a whole) where the value of "T" (2.493, 2.164,

respectively). However, there were no statistically significant differences between the average scores of male and female teachers after applying the self-directed questionnaire in (professional development, self-evaluation, and the reasons). See the table (9).

Table (9) Descriptive Statistics for the CS Female and Male Teachers

Dependent Variable	Type	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
The Learner Self-Directedness	Male	241	55.78	6.634	-2.628	350	.009
	Female	111	57.74	6.189			
PD	Male	241	23.50	3.781	-.919	350	.359
	Female	111	23.88	3.213			
Self-reflected	Male	241	33.33	4.313	-.605	350	.545
	Female	111	33.62	4.050			
planning	Male	241	34.00	4.344	-2.493	350	.013
	Female	111	35.22	4.095			
Reason	Male	241	27.54	4.078	-1.519	350	.130
	Female	111	28.25	4.122			
Total	Male	241	174.15	18.938	-2.164	350	.031
	Female	111	178.71	17.140			

Verify the second hypothesis, which states: " There is statistically significant between the average of teachers' grades and the workplace setting factor after applying the self-directed learning questionnaire." The researcher used T-test, and the researchers used the 5-point Likert Scale to interpret the interval, see the table (10).

Table (10) 5- point Likert Scale

Response	Scale	Interval	Level
Extremely agree	From 1 to 1,79	.79	Low
Agree	From 1.80 to 2.59	.79	
Neutral	From 2.60 to 3.39	.79	Moderate
Disagree	From 3.40 to 4.19	.79	High
Extremely disagree	From 4.20 to 5.00	,80	

The table (11) shows that the weighted average of section (1) was 4.34 with Std. Deviation .504, which indicates that the trend of "The Learner Self-Directedness in the Workplace Scale (SDL)" is (Extremely Agree), as a general trend is 4.34. According to the table (11), It lies in the interval [4.20 – 5.00] which is considered a high level.

Table (11) Descriptive Statistics for the Questionnaire

Section	Section	Mean	Std. Deviation	Trend
1	The Learner Self-Directedness in the Workplace Scale (SDL)	4.34	.504	Ex, agree
2	The Professional Development	3.94	.602	Agree
3	Self-reflected	4.18	.529	Agree
4	planning	4.30	.537	Ex, Agree
5	Reason	3.97	.586	Agree

Verify the third hypothesis, which states: "There is statistically significant between the average of teachers' grades and professional development factor after applying the self-directed learning questionnaire." The researcher used a T-test.

The weighted average of section (2) was 3.94 as shown in the table (11) with Std. Deviation .602, which indicates that the trend of "The Professional

Development" is (Agree), as a general trend according to the table (10) is 3.94. It lies in the interval [3.41 – 4.20] which is considered a high level.

Verify the fourth hypothesis, which states: "There is statistically significant between the average of teachers' grades and the self-reflected factor after applying the self-directed learning questionnaire." The researcher used a T-test.
The weighted average of section (3) was 4.18 as shown in the table (11) with Std. Deviation .529, which indicates that the trend of "The Self-reflected" is (Agree), as a general trend according to the table (10) is 4.18. It lies in the interval [3.41 – 4.20] which is considered a high level.

Verify the fifth hypothesis, which states: "There is statistically significant between the average of teachers' grades and the planning factor after applying the self-directed learning questionnaire." The researcher used a T-test.
The weighted average of section (4) was 4.30 as shown in the table (11) with Std. Deviation .537, which indicates that the trend of "The Planning" is (Extremely Agree), as a general trend according to the table (10) is 4.30. It lies in the interval [4.20 – 5.00]. that consider a high level.

Verify the sixth hypothesis, which states: " There is statistically significant between the average of teachers' grades and the reasons factor after applying the self-directed learning questionnaire." The researcher used a T-test.
The weighted average of section (5) was 3.97 as shown in the table (11) with Std. Deviation .586, which indicates that the trend of "The Reason" is (Agree), as a general trend according to the table (12) is 3.97. It lies in the interval [3.41 – 4.20] which is considered a high level.

All of all, the total average of the self-directed professional development questionnaire is 4.18 with Std. Deviation .440. It is considering a high-level trend.

VII. Discussion

In this study, it is statistically (significant) shown that CS teacher female engages in the workplace and planning processes more than male. Essentially, the Saudi cultural perspective has been understood to this trend in the workspace and planning processes (Baki, 2004). Indeed, the female teacher is more engaged in self-directed learning than male not only in the education sector but also in business (Guglielmino, Guglielmino, & Long, 1987). The female teacher's engagement is understood when the correlation coefficient is being applied between CS teachers and the path of self-directed learning for professional development.

In the Self-Directedness in the workplace, the result shows that the trend is extremely obvious in all statements and the highest three refer to are excited, enjoy and new skills in workplaces (the school in this situation). This is a positive direction for teachers to feel such in their self-directedness. It is a signal of the readiness of involvement in professional development. However, the lowest three statements in this factor need more attention where the participants do not strongly agree to enjoy reading a book or like to learn something different than their area. Indeed, the CS teachers are ready to engage in self-directed learning as driven from adult's theory. That means the stakeholders in the education sector need to take care and facilitate the materials to support the self-directed learning trend.

In professional development, the outcome agreed and confirmed the appropriate recourse for self-directed learning is the internet platform, it is the same with the study (Cuny, 2012) (Aldgry, 2018) (Borko, 2004). The policymaker or service provider should move away from this tool to support more materials. Indeed, the second-high statement was the discussion with a colleague. Also, this will increase adaption to self-directed learning strategy since the teachers will get feedback from the familiar person on the same path. The colleague is playing an important role to adopt self-directed learning as shown in the study (Hogg, 2008) (Almazroa & Al-Shamrani, 2015). However, CS teachers disagree and have not fully interacted with the National Center for Vocational Education Development, NCVED. Non-interaction of CS teachers with NCVED could be as a result of poor marketing of its work since it has started two years ago or self-directed learning strategy is part of its responsibilities. Appending topics and catching the teacher will improve the self-directed learning strategy, then, independent learning will improve in CS teachers. Indeed, the participants disagreed to attend the program and workshop offered by the Ministry of Education. This is a reason why CS teachers take the path of self-directed learning strategy. In order to fulfil what they need. The Ministry of Education should be wary of what kind of silks the CS teachers are looking for and aiming to contact CS teachers before they organize the training program.

In the self-reflected, the students and colleague feedback were the common factors for self-reflection. It is natural that these two statements were high in agreement among the participants because of the human natural response to the issue. This is like the research outcome of the Menekse study (Menekse, 2015). It is also noted that students help CS teachers to identify their weaknesses which prompt CS teachers to learn new strategies and implement them as soon as possible. Similarly, CS teachers are encouraged by their colleagues to learn new strategies or take a course toward skill development. The research shows that the influence of students and CS teachers are strong in terms of relationship to self-directed learning strategies. However, the parents and

principal influence have a poor relationship with self-directed learning or strategies being adopted by CS teachers. a

In the planning, the participants opined that self-directed learning is a tool to learn and search for more knowledge in core CS and pedagogy. This is evident from the most topic teachers wanted to spend more time in order to grasp the knowledge as rightly revealed by the research. Even though the CS pedagogy is being ranked second among the participants, this is because of the excellent awareness of pedagogy among the CS teachers. However, using new teaching methods and planning the class are considered insignificant factors influencing self-directed learning. The self-reflection has been stated by the participants as one of the reasons CS teachers think and learn topics related to CS core and CS teaching.

In the reasons, research shows that students' need, and CS teacher's personal plan are being ranked most significant to self-directed learning among CS teachers. This is like the research outcome of other studies (Menekse, 2015) (Aldgry, 2018). However, the teacher's award and the STCS are being ranked by the participants as less significant to self-directed learning. Meanwhile, self-directed learning is a tool for CS teachers to learn what they need in order to apply for a teacher's award (Alghamdi, Pears, & Nyl´en, 2018) and STCS encourages teachers to involve in self-directed learning. The researchers stated that the teacher's award and the STCS are new systems and CS teachers in SA should be aware of their ability to deal with the new system and engage more with self-directed learning strategy.

VIII. Conclusion

This study investigates how CS teachers learn on their own. The research shows the correlation between their self-directedness in the workplace, self-reflection, planning, reasons for engaging in self-directed learning and professional development. The researcher stated that the number of participants was few. It is essential that more investigations are conducted to verify the results of this study. However, the result is significant and essential to the CS teacher's community. The results of this study stated the differences between CS female teachers and CS male teachers. Also, this study stated the most significant factors influencing self-directed learning among CS teachers. This study suggests that the training program should be considered and the need for CS teachers elaborate on the resources that would suit self-directed learning. It is also stated in the research that the students and colleagues are more significant to influence CS teachers' Self-Directed Learning strategy. Indeed, the research also submitted that CS teachers should pay more attention to a good resource that contains updated knowledge in CS and pedagogy. In the future, the author will investigate the suggested design structure of the workshop in order to increase the self-directed learning strategy among CS teachers.

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