Awareness of Cognitive load theory among expert and novice language teachers

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Abstract:

This study investigated the awareness of the concept of cognitive load among a group of 194 language teachers of Arabic, English and French in Egypt. It tried to investigate the teachers' knowledge of the Cognitive Load Theory, their practices linked to that concept ; their attitudes towards it and whether gender, type of language and experience make any difference in the teachers' awareness. By using an online scale and interviews, teachers showed limited knowledge of the theory of cognitive load and that language type, experience or gender made no difference in their actual practices in class. Despite that, teachers' levels of attitudes towards the concept and its related activities came high. The study ended with some conclusions and suggestions for further research.

Key words: Cognitive Load, Teacher Preparation Programmes, Continuous Professional Development, Teacher Awareness.

Introduction

The main philosophy deriving this research is that when teachers understand the language they teach and are able to analyse it, this will positively contribute to their teaching effectiveness. Understanding and analysing are two conceptions for expressing what is named as awareness. Consequently, teacher language awareness (TLA) has become a major concern in language education. It is a label applied to research and teacher development activity that focuses on the interface between what teachers know, or need to know, about language and their pedagogical practice (Andrews and Svaleberg, 2016). This language awareness movement, arisen at the end of the last century, has embraced both mother-tongue and second-/foreign-language teaching, and sought to find ways of improving the language awareness of both students and their teachers. The basic argument of such movement was that people who are able to analyse and describe the language accurately are likely to be effective users of such language.

An early major contribution to thinking about TLA was made by Edge (1988) in a short paper in which he outlined the three main roles or competences that the teacher trainee needs to develop: *language user*, dependent on the teacher's language proficiency and determining that teacher's adequacy as a model for students; *language analyst*, dependent on the teacher's language systems cognition base and referring to the ability to cognate the workings and loads of the target language; and *language teacher*, dependent on familiarity with a range of

language procedures and possession of sufficient theoretical professional knowledge or cognition that helps taking appropriate decisions about using those procedures. TLA has obvious connections with all of these competences and not just subject matter cognition about the language systems. This is due to the fact that "the variety of activities and loads related to language awareness has made it increasingly difficult to pin down the concept" (Andrews, 2007). However, in most cases, language awareness (LA) has been viewed, then, as teachers' knowledge about language or as expressed by Thornbury (1997: x) "the knowledge that teachers have of the underlying systems of the language that enables them to teach effectively".

Brog (2003) and Lindahl (2013) detailed the conceptualisation of Thornbury about TLA by asserting that each construct, named as domain, is a composite of elements and features that are not distinctive of their own and have overlapping features. They added that the declarative, procedural and strategic knowledge about the language, the teachers' past school experience, the professional coursework they completed, the contextual loads affecting their practices and their students' performances, and the actual classroom practices have all constructed their awareness and cognition of their teaching practices.

Cognitive load theory (CLT), as proposed by Sweller (1988), is such a theory that can help analysing and illuminating that kind of linguistics, professional and procedural domains imposed on teachers. It is a cognitive as well as an instructional theory derived from the field of cognitive psychology and has become one of the most influential theories in guiding instructional designs and implementation. It enables professionals to discuss teaching approaches based on the knowledge of human cognitive architecture. This cognitive architecture as explained by Torcasio & Sweller, 2010, is composed of a natural information processing system, which collects information provided by the sensory memory, creates novel information, stores it, and is able to disseminate it over a long distance and time.

The cognitive load theory pays attention to that cognitive structure and place unusual emphasis on the role of working memory (WM) in creating and storing information to be transferred to and stored in long-term memory (LTM) for following use. WM is severely limited in terms of capacity and duration that we can only deal with two or three pieces of information at the same time (Sweller, VanMerrienboer & Paas, 1998). Consequently, if the complexity of the instructional materials is not properly considered, either by teachers or students, in terms of size and schemata, this surely yields in a

cognitive mental overload on students, combined with plethora of information, and hence bringing about reduced performance on tasks and ineffective learning outcomes (Paas, Renkl & Sweller, 2003; Sweller et al., 1998). In other words, learning means storing information in LTM to be used later, which is to say, if "nothing has been stored in LTM, nothing has been learned" (Torcasio & Sweller, 2010, p. 660). Teachers' awareness of such domains and loads is essential then for better performance by teachers and students.

Types of Cognitive Load (CL)

Feldon (2010, p. 18) defined CL as "the number of separate chunks (schemas) processed concurrently" in WM in learning or performing a task, plus "the resources necessary to process the interaction between them."   Based on this interrelation of instruction designs and CL, the theory presumes that the total load should stay within WM limits if learning is to occur (Sweller, 2005). There are three independent sources of CL in learning: intrinsic, extraneous, and germane.

Feldon (2010) defined the intrinsic cognitive load as "the inherent complexity of the material (for instance: information, vocabulary, grammar, etc.) to be learned" (p.18). Sweller (2010) defined intrinsic CL as the number of elements concurrently processed in WM to "understand and learn material under instruction" (p. 41). It is due to a large number of elements processed in WM simultaneously (Mayer & Moreno, 2010).

Extraneous load, on the other hand, refers to "information in the instructional environment" that occupies WM space but has no assistance in understanding or solving the problem, and no contribution to learning (Feldon, 2010, p. 18; Mayer & Moreno, 2010). In Sweller words, (2010) extraneous load is the interacting elements, which should be reduced by the devised principles of CLT. For instance, when an EFL teacher introduces the word "Halloween," for students to learn, s/he presents a picture of a pumpkin. However, without cultural background knowledge about this western tradition, the picture of pumpkin may not help them understand the word "Halloween," which exerts extraneous CL.

The last type of loads is the germane load. It is the effort put in the "necessary instructional scaffolding" and in "learning concepts that facilitate further content learning" (Feldon, 2010, p. 18). Germane load is caused by motivating learners to make effort toward understanding and learning.   In the case of helping those learners understand the word "Halloween" which does not exist in their native culture, teachers may use some local festivals to start. Then teachers introduce Halloween and compare this Western festival with their native festivals.

Teachers may even go further to guide students list their understanding of differences and similarities. Such scaffolding or facilitating from teachers are germane CL.

Taking these three types of CL together, a learning task presented to learners may exert different levels of CL upon different individuals due to their level of relevant prior knowledge—schema (Feldon, 2010). Perhaps most importantly is the case when there is too much to process. In other words, when CL exceeds WM's capacity to process it, learners will have substantial difficulties in learning; indeed there will be *overload.* The example would be that the word "Halloween" could be overload to students' working memory because they perhaps, have not developed phonetic awareness of the word syllables; its spelling or meaning .CLT aims to avoid such overload of learners' cognitive systems and optimize the use of WM, in detail, by reducing extraneous CL   so as to promote the use of cognitive resources into germane CL, or by supplying appropriate prior knowledge content to students so that the intrinsic load of the new material does not occupy all the available WM resource (de Jong, 2010; Feng, 2011; Feldon, 2010; Mayer & Moreno, 2010). However, it should be noticed that if additional activities designed to enhance germane CL exceed learners WM limitations, the germane load could become an extraneous load and debilitate learning as well (de Jong, 2010).

Teachers' awareness and understanding of such loads, and the complexity of their constitution is a key issue for recognising their influences and reducing them to the putative level. Based on that, the current study aimed at investigating language teachers' awareness of the different types of cognitive load and their influences on the performance of both teachers and students. To achieve this aim, the following main question was hypothesiesd:

What is the level of awareness of native and foreign language teachers of cognitive load and its reduction strategies?

1. To gain an answer to this question, the following sub-questions were postulated: 1. To what extent are language teachers (native and foreign) aware of the cognitive aspects of cognitive load?

2. To what extent are language teachers (native and foreign) aware of the procedural aspects of cognitive load?

3. What are language teachers (native and foreign) attitudes towards cognitive load and its decrease strategies?

4. **What are the modifications necessary for language teachers' preparation programmes in the light of their awareness of CLT?**

Methodology

Research design

To gain answers to the aforementioned research questions, the researchers adopted a mixed method research design for collecting quantitative and qualitative data. The purpose for adopting this is that the awareness phenomenon is such a complex one that one type of data is difficult to delineate.

Participants

Language	Gender		Total	Experience			Total
	Male	Female		Less than 5	5-10	More than 10	
Arabic	48	90	138	102	11	25	138
English	19	29	48	35	4	9	48
French	4	4	8	3	3	2	8
Total	71	123	194	140	18	36	199

The participants of the study were 194 language teachers enrolled in the study. They were different in terms of gender, experience, educational background and specialisation. Table (1) gives a full account about them. The sample of 194 teaches may not represent the whole population. Also, possible idiosyncratic differences among participants cannot be controlled in any way. Taking these limitations into account, the results should be interpreted with caution.

Instruments

A multidimensional cognitive load awareness scale (CLAS) was prepared by the researchers with the purpose of measuring the different components of teachers' awareness of the cognitive load. The scale comprised of 78 items distributed on four dimensions. The first part of the questionnaire included the following demographic topics: age, gender, status of institution, highest academic degree, major/field of study, year of graduation (highest degree), and teaching experience. The second part of the questionnaire included statements about teachers' knowledge of cognitive loads to which the participants answered using a 5-point Likert scale on their level of agreement (strongly disagree, disagree, neutral, agree and strongly agree). Part three consisted of items related to their procedures towards

reducing the level of loads on their students. The last section of the questionnaire tackled teachers' attitudes towards the concept and the reduction strategies. It should be noted that the last three parts correspond to the three research questions of this study.

Before distributing this modified scale to the actual participants, it was pilot-tested on 40 teachers to predict accurately the effectiveness of scale instruments, plans for distribution and receipt of answers, the proportion of a target sample that will participate in the survey, and the time necessary to complete the survey (Brown, 2001 and Dornyei, 2007). The scale revisions took account of the feedback provided by those volunteer teachers regarding the aforementioned features. To check its reliability, the scale was subjected to statistical analysis by means of SPSS and the Alpha Cronbach score obtained was 0.858 which means it is reliable enough to be finally administered on the participants of the study. Consequently, the scale was distributed by means of online google drive. After sending out the emails containing the consent form, instructions and the link that would direct the respondents to the questions once they chose to participate, the researchers simply waited for their data to get into the account at the website. It took approximately 30 minutes from each participant to complete the scale.

Data analysis.

The data retrieved were organized into the four major sections outlined above. The demographic data were then analyzed question by question in terms of percentage (except age and teaching experience that included the mean and the standard deviation (SD) while the mode and the median were added to year of graduation data presentation) and summarized in a table presented at end of the section. Depending on the nature of the question, some individual responses were grouped for ease of interpretation. The Likert-scale items were analyzed in terms of percentages so as to produce descriptive statistics used to present an overall picture of the teachers and their attitudes toward CLT and their classroom practices. The quantitative and qualitative data were combined for ease of interpretation. Results were therefore presented using terms such as always, often, never, rarely, positive, negative or neutral according the position participants had.

Results of the study

As explained earlier, by using the two instruments for data collection; teachers' awareness scale and interviews, quantitative and qualitative data were collected. The quantitative data clarifies the awareness level of those teachers and the qualitative data interprets the reasons for such awareness and how it is formed. Presenting such data depended on the research questions previously hypothesised.

First: Teachers' awareness of the cognitive load

To examine this dimension, four categories were hypothesised: general awareness of the cognitive load and its reduction strategies; knowledge of the cognitive load, awareness of the procedures and practices related to the cognitive load, and finally teachers' attitudes towards such concept and its reduction strategies. These sub-dimensions are clarified in the following sections.

1. **General awareness of the cognitive load and its reduction strategy:**

The current research dimension sought to answer the main research question stating, "To what extent are the teachers aware of the cognitive load and its reduction strategies?"

The CLAS was administered to the research participants and the data were analysed via Wilcoxon test as the data gathered were ordinal. Furthermore, the scores attained were compared with a hypothetical mean representing the second level of awareness which was uncomplete. The following results were attained:

Table (2): Means and standard deviations of the participants' scores concerning the awareness of cognitive load scale (total score)

Mean	N	Mean	Std. Deviation
Real	194	230.5979	10.22661
Hypothetical	194	276	0

It is clear from the above table that the real mean score of the participants was 230.59 and the standard deviation was 10.22

which is less than the hypothetical mean (276). To identify the significance of differences Wilcoxon test was adopted. The following table depicts the results:

Table (3): Wilcoxon test results for the differences between the real and hypothetical mean scores of the cognitive load awareness scale (total score)

	N	Mean Rank	Sum of Ranks	z	sig
Negative ranks	0[a]	.00	.00		
Positive ranks	194	97.50	18915.00	12.08	0.00
Ties	0[c]				
Total	194				

It is evident from the above table that Z value for the differences between the mean scores was 12.08 and such value is significant at 0.01 indicating that there was a statistically significant difference between the two means in favor of the hypothetical mean which represents the second grade of awareness indicating that the level of cognitive load awareness and its reduction strategies is insufficient as the participants' awareness was very weak.

2. **Knowledge of cognitive load:**

The current research dimension sought to answer the research sub-question stating;"What is the cognitive load knowledge level among the native and foreign language teachers?". For answering the question, the real mean of the cognitive dimension was compared with a hypothetical one representing the second grade of the participants' responses as the cognitive awareness level was incomplete. The following table (table 4) represents the means and standard deviations.

Table (4): Means and standard deviations of the cognitive dimension on the scale

Mean	N	Mean	Std. Deviation
Real	194	84.13	4.57
Hypothetical	194	104.00	.00

It is clear from the above table that the participants' mean score was 84.13 concerning the cognitive dimension of the awareness scale and the standard deviation was 4.57 which is less than the hypothetical mean (104). Wilcoxon test was adopted as the scores

were ordinal in order to identify the significance of the differences. The following table characterizes the results:

Table (5): Wilcoxon test results for participants' scores on the cognitive dimension

	N	Mean Rank	Sum of ranks	Z	Sig
Negative ranks	0[a]	.00	.00		
Positive ranks	194[b]	97.50	18915.00	12.09	0.00
Ties	0[c]				
Total	194				

It is clear from the above table that the z value of the differences between the mean scores was 12.09 which is significant at 0.01 revealing that there was a statistically significant difference between the mean scores in favor of the hypothetical mean representing the second grade of the cognitive awareness. Such results indicated that the participants' awareness of the cognitive load was insufficient as their knowledge was limited.

The qualititative data supported this. On interviewing teachers, it was clear that they did not have clear knowledge of the concept. They viewed cognitive load as " *learning difficulties students face especially on understanding either while reading or other activities*, interviewee 7" or "*unsystematic accumulation of knowledge that needs classification*", interviewee 2.

Moreover, they were not able to identify the relationship between cognitive load and memory. Interviewee 4 for example said: "*remembering is the first level of knowledge, how could it be connected to cognitive load*". Interviewee 10 also pointed out that the memory can not be full. Interviewee 5 said that "*memory has nothing to do with the load. It is mainly related to the size of knowledge students gain during studying*".

3. **Awareness of the procedures and practices related to the cognitive load**

The present dimension includes three sub-dimensions of the scale, namely, features, causes, and reduction strategies of cognitive load. The real mean score of the participants was compared with the hypothetical mean which was suggested by the researchers and one sample t-test was utilized to validate the results. The table below clarifies this:

Table (6): Means and standard deviations of the cognitive dimension on the scale

Procedures and practices	Mean Type	N	Mean	Std. Deviation
Awareness of the cognitive load features	Real	194	17.72	3.034
	Hypothetical	194	24.00	.000
Awareness of the cognitive load causes	Real	194	42.31	5.491
	Hypothetical	194	56.00	.000
Awareness of the cognitive load reduction strategies	Real	194	58.54	3.840
	Hypothetical	194	72.00	.000
Awareness of the procedures and practices in general	Real	194	118.58	8.441
	Hypothetical	194	152.00	.000

The above table reveals that the participants' mean scores concerning the awareness of the cognitive load procedures and practices in general was 118.58 and the standard deviation was 8.44 and such mean is less than the hypothetical one representing the second grade of awareness. In details, the means of the CL awareness features was 17.72; of the causes of cognitive load was 42.31 and the standard deviation was 5.49 ; of the reduction strategies was 85.54 and the standard deviation was 3.84. all of these means are less than the hypothetical ones and representing a second-grade level of awareness. Wilcoxon test was utilized for verifying the significance of the differences between means as the degrees were ordinal. The following table characterizes the results:

Table (7): Wilcoxon test results for the means differences of CL features

Dimension		N	Mean rank	Sum of ranks	z	sig
Awareness o cognitive loa features	Negative ranks	0[a]	.00	.00	11.97	0.00
	Positive ranks	190[b]	95.50	18145.00		
	Ties	4[c]				
	Total	194				
Awareness o cognitive loa causes	Negative ranks	0[a]	.00	.00	12.024	0.00
	Positive ranks	192[b]	96.50	18528.00		
	Ties	2[c]				
	Total	194				
Awareness o cognitive loa reduction strategies	Negative ranks	0[a]	.00	.00	12.94	٠.٠٠
	Positive ranks	194[b]	97.50	18915.00		
	Ties	0[c]				
	Total	194				
Awareness procedures and practice in general	Negative ranks	0[a]	.00	.00	12.081	0.00
	Positive ranks	194[b]	97.50	18915.00		
	Ties	0[c]				
	Total	194				

It is clear from the above table that all z values of the differences between the real means of the teachers concerning the procedures and practices were significant at 0.01 indicating that there were significant differences between the means and all the differences were in favor of the hypotheticals means. Such results indicated that the participants awareness of the sub-dimensions, namely, the cognitive load features, causes, reduction strategies, procedures and practices in general was weak.

Qualitative data obtained through interviews supported the quantitative data since the teaches were not able to identify

definite features of the cognitive load. They just articulated some superficial manifestations that could be attributed to cognitive load or others such as forgetting (interviewees 6,3,4), boredom (2,5), or asking teachers to stop teaching (3,2,6,10).

As for the causes of cognitive load, most of them confirmed that the size of knowledge presented to students is considered the main reason of cognitive load. In addition, methods of presenting the information is another reason suggested by Interviewees 7 and 10.

Most teachers confirmed that the cognitive load can be successfully reduced by giving students extra time for clarification. Some other strategies were suggested by individual teachers such as "*using games*" suggested by interviewee, "*discussion*" suggested by interviewee 3 and "*using media*" as suggested by interviewee 10. Finally, interviewee 1 pinpointed the importance of *"reorganizing the educational context as a motivating agent for students to continue learning"*.

4. **Techers' attitudes towards cognitive load and its reduction strategies**

The current research dimension sought to answer the research question stating, "What are the levels of the native and foreign language teachers' attitudes towards comprehending the cognitive load and its reduction strategies?". The following table portrays the real and hypothetical means and standard deviation of the participants' responses concerning the attitudes dimension.

Table (8): Means and standard deviations of the attitude dimension

Mean	N	Mean	Std. Deviation
Real	194	27.8711	1.57996
Hypothetical	194	20.0000	.00000

It is clear from the above table that the real mean value of the teacher' attitudes was 27.78 and the SD was 1.57 which is higher than the hypothetical mean representing the neutral attitude. Wilcoxon test was adopted as the scores were ordinal in order to identify the significance of the differences. The following table portrays the results:

Table (9): Wilcoxon test results for the attitude dimension

Dimension		N	Mean rank	Sum of ranks	z	sig
Attitudes towards the cognitive load	**Negative Ranks**	194[a]	97.50	18915.00		
	Positive Ranks	0[b]	.00	.00	12.12	0.00
	Ties	0[c]				
	Total	194				

The above table explains that the z value of the differences between the real and the neutral means of the participants' attitudes was significant at 0.01 indicating that the differences between the means were in favor of the real mean showing that they have positive attitudes towards the CL and its reduction strategies.

Interviews have confirmed the above results. All interviewees believed in the necessity of enrolling in training workshops related to diagnosing the features of the cognitive load and the ample strategies for its reduction.

Second: The gender effect on the cognitive load and its reduction strategies awareness among teachers

The current research dimension sought to answer the fifth research question stating, "What is the effect of the gender on the awareness of cognitive load and strategies of its reduction?". To gain an answer this research question, an independent samples t-test was utilised for comparing the mean sores of the males and females in the light of the cognitive scale with its all dimensions. The following table portrays the results attained:

Table (10): Means and SD of the gender differences

Dimension	Gender	N	Mean	SD	t	df	sign
Knowledge	m	71	84.53	4.69	.091	192	0.36
	f	123	83.91	4.51			

Dimension	Gender	N	Mean	SD	t	df	sign
Cognitive load features	m	71	18.12	2.80	1.41	192	0.15
	f	123	17.48	3.14			
Cognitive load causes	m	71	42.22	5.83	1.81	192	0.85
	f	123	42.37	5.30			
Reduction strategies	m	71	58.64	4.84	0.27	192	0.78
	f	123	58.48	3.13			
Attitudes	m	71	28.01	1.61	.95	192	0.34
	f	123	27.78	1.55			
Awareness in general	m	71	231.54	10.56	0.98	192	0.32
	f	123	230.04	10.02			

The mean scores of the males on the knowledge dimension was 84.53 and the SD was 4.69 and for the females was 83.91 and the SD was 4.51. The *t* value of the difference between the means was 0.915 which is insignificant at 0.05 level indicating that the males and females are similar in their awareness of cognitive load knowledge.

As for the feature, the mean score of the males was 18.12 and the SD was 2.8. On the other hand, the mean score of the females was 17.48 and the SD was 2.8. The value of *t* for the difference between the means was 1.41 which is insignificant at 0.05 level indicating that the males and females were similar in their knowledge of the cognitive load features.

The same results were obtained for the difference in means between males and females in knowledge of the causes of the cognitive load on their students. The mean score of the males was 42.22 and the SD was 5.83, while the mean score of the females was 42.37 and the SD was 5.30. The value of t for the difference between the means was 1.81 which is insignificant at 0.05 level.

Similar results obtained regarding the teachers' knowledge of the reduction strategies. The mean score of the males was 58.64 and the SD was 4.84. On the other hand, the mean score of the females was 58.48 and the SD was 3.12. The value of *t* for the difference between the means was 0.279 which is insignificant at 0.05 level indicating that the males and females has similar degrees in relation to their awareness of cognitive load reducing strategies.

Finally, the mean score of the males in relation to the general score of awareness was 231.54 and the SD was 10.58. On the other hand, the mean score of the females was 23.04 and the SD was 10.02. The value of *t* for the difference between the means was 0.984 which is insignificant at 0.05 level indicating that the males and females has similar degrees in relation to their awareness of cognitive load in general.

Third: the effect of the experience factor on the cognitive load

The current research dimension sought to answer the fifth research question stating, "What is the effect of the experience factor on the awareness of the cognitive load and its reduction strategies?"

For verifying the effect of the experience factor on the cognitive load, the participants' scores on the cognitive load taking into account their varied experiences via the One-Way ANOVA analysis. The following table delineates the results:

Table (11): Means and SD of the differences in experience

Dimension		Sum of Squares	df	Mean Square	F	Sig.
Knowledge of cognitive load	**Between Groups**	28.36	3	9.45	.447	.720
	Within Groups	4016.87	190	21.14		
	Total	4045.24	193			
Features of cognitive load	**Between Groups**	17.17	3	5.72	.618	.604
	Within Groups	1759.79	190	9.26		
	Total	1776.96	193			
Causes of cognitive load	**Between Groups**	147.30	3	49.10	1.645	.181
	Within Groups	5672.88	190	29.85		
	Total	5820.18	193			
Strategies of cognitive load	**Between Groups**	63.88	3	21.29	1.454	.228
	Within Groups	2782.19	190	14.64		
	Total	2846.08	193			
attitudes	**Between Groups**	6.57	3	2.19	.876	.454
	Within Groups	475.20	190	2.50		
	Total	481.77	193			
Awareness of cognitive load in	**Between Groups**	353.54	3	117.84	1.129	.339
	Within Groups	19831.09	190	104.37		

general	Total	20184.63	193

The results in the above table indicate that the experience factor has no effect on the participants' awareness of cognitive load as *f* value was insignificant. By asking interviewees about the factors formulated such concept, some of them assured that work experience (interviewees 3, 7, 8 and 10), their children at home (3, 4, 6), and free reading (2,9).

Fourth: The effect of the type of language the teachers teach on the cognitive load awareness

The current research dimension sought to answer the sixth research question stating, "What is the effect of the type of language the teachers teach on the cognitive load awareness and its reduction strategies?"

For verifying the effect of the participants' language type on cognitive load, the participants' responses on the cognitive load were analysed via One-Way ANOVA. The following table portrays the results:

Table (12): ANOVA for the differences in the type of language

Dimension		Sum of squares	df	Mean square	F	Sig.
Knowledge of cognitive load	Between groups	36.25	2	18.12	.86	.42
	Within groups	4008.99	191	20.98		
	Total	4045.24	193			
Features of cognitive load	Between groups	21.63	2	10.81	1.17	.31
	Within groups	1755.33	191	9.19		
	Total	1776.96	193			
Causes of cognitive load	Between groups	13.52	2	6.76	.22	.80
	Within groups	5806.66	191	30.40		
	Total	5820.18	193			
Strategies of cognitive load	Between groups	6.26	2	3.13	.21	.81
	Within groups	2839.81	191	14.86		
	Total	2846.08	193			

Dimension		Sum of squares	df	Mean square	F	Sig.
attitudes	Between groups	3.02	2	1.51	.60	.54
	Within groups	478.75	191	2.50		
	Total	481.77	193			
Awareness of cognitive load in general	Between groups	39.24	2	19.62	.18	.83
	Within groups	20145.39	191	105.47		
	Total	20184.63	193			

Based on the results obtained above, language type had no effect on their knowledge of cognitive load as f value for calculating the differences between the participants' mean scores was insignificant in all the scale dimensions and also the awareness in general.

Discussion

Taken all together, the results of the study regarding teachers' awareness have been revealed. To interpret and discuss them, they can be grouped into three major themes: teachers' knowledge of the CL and the different strategies for its reduction; the different features and practices in and outside the classroom that helped formulating the teachers' awareness and finally the teachers' attitudes towards the concept of CL. In order to understand such results, the upcoming sections will highlight this in details.

Teachers' knowledge of the CL and its reduction strategies

The results obtained revealed a weak level of awareness knowledge of the cognitive load and the different strategies for its reduction. Intrinsic, extrinsic or germane loads were unclear and the dominating knowledge was superficial such as those when they limited the features to students' withdrawal, boredom or getting astray. When asked about memory for example, they denied having any influence on students' cognition. This might be attributed to the teacher preparation and continuous professional development (CPD) programmes. Based on teachers, such programmes are free from any subject-specific academic course works related to developing (prospective) teachers' knowledge of CL and the related concepts and strategies. Such pre-service or in-service preparation problems are also coupled with teachers unwilling

to endeavor for self-development. Interviews revealed that none of them showed any readiness to go for self-reading or development; "I am not free to do so, teaching is so hectic and we have many other responsibilities" (teacher 3 said). In addition, they did not rely on any scientific referential framework for development other than those personal experiences such as dealing with their children at home or in their schools.

In describing such beliefs about the CLT and their awareness towards the concept, there is a clear thread of awareness in the centrality and effectiveness of the preparation and the CPD programmes rather than being a consciousness raising catalyst for facilitating learning. In this position, teachers have been transmitted from "the perception" of the importance of the concept to the "understanding position" and consciousness in which they should perceive that preparation programmes in colleges and in service CPD as the sole source for formulating their professional competence. Extensive growing body of research (Dornyei, 2007; Ellis, 2006; Freeman, 2002 and Phipps & Borg, 2007) highlights this emphasizing that the situations currently available for teachers is different from earlier. The different sources to access knowledge make it easy for them to develop and accelerate their declarative, procedural, strategic and evaluative cognition either before or in service (Brog, 2003 and Lindahl, 2013). Teachers are required to develop their potentials in order to meet the different requirements asked for by the educational institutions. Knowledge bank and quality assurance and training programmes available free for most teachers can help them achieve this.

Ellis (2005) describes this as the weak inter-face position in which teachers' explicit knowledge of a concept or structure makes it more likely to attend to that structure in the input and carry out the cognitive comparison between what they observe in the input and their own output and take the different steps to achieve that.

The school practices and processes and the cognitive load

Results either quantitative or qualitative did not show any influence of the demographic factors (age, gender and experience) on increasing the level of the teachers' awareness. Novice teachers were not different from those expert or proficient teachers in terms of their awareness towards the concept of CLT. In other terms, none of the teachers practices activities that reflect knowledge of the CL and their components. The language teachers' preparation programmes

and the CPD in Egypt may be the reason since the vast majority of language such programmes probably emphasize on form rather than meaning. Consequently, the teachers' level of awareness and hence their teaching strategies became similar and conventional. This is not the case in other countries. In UK, for instance, language awareness is the focus of in-service professional development courses (Anderews, 2007). Such courses provided an opportunity for teachers to explore the connections between language form, meaning, context and use in ways that they generally had not done during their previous studies at university and/or teachers' college.

Bartels (2005:405), explains why such knowledge is essential for teachers stasting: 'armed with this knowledge about language, teachers will . . . be able to understand and diagnose student problems better, provide better explanations and representations for aspects of language, and have a clearer idea of what they are teaching'. However, such knowledge, though has the potential to be of value to the teacher helping them to acquire knowledge and conceptions about language and language learning, it is not in itself enough to promote significant changes in their pedagogical practice. It is suggested that this should be followed by CPD training courses that promote language awareness and enhance teachers' practices in class.

Teachers' attitudes and the CL

Despite the fact that teaches' knowledge of the CL, its types and the different strategies for its reduction was limited, they have positive attitudes towards increasing their repertoire of such concept. This means they are aware of its potential impact on student learning and that it should be imbedded in their preparation and CPD courses as an interlanguage factor. "Such teacher is more likely to be effective in promoting student learning than the teacher who is not aware of that important concept" interviewee 3 said.

Being new and ambiguous, teachers' estimation of the importance of the CL concept and its relationship with the performance of both teachers and students is also high. This positive estimation may have been triggered as a result of the scale administered which included several peculiar terms that tempted the teachers' cognitive appetite, especially it is related to their professional practices in class. Andrews (2007) supports this asserting that the teacher's self-confidence, or lack thereof, with language indicates a level of readiness on behalf of the teacher to give serious attention to language-related pedagogical issues. This, in turn, suggests that the teachers are likely to enrich their knowledge of the concept and include its related activities in their teaching

practices.

Conclusion

The current study sought to provide insight into the degree of novice and expert teachers awareness towards the concept of CLT and its relationship with their actual performance in class. Three factors have been highlighted by researchers as components of teachers' awareness; knowledge of the concept of CL (intrinsic, extrinsic, and germane) , practices, and attitudes. The results obtained showed that the teachers' knowledge of all the CL types and features is limited. Moreover, expert and novice teachers were not different in their practices in class since all of them did not reveal any link between their practices and the CL activities. In addition the type of teachers' language, their gender and their experience did not also influence their knowledge, practice and attitudes towards the CL theory. Finally, they enjoyed a high level of attitudes towards the CL theory.

Based on the results outlined earlier, if curriculum designers incorporated information of CL theory in their courses, this surely increases teachers' level of awareness of their language and hence try to utilize it to minimize the cognitive load (intrinsic, extrinsic or germane) which in turn yields facilitating learning. Moreover, the above results warrant the need for comprehensive training in CL theory that can prepare educators to recognize personality types, psychological needs, channels of communication, and interaction preferences. Increasing teachers' level of awareness of CL can aid teachers in creating a classroom environment conducive to learning and increased student achievement. Such results justifies further studies to determine if more extensive knowledge of and training on CL theory activities can enhance students' language or not.

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