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**TJHSS**



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# Accessibility in the Computer-Aided Translation Tools for English-Arabic Language Pair

Iman Magdy Refaat

Assistant Lecturer

Department of English

School of Linguistics and Translation, Badr University in Cairo

## Abstract

Computer Aided Translation (CAT) Tools are essential in the current market. They are required by the clients to be used by the translators as they keep the format of the source text, consistency on both terminology and style levels throughout the project, and save time and money for both clients and translators. However, one of the main disadvantages of the most commonly-used CAT tools, like Trados, MemoQ, and more, is that they are not accessible to visually-impaired translators. This critical disadvantage limits their job opportunities in the market.

As per the best knowledge of the current researcher, most of the previous studies that are conducted on the accessibility in CAT tools are for different language pairs except the Arabic language and the Arab visually-impaired translators' experience with CAT tools is not evaluated. The current paper sheds the light on the accessibility in CAT tools in the Arab market to explore their efficiency for the visually-impaired Arab professional translators working on the English-Arabic language pair. This paper aims to explore how the commonly-used CAT tools are accessible or inaccessible, to what extent they are compatible with the screen readers, and to suggest alternative CAT tools to be accessible to the visually-impaired translators and also to be compatible with the commonly-used CAT tools.

This study is conducted in the light of Skopos theory by Vermeer (2006). Quantitative and qualitative questionnaire is designed in order to be answered by Arab visually-impaired professional translators and students in language and translation universities who use CAT tools to explore to what extent the CAT tools are accessible and compatible with the screen readers. Moreover, case studies are conducted in order to get more insights on the accessibility in the commonly-used CAT tools. At the end of this research, alternative CAT tools would be suggested to be accessible to the visually-impaired translators and also to be compatible with the commonly-used CAT tools in order to give them the chance to have job opportunities in the localization and translation market.

**Keywords:** Accessibility, Localization, CAT tools, Skopos, Translation Memory, Quality, Productivity

**I**ntroduction: Technology in the translation and localization field has become an essential and main requirement for clients and translators. Millions of words need to be translated within tight deadlines. Therefore, there have

been many endeavors in order to develop tools to help translators to increase their productivity to meet the translation/localization market needs. Such tools are the Computer Aided Translation (CAT) tools which are required by clients to be used by translators in order to guarantee

the speed of their translation performance for increasing productivity and to provide translation with high quality despite any tight deadlines.

CAT tools have become available for individual translators, not only companies, since the 1990s in order to meet the millions of words that are needed to be translated by big companies, like IBM and Microsoft, for localizing their products to be promoted and sold in each market and locale.

The concept of localization was generated at that time and it is defined by LISA (the Localization Industry Standards Association) as a process that “involves taking a product and making it linguistically and culturally appropriate to the target locale (country/region and language) where it will be used and sold” (Pym, “Technology” 13). For managing this process, CAT tools are developed in order to handle all elements that need technical preparations in order to publish the content properly on all digital environments like software, websites, and applications.

Clients have requirements that should be considered by translators. According to Skopos (purpose) theory by Vermeer, a translation brief is sent by the commissioner (client) in order to be followed by the translator. Skopos rule is any action that is determined by its purpose; it is a function of its purpose. CAT tools are required by clients and they mention in their translation briefs which CAT tool should be used by translators or the translators, themselves, decide to use a CAT tool in order to meet the deadline and quality level required by the client. Therefore, the current research paper is written in the light of this theory.

Translators are required to learn CAT tools in order to cope with the current market requirements. In the Arab market, especially the Egyptian market, translators use CAT tools in order to increase their job

opportunities. However, what about the visually-impaired translators? Can they use CAT tools? Are they accessible to them? To what extent are the commonly-used CAT tools accessible or inaccessible? To what extent are they compatible with the screen readers? This paper sheds the light on the accessibility in the CAT tools and whether the visually-impaired translators can use them without any obstacles or not.

There are many papers which tackle accessibility in CAT tools; however, there are no studies, according to the best knowledge of the current researcher, conducted on the Arab visually-impaired translators in the Arab market. Therefore, the current research paper tries to explore the accessibility of CAT tools and whether the Arab visually-impaired translators can use them, specially the commonly-used ones, or not. If they are inaccessible, how far are they inaccessible? And what are the alternative CAT tools that they can use instead to cope with the market needs?

## **2. Literature Review**

### **2.1 Overview on Computer Aided Translation Tools**

The history of CAT tools began in the cold world war when the information collected by the intelligence services needed to be translated without delay (Cocci, 2007). For the first time, funds were allocated for the translation technology. The first attempts of machine translation were in the specialized research centers financed by the USA and Union of Soviet Socialist Republics (USSR). The term Machine Translation (MT) was coined by Warren Weaver, in 1947, who defended the possibility of developing an automatic translation program. Systran (System Translation) was invented by the American researcher Toma in those years and used by the US Air Force for translating reports and documents written in Russian. This system is still used until now by the European Commission. (Cocci, 2007)

Between the late 1960s and early 1970s, the idea that machines will be able to provide translation services was dismissed (NordicTrans, 2018). The approach during this period was that machines can work alongside the human translators, “not so much as to do simultaneous translation but to facilitate the work of the human linguist” (NordicTrans, 2018).

The first attempts that form the basis of today’s CAT tools were like creating terminology databases, translation memories, and other similar developments in the late 1970s. In the mid-1980s, TSS (Translation Support System) was the first CAT tool developed by the US company AlpNet. However, this system was limited because of its high cost which made it usable by large companies only; “IBM was one of the first purchasers of this system” (Cocci, 2007).

The Dutch company INK, in the second half of the 1980s, developed a system called "TextTools," inspired by TSS. TRADOS GmbH, a language service provider (LSP) company established in 1984 by Jochen Hummel and Iko Knyphausen in Stuttgart, became its official dealer in Germany. (Cocci, 2007)

The CAT tools technology only found its foothold with the release of Trados MultiTerm and Translator’s Workbench in the early 1990s by the German company TRADOS GmbH.

“In 1994, Trados released a Windows version with a MS Word interface and received a major boost in 1997 when Microsoft decided to not only use their products for internal localization needs, but also acquired a 20% share in the company. Despite competition from the likes of IBM’s Translation Manager 2, STAR Transit and Déjà

Vu, by the end of the decade Trados became the clear market leader in CAT software until it was acquired by competitor SDL in 2005.” (Andovar.com).

There are many CAT tools in the market now offline (desktop-based tools) and online (cloud/server-based tools) that are used by many translators and required by many clients like MemoQ, Wordfast, MateCat, Memsourc, and more.

Big companies like IBM and Microsoft among others need their products to be localized in several languages within a short time. Therefore, ideas are put forth and investments made in order to increase productivity and quality within tight deadlines and to develop computer-aided translation tools that can help translators to increase their productivity and meet the client’s requirements (the “commission” as per Skopos theory by Vermeer) and translate millions of words in a short time.

Back in the 1980s, Microsoft was developing software for the North American market and then translating it from English to other main European languages: German, French, Spanish, and more. At that time, this was adequate and manageable because few foreign languages were targeted. However, as the number of markets increased, the simple one-to-one language translation model became inadequate and expensive. Pym explains that “The software required not just replacement of the pieces of language in the menus, dialogue boxes, and Help files visible to the user, but also attention to a long list of apparently minor details like date formats, hotkeys, and punctuation conventions.” (Pym, “Exploring” 121). Some of these apparently minor items would supposedly be done by a translator. Some indeed concern translation; others require a technical engineer; and others require telecommunications

technicians, terminologists, marketing experts, and perhaps lawyers. “Together, these tasks are ideally carried out by teams, of which translators are a part. The entire process is then called “localization,” of which translation is a part” (Pym, “Exploring” 121).

The term “localization” is defined by LISA (the Localization Industry Standards Association) as a process that “involves taking a product and making it linguistically and culturally appropriate to the target locale (country/region and language) where it will be used and sold” (Pym, “Technology” 13). In localization, a product is like software, application, website, manual, and so forth which needs to be adapted to each target “locale”. The term “Locale” is the source from which the word “localization” was developed. The key concepts of localization are defined by LISA as follows;

Localization (L10n) involves taking a product and making it linguistically and culturally appropriate to the target locale (country/region and language) where it will be used and sold (LISA 3). Internationalization (i18n) is the process of generalizing a product so that it can handle multiple languages and cultural conventions without the need for redesign. Internationalization takes place at the level of program design and document development (LISA 3). Globalization (g11n) addresses the business issues associated with taking a product global. In the globalization of high-tech products this involves integrating localization throughout a company, after

proper internationalization and product design, as well as marketing, sales, and support in the world market (LISA 3). This meaning is more specific than the general process of economic globalization. (Pym, “Exploring” 137)

So, localization is a broad process that includes translation, technical engineering, and culture adaptation for marketing purposes. It is challenging and needs both linguistic and technical skills.

## 2.2 Skopos Theory

Vermeer’s Skopos theory is the theory that will be used in this study because according to the Skopos (purpose) and the commission’s (client) requirements, the type of CAT tool and translation strategy that should be used during the localization/translation process will be determined. Vermeer (2004) in his paper “*Skopos and Commission in Translation Action*” explains the concept of the Skopos theory in which he understands translation as an action that has aim or purpose that leads to the target text. Such purpose and mode in which the action (translation strategies) is realized are determined by a commission (client or the translator him/herself) (236).

ReiB, Katharina & Vermeer, Hans J. in their book *Towards a General Theory of Translation Action: Skopos Theory Explained*. Routledge, 2014 explains Skopos theory that was introduced in an essay published in *Lebende Sprachen* (Vermeer [1978]1983), in which the author proposed a “framework for a general theory of translation” and called it “Skopos” which means purpose. The object of this theory is translational action. The process of translating or interpreting, its product (the *translatum*) and the relations between them,

i.e. how they are interdependent, is discussed in this book.

The main difference between this theory and the other translation theories is that it is a theory of translational action which is governed by its purpose. The Greek word Skopos means “purpose” and the terms purpose, aim, function, and Skopos are used in this book as synonyms. The Skopos rule is: any action is determined by its purpose; it is a function of its purpose. In other words, “the end justifies the means”. The sociological rule: the intended audience (addressees) may be described as a specific kind or subset of Skopos. Reiß points out, it is “not only the purpose of a particular translation which plays a role but also commissioners or publishers who may have a say” (90).

The concept of equivalence and adequacy is explained in this book. The translator only searches for equivalents for certain characteristics of the text. In such case, “the guideline for the translation process will be that of achieving adequacy; by selecting the appropriate linguistic signs for achieving the purpose with regard to the characteristic in question.” The equivalence relationship in translation refers to equivalence between two texts. Equivalence means that two texts achieve functions of equal value within the culture-specific communicative events in which they are used.

Skopos theory includes three factors: commission's translation brief, purpose, and translation action. In the current localization and translation market, the client sends a translation brief to the translator where all instructions, purpose, and requirements are mentioned therein. The translator should observe all these instructions and requirements in order to determine which CAT tool should be used and the translation strategy that should be applied.

## 2.3 Previous Studies on Accessibility in CAT Tools

There are many studies conducted on the accessibility issue in CAT tools for visually-impaired translators; however, such studies haven't been conducted in the Arab world in the field of English into Arabic translation.

Vázquez and Mileto in their article *On the Lookout for Accessible Translation Aids: Current Scenario and New Horizons for Blind Translation* 2016, published in *Journal of Translator Education and Translation Studies (TETS)*, concentrate on how CAT tools are accessible and used by the visually-impaired translators especially that they become “a prime requirement for translators to successfully enter the marketplace” (155). In their exploratory case studies, they want to discover the evolution in terms of accessibility of SDL translation technology across different tool versions, namely SDL Trados Studio 2009, 2011, and 2014. They aimed to understand “where the accessibility boundaries of the tool were and what could be achieved by a blind user with it.” (122). They choose SDL Trados Studio tool because it is the most popular tool in the market and they want to further investigate “whether the reports made by different blind translators through The Round Table mailing list or personal regarding its inaccessibility held true.” (122). There were accessibility issues in Studio 2009, 2011, and 2014. They are not user friendly for blind translators. The researchers found out that in comparison with their sighted peers, the visually-impaired translators don't experience the same seamless interaction between translation software and assistive technologies (AT). Their findings reveal that the inaccessibility of most popular CAT tools may limit the chances of blind students to fully develop their translation careers. Therefore, the tool developers and translation technology lecturers need to change their mindset and put into their

consideration those blind translators and students and make tools accessible by them.

The article “*Translation tools and software - help or hindrance?*” written by Tara Owton in Euroblind Newsletter in 2017, discusses the difficulties encountered by blind and visually-impaired translators when using translation tools. She explains that Trados is the CAT tool that she should use because it is the most commonly used CAT tool.

In a recent research conducted in 2018 by Silvia Rodríguez Vázquez, Dónal Fitzpatrick, and Sharon O’Brien “Is Web-Based Computer-Aided Translation (CAT) Software Usable for Blind Translators?” states that recent experience reports by end users that the commonly-used desktop-based computer-aided translation tools are not compatible with screen readers so that visually-impaired and blind translators cannot use them. In this paper, it tests the usability of two online CAT tools; MateCat and Memsourc and whether they can be alternatives for desktop applications. The results indicate that “MateCat is significantly more usable than Memsourc, although changes would be needed in the former for blind translators to be able to perform a translation job completely autonomously and efficiently.” (31). Overall, this study indicates that accessibility is still low in the computer-aided translation tools and developers should consider this issue in order to guarantee equal opportunities for all in the translation market.

All of these studies are conducted on visually-impaired translators from different nationalities rather than Arab ones. More studies are needed to be conducted on the Arab visually-impaired translators in order to find out whether they can use CAT tools or they face obstacles because of its inaccessibility. Therefore, the current paper tries to explore such issues and whether

there are alternatives for the inaccessible CAT tools.

### **3. Testing the Accessibility of the Computer-Aided Translation Tools**

#### **3.1 Research Problem**

CAT tools are an essential asset that should be learned and used by the translators in the current market in order to meet the client’s needs and requirements. However, according to the previous studies mentioned above, the commonly used CAT tools are not accessible and incompatible with the screen readers to be used by the visually-impaired and blind translators. This issue limits their job opportunities. However, there are no studies, according to the best knowledge of the current researcher, are conducted on the Arab market in general and the Egyptian one in particular to discover whether the Arab translators encounter the same issues and limitations in using the CAT tools. The current paper tries to shed the light on the accessibility in CAT tools and to what extent they are accessible or inaccessible for the Arab visually-impaired professional translators and the students in the language schools.

Based on a survey conducted in the master’s thesis, “The Use of Computer-Aided Translation Tools in English to Arabic Translation: A Study in the Light of the Skopos Theory” in 2019, by the current researcher and answered by 120 professional translators in the English to Arabic localization and translation field, despite their many advantages, there are also disadvantages. One of the main disadvantages of the commonly-used CAT tools is their inaccessibility and incompatibility with screen readers; this critical issue which limits the job opportunities for visually-impaired translators as per their comments in the survey as shown in the screenshot below

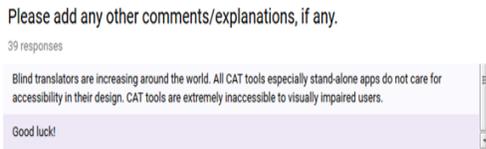


Figure 1: Figure 2.27: Participants’ comments to the survey “The Use of Computer-Aided Translation Tools in English to Arabic Translation” (64)

The commonly used CAT tools in the Arab market in general and the Egyptian one in particular are Trados, MemoQ, Wordfast (desktop-based CAT tools) and Memsourse, XTM, MateCat (web-based CAT tools) as shown in the screenshot below:

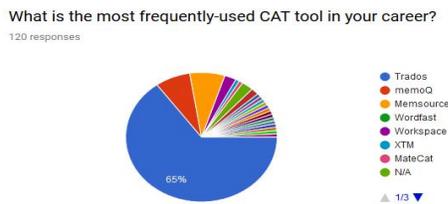


Figure 2: Figure 2.17: CAT tools used by the participants in their career (45)

Some of the most commonly-used CAT tools in the market, as per the survey conducted in the master’s thesis, are tested in this paper in order to evaluate to what extent they are accessible to the Arab visually-impaired translators.

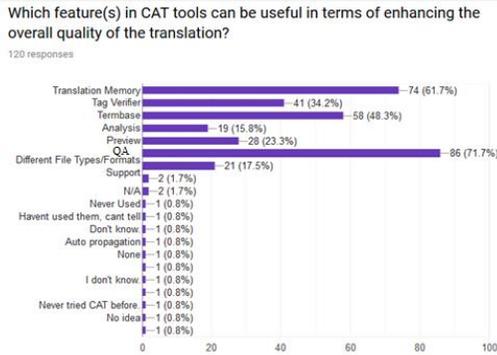
### 3.2 Participants, Tools, and Data

In order to evaluate the accessibility of these CAT tools accurately, 2 methods are adopted. (1) a questionnaire is designed by Google Forms under the title “Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools” for English-Arabic language pair to be answered by Arab professional translators and students in language and translation universities. This questionnaire is followed with semi-structured interviews in order to get more

insights about the accessibility of CAT tools. (2) Case studies are conducted for accurate qualitative evaluation.

As for the questionnaire, it is divided into two parts: quantitative and qualitative evaluations. For quantitative evaluation, Computer System Usability Questionnaire (CSUQ) is used in order to measure the perceived usability of the accessibility in the CAT tools. It consists of 19 questions with a 7-point Likert scale to score the tool’s usefulness, information quality, and interface quality. This questionnaire is developed by Jim Lewis (1995, 2002) at IBM. The CSUQ is made up of four parts, each consisting of items ranked on a 7-point Likert scale (1 = totally disagree and 7 = totally agree): the overall satisfaction score (OVERALL: all 19 Items), the system usefulness score (SUSUSE: Items 1-8), the information quality score (INFOQUAL: Items 9-15), and the interface quality score (INTERQUAL: Items 16-18). The mean, median, and standard deviation of these 4 parts are calculated accordingly. For qualitative evaluation, it is based on the observations and comments of the visually-impaired translators and students. It consists of 8 questions for discussing the experience of the visually-impaired translator with the CAT tool, to what extent it is accessible and compatible with the screen reader they use, and their point of view of the current localization and translation market and their job opportunities in the current market. This questionnaire is designed with Google Forms and sent to the visually-impaired translators and language and translation school students in the Arab market. This questionnaire is shared in LinkedIn, Facebook, and sent via emails to visually-impaired translators and students. Moreover, semi-structured interviews are also conducted with the respondents in order to get more insights about the accessibility of CAT tools.

The quantitative questions are as



shown in the screenshot below:

Figure 3: The quantitative CSUQ questions in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

The qualitative questions are as shown in the screenshot below

1. Is it compatible with the screen reader?
2. To what extent is it compatible or incompatible with the screen reader? Explain.
3. Is it fully accessible?
4. If it is not fully accessible, what are the parts that are accessible and inaccessible in the tool?
5. Can you deliver the final files with the same formats and tags of the source text? Explain.
6. Please add any other observations/comments regarding the accessibility in this CAT tool.
7. Please add any recommendations or observations on the accessibility in CAT tools in general.
8. Please share your recommendations or observations on the situation of the visually impaired translators in the translation and localization industry in the Arab market in terms of CAT tools, job opportunities, and dealing with clients inside and outside your country.

Figure 4: The qualitative questions in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

As for the case studies, they are conducted for qualitative evaluation with four Egyptian visually-impaired translators; three Egyptian professional translators and one university student. They help in trying different CAT tools in order to explore to what extent they are accessible or inaccessible and whether there are alternatives for the inaccessible CAT tools. The current researcher concentrated on the

commonly-used features by the translators according to the survey conducted on her MA thesis in 2019 and they were as shown in the screenshot below:

Figure 5: Figure 2.19: CAT tools' features that help in enhancing the overall translation quality (47)

As per the screenshot above, the commonly used features that their accessibility needs to be tested by the current researcher are: translation memory, termbase, quality assurance/verification, and tags among other parts in the user interface as per each CAT tool tested in the current paper.

### 3.3 Results and Data Analysis

12 Arab professional translators and language and translation school students answered the questionnaire. Most of the visually-impaired translators/students quit the translation career path because of the job opportunity limitations they face because of their disability and the inaccessibility of the commonly-used CAT tools, like Trados and MemoQ. Therefore, the number of the respondents is few. Therefore, this questionnaire is followed with semi-structured interviews in order to get more insights about the accessibility of CAT tools. Case studies are also conducted in order to get accurate qualitative evaluation. Hereinbelow, the data analysis of both the questionnaire/semi-structured interviews and the case studies.

#### 3.3.1 SDL Trados Studio with the Screen Reader NVDA and JAWS (Desktop Tool):

- The Questionnaire and Semi-Structured Interviews Results:

As shown in the screenshot below, the rates of the four SDL Trados 2015 and 2017 are low in the four parts. This indicates that the tool is not fully accessible to the visually impaired translators

SUBSCALE	INFOQUAL	INTERQUAL	OVERALL
1. Overall, I am satisfied with how easy it is to use this CAT tool.	9. The CAT tool gives error messages that clearly tell me how to fix problems.	16. The interface of this CAT tool screen is pleasant and accessible.	19. Overall, I am satisfied with this CAT tool.
2. It was simple to use this CAT tool.	10. Whenever I make a mistake using the CAT tool, I recover easily and quickly.	17. I like using the interface of this CAT tool.	
3. I can effectively complete my work using this CAT tool.	11. The information (such as online help, on-screen messages, and other documentation) provided with this CAT tool is clear.	18. This CAT tool has all the functions and capabilities I expect it to have.	
4. I am able to complete my work quickly using this CAT tool.	12. It is easy to find information I needed.		
5. I am able to efficiently complete my work using this CAT tool.	13. The information provided for this CAT tool is easy to understand.		
6. I feel comfortable using this CAT tool.	14. The information is effective in helping me complete the tasks and scenarios.		
7. It was easy to learn to use this CAT tool.	15. The organization of information on this CAT tool screen is clear.		
8. I believe I became productive quickly using this CAT tool.			

SDLTrados 2015 (NVDA 2018)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	3	2	2
INTERQUAL	4	4	2
INFOQUAL	6	6	2
OVERALL	4	4	2
Trados 2017 (JAWS 2019)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	1	1	0
INTERQUAL	5	5	2
INFOQUAL	1	1	0
OVERALL	2	1	2

Figure 6: The CSUQ questions for SDL Trados in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the replies to the qualitative questions and the semi-structured interviews, SDL Trados 2015 and later versions are compatible with the screen reader, JAWS or NVDA; however, not all features in the tool are accessible. Menus and buttons are accessible; however, the main issue is in the Editor Pane (source and target columns) that is not accessible at all. It is not fully accessible. Therefore, client's requirements could not be met. The participants recommend making hotkeys easier to execute. Graphics and icons need to be labeled. Tags must be provided with their codes in order to be copied and pasted or there should be a function for their insertion. Segments and target text area must be as text boxes not labels

- Case Studies:

SDL Trados 2015, 2017, and 2019 are tested with a university student (Ahmed Saad from College of Language and Communication, Arab Academy for Science, Technology & Maritime Transport) and professional translator (Mohamed Aglan, a Proz-certified and professional freelance translator). The table below explains which parts in the tool are accessible or inaccessible according to the observations of the current researchers with the participants in the case study. Unfortunately, the latest versions of the

tools are less accessible than the older ones. The most accessible one was the old version, Trados 2007. The accessibility has become lower and lower until the last version now, SDL Trados 2021, which is not accessible at all. The following table is not applicable to SDL Trados 2021

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	No	N/A
Tags	No	N/A
QA pane	No	N/A
TM matches and concordance	No	N/A
TB	No	N/A
Navigation	Yes	N/A

Table 1: The features that are accessible and inaccessible in SDL Trados

### 3.3.2 Memsource Web Editor with the Screen Reader NVDA (Cloud-Based Version):

The Questionnaire and Semi-Structured Interviews Results:

As shown in the screenshot below, the rates of the mean, median, and standard deviation of the four parts of the CSUQ questionnaire are higher than SDL Trados. The rates indicate that the tool is highly accessible to the visually-impaired translators.

Memsource (NVDA Updated)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	6	6	1
INTERQUAL	7	7	0
INFOQUAL	4	3	2
OVERALL	6	7	2

Figure 7: The CSUQ questions for Memsource Web Editor in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the replies to the qualitative questions and the semi-structured interviews, the participant's view on

Memsorce Web Editor with the screen reader NVDA, the last updated one, that it is compatible with the screen reader; however, there are buttons that are not accessible and need a mouse to press them. Moreover, confirming segments cannot be done by the keyboard. It is not fully accessible. Therefore, sometimes the participant exports the file to work on it on a word file then imports it to the tool for the final delivery. Tasks could be delivered to the client as per their requirements. It needs improvements in order to use keyboard shortcuts to be accessible to the visually-impaired translators.

### Case Studies:

Memsorce Web Editor and Memsorce Desktop Editor are tested with the university student, Ahmed Saad, and the professional freelance and PHD holder translator, Dr. Mohamed Amin.

As for Memsorce Web Editor (cloud-based tool) with the screen reader NVDA and JAWS:

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	No	It is not fully-accessible.
Tags	No	However, the participant can notice them when the screen reader repeats the last word before tags twice.
QA pane	Yes	Partially. The navigation is difficult.
TM matches	Yes	Partially
TM match percentage beside the segment	Yes	Partially. It is only accessible by hovering the mouse over it.
TB	No	N/A
Labels of TM, TB, and more	Yes	Partially. It is only accessible by hovering the mouse over it
Navigation	No	The navigation among segments, menus, buttons is

		difficult
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**Table 2: The features that are accessible and inaccessible in Memsorce Web Editor**

As for Memsorce Desktop Editor (Desktop Version) with the screen reader NVDA and JAWS:

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	Yes	N/A
Tags	Yes	Partially. Tags are not fully read by the screen reader. By the pauses and repetitions of the screen reader, the visually-impaired translator can detect the number of tags and insert them in their right places by pressing F8.
QA pane	No	N/A
TM matches	No	N/A
TM match percentage beside the segment	No	N/A
TB	No	Termbase needs to be in Excel format or any other format in order to be accessible for the visually impaired translator outside the tool.
Labels of TM, TB, and more	No	N/A
Navigation	Yes	Partially. The navigation needs more improvement.

**Table 3: The features that are accessible and inaccessible in Memsorce Desktop Editor**

According to the above tables, Memsorce Desktop Editor is smoother in the usage and more accessible than Memsorce Web Editor. This is mainly because the inaccessibility of the Editor Pane (source and target segments) in the Memsorce Web Editor which is, in the contrary, fully accessible in Memsorce Desktop Editor.

Ahmed is not fully blind; therefore, he can use the mouse to hover over the parts that cannot be reached by shortcuts in order to let the screen reader read them or to hardly see them like the inaccessible QA pane in Memsorce Desktop Editor.

However, for the fully-blind translators, like Dr. Mohamed Amin, the mouse is impossible for them (they mainly use the keyboard and its shortcuts). They can refer to Memsources Web Editor to run the QA as it is not accessible in the desktop version. Workarounds like this could be applied in order to solve such accessibility issues.

### 3.3.3 Wordfast Pro 3 with the Screen Reader NVDA (Desktop Tool):

- The Questionnaire and Semi-Structured Interviews Results:

As per the screenshot below which shows the rates of the mean, median, and standard deviation of the 4 parts of the CSUQ questions, Wordfast Pro 3 is partially accessible.

Wordfast Pro 3 (NVDA 2019.1)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	6	5.5	1
INTERQUAL	5	5	1
INFOQUAL	5	5	1
OVERALL	5	5	1

Figure 8: The CSUQ questions for Wordfast Pro 3 in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the qualitative questions and the semi-structured interviews, the visually-impaired translator's point of view, Shima Ibrahim, freelance translator and MA holder, of the accessibility in Wordfast Pro 3 is that it is compatible with the screen reader. Shortcuts can be used; therefore, it facilitates the performance. Files could be delivered as per the client's instructions; however, if there is a complex format, it couldn't be fully maintained.

### 3.3.4 Wordfast Pro 5 with the Screen Reader NVDA (Desktop Version):

- The Questionnaire and Semi-Structured Interviews Results:

As per the screenshot below which shows the rates of the mean, median, and standard deviation of the 4 parts of the CSUQ questions, Wordfast Pro 5 is not accessible.

Wordfast Pro 5 (NVDA 2019 and above)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	1	1	0
INTERQUAL	3	4	2
INFOQUAL	1	1	0
OVERALL	2	1	2

Figure 9: The CSUQ questions for Wordfast Pro 5 in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the qualitative questions and the semi-structured interviews, the visually-impaired translator's point of view, It is incompatible with the screen reader. It is not accessible at all. Instead of improving the accessibility in the last updated version, it is diminished.

### 3.3.5 MateCat with the Screen Readers NVDA and JAWS (Cloud-Based Tool):

- The Questionnaire and Semi-Structured Interviews Results:

As per the screenshot below,

MATECAT (NVDA 2018)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	5	5	1
INTERQUAL	4	4	1
INFOQUAL	3	2	2
OVERALL	4	4.5	1

MATECAT (JAWS 2019)			
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	6	6	1
INTERQUAL	6	6	1
INFOQUAL	5	5	1
OVERALL	6	5	1

MateCat is partially accessible and better than Trados for example.

Figure 10: The CSUQ questions for MateCat in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the qualitative questions and the semi-structured interviews, it is compatible with the screen reader and accessible. However, the speed of the cloud-based tool may be affected by the

internet connection. TM and TB need to be in other formats in order to be opened with the tool (tmx and xls). Files can be delivered properly with the same types and formats; however, Trados Package (.sdlppx) files cannot be opened with MateCat (.sdlxliff files can be opened). Tags accessibility needs to be improved. Hotkeys need to be improved in order to be easier to execute. A good alternative for Trados but not MemoQ as it cannot open a MemoQ file at all.

- Case Studies:

MateCat is tested by the university student and the table below indicates its accessibility:

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	Yes	N/A
Tags	Yes	Partially. They need more improvement
QA pane	Yes	N/A
TM matches	Yes	N/A
TB	Yes	Termbase needs to be in Excel format or any other format in order to be accessible for the visually impaired translator.
Navigation	Yes	Partially. The navigation needs more improvement.

**Table 4: The features that are accessible and inaccessible in MateCat**

MateCat is a good alternative to Trados as it can open Trados files. However, the TM should be in .tmx format not .sdltm format in order to be opened in MateCat. TB needs to be in Excel sheet not .sdltb format in order to be opened in MateCat. It cannot open Trados package files in .sdlppx format.

### 3.3.6 Smartcat with the Screen Readers NVDA and JAWS (Cloud-Based Tool):

- The Questionnaire and Semi-Structured Interviews Results:

According to the table below that shows the mean, median, and standard deviation of the 4 categories of the CSUQ questions, Smartcat with the screen reader

JAWS is highly accessible in comparison with the other CAT tools mentioned above.

**Figure 11: The CSUQ questions for MateCat in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire**

According to the qualitative questions and the semi-structured interviews, it is compatible with the screen reader and accessible to great extent. It has an issue with the tags (the screen reader reads them as pictures and does not specify the type of each tag). QA pane is accessible. Termbase/Glossary file should be in xml format generated from SDLMultiterm. All file types can be handled and delivered with the same formats except MemoQ files. Tags need to be presented in program codes rather than graphics. A good alternative for Trados but not MemoQ.

- Case Studies:

Smartcat is tested with the university visually-impaired student and the accessibility is as shown in the table below:

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	Yes	N/A
Tags	Yes	Partially. They need more improvement
QA pane	Yes	N/A
TM matches	Yes	N/A
TB	Yes	N/A
Navigation	Yes	Partially. The navigation needs more improvement.

**Table 5: The features that are accessible and inaccessible in Smartcat Desktop Editor**

Smartcat is an excellent alternative to Trados as all Trados file formats can be opened via Smartcat: .sdlxliff file for the bilingual file, .sdltm for the TM, .sdlppx for the package files, and return package in .sdlrpx format can be generated from Smartcat. Thus, all client's requirements who send tasks to be worked on Trados can be easily met via Smartcat. Regarding the

TB, it needs to be in xml format generated from SDL Multiterm in order to be opened in Smartcat. However, MemoQ files cannot be opened via Smartcat; therefore it is not an alternative to MemoQ.

### 3.3.7 Fluency Now with the Screen Readers NVDA and JAWS (Desktop Tool):

- The Questionnaire and Semi-Structured Interviews Results:

According to the rates of mean, median, and deviation shown in the screenshot below, the accessibility of Fluency Now is high in comparison with the other tools mentioned above. Its accessibility reaches 100% with the screen reader NVDA (the last updated version).

	SmartCAT (JAWS 2020)		
Subscale	Statistical Indices		
	Mean	Median	Std Deviation
SYSUSE	7	6,5	1
INTERQUAL	6	7	1
INFOQUAL	6	5	1
OVERALL	6	6,5	1

Figure 12: The CSUQ questions for Fluency Now in the Quantitative and Qualitative Evaluation of the Accessibility in the Computer-Aided Translation Tools questionnaire

According to the qualitative questions and the semi-structured interviews, it is compatible with the screen reader. However, with JAWS, there is difficulty in reading Arabic text as it reads it in a reverse way. Therefore, NVDA needs to be used in order to read the Arabic text. It is accessible; however, as a CAT tool, it is not friendly; TM matches are not accurate and if there is a glossary, the term-highlighting techniques are neither accessible nor available in the accessibility window. Files could be delivered with the same formats. A good alternative for Trados as it opens sdxliff files; however, the TM and TB

inside it is not user friendly (they are not working properly in most cases). MemoQ file cannot be opened therein. Any xml-based file and PDFs can be opened with this tool.

### Case Studies:

Fluency Now is tested with the university visually-impaired student and the professional visually-impaired translator and PHD holder. Its accessibility is indicated in the table below.

Feature	Accessibility	Comment
Menus	Yes	N/A.
Editor Pane (Source and Target segments)	Yes	N/A
Tags	Yes	N/A
QA pane	Yes	N/A
TM matches	Yes	The embedded TM that is auto-created inside the tool is accessible; however, the client's TM cannot be opened and its matches cannot be read.
TB	No	N/A
Navigation	Yes	N/A

Table 6: The features that are accessible and inaccessible in Smartcat Desktop Editor

Fluency Now is highly-accessible. It fits the fully visually-impaired translators. No mouse is needed to navigate or open menus. Trados .sdxliff file can be opened, tags are well preserved, and the translated file can be delivered with the same format as per the client's requirements. However, the terminology and translation legacy kept in the client's TM cannot be adhered to and followed because they cannot be opened inside the tool.

As per the current researcher's observation, Fluency Now cannot be an alternative to Trados as the TM and TB cannot be used in the tool; therefore, the visually-impaired translator cannot stick strongly to the client's requirements and the translation quality needed. Project glossary in the TB and translation legacy in the TM should be adhered to by the translators for

keeping consistency with the project's terminology and the previous style and translation kept in the TM. These translation quality requirements cannot be met by the visually-impaired translators with Fluency Now.

### 3.4 The Final Results

According to the questionnaire rates mentioned above, the order of CAT tools according to their accessibility is as follows: Fluency Now is the higher one among the CAT tools, Smartcat is the second, then MateCat, Memsourse, Wordfast Pro3, Trados, and the lowest accessibility CAT tool and comes at the end is Wordfast Pro5.

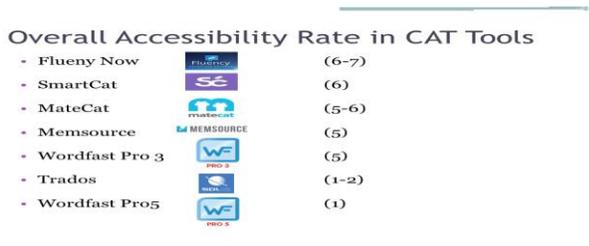


Figure 13: The order of CAT tools according to their accessibility as per the questionnaire rates.

### 3.5 Practical Application

According to the current researcher's observations in the case studies, Smartcat is the most practical CAT tool that could be an alternative to SDL Trados in order to finish any task required by the current clients in the translation and localization market. Memsourse Desktop Editor can be used instead of the Memsourse Web Editor. However, TM, TB, and QA are not accessible. MateCat is also an alternative to Trados; however, it needs workarounds to accept the unsupportive formats in the tool; like SDLTM file needs to be in tmx format and SDLTB file needs to be in Excel format, etc.

The current researcher worked with a visually-impaired student and translator in both educational and professional environments.

- Practical Application in a University:

The current researcher was teaching a CAT tools course for Term-8 students at the College of Language and Communication, Arab Academy for Science, Technology and Maritime Transport. The visually-impaired student was trained on Smartcat as an alternative to SDL Trados. All assignments were delivered successfully by him as per the instructions. He got A+ in this course.

- Practical Application in a Localization/Translation Company:

The current researcher worked with the visually-impaired student as an intern in the internship training program at Arabize for localization and translation and as a new hire as a junior translator.

In the internship program, the current researcher trained him on MateCat and he could finish 5000-word file in 3 days as required. His quality was very good according to the criteria specified at Arabize. He adhered to the legacy in the TM and the terminology in the TB as it was inserted in the tool and he could detect them while he was working.

In the new-hire orientation period, the current researcher trained him on Smartcat as an alternative to Trados in order to finish any miscellaneous projects. A sample file was assigned to him and he worked on it via Smartcat smoothly. He was also trained on Memsourse Desktop Editor in order to work on Microsoft tasks. He could finish all the assigned tasks successfully with high quality and quantity within tight deadlines as required by the client. Recently, he could finish 3000 words within the 8-working hours with high quality as per the client's requirements.

### 4. Conclusion and Recommendations

This study has tried to shed the light on the accessibility in CAT tools in the Arab market. It tries to explore to what extent they are accessible and what are the alternative CAT tools that could be

accessible to the visually-impaired translators. According to the researcher's best knowledge, there are few studies conducted on CAT tools in general in the Arab market. However, regarding the accessibility in CAT tools for the visually-impaired translators, there are studies conducted on this issue; however, there are no studies conducted on the Arabic language and the Arab visually-impaired translators and whether such programs fit the English-Arabic language pair or not.

According to the results concluded from the questionnaire, semi-structured interviews, and the current researcher's observations in the case studies, Fluency Now is 100% accessible; however, it doesn't fit the market requirements regarding sticking to the legacy in the translation memory and the approved terminology translations in the termbase which are not user-friendly inside Fluency Now. Moreover, the visually-impaired translator needs to switch between screen readers in order to read the Arabic text inside the tool. Smartcat is the most practical CAT tool that could be an alternative to SDL Trados in order to finish any task required by the current clients in the translation and localization market. Memsource Desktop Editor can be used instead of the Memsource Web Editor. However, TM, TB, and QA are not accessible.

The visually-impaired translators share their observations and recommendations on both technical and market levels. On the technical level, they need graphics and icons in the CAT tools to be labeled in order to be read by the screen readers. Tags must be provided with their codes in order to be copied and pasted properly. There should be a function for their insertion. Hotkeys need to be easier to execute because mouse cannot be used by the visually-impaired persons. The editor pane (source and target) should be

accessible. CAT tool developers should test their products using screen readers, label their app controls, and avoid using graphical buttons. Visually-impaired translators should be part of the testing team even on a volunteering base. OCR function needs to be improved. On the market level, clients should note that visually-impaired translators can be productive on cloud-based CAT tools especially Smartcat and MateCat. In this case, for more security, clients can make sure of the tool's privacy policy. Unfortunately, the blind translator should not mention their blindness! While many CAT tools are not putting blind in mind, blind people are overloaded with preset ideas that are not urging them to fight for their rights in terms of accessibility. Clients don't know much about screen readers and accessibility. Clients can give more opportunities to the visually impaired by allowing them to work on alternatives to Trados and MemoQ.

According to the above observations by the visually-impaired translators, the current researcher recommends that more academic studies are needed to be conducted on CAT tools, localization, and translation technologies in the field of English to Arabic translation in the Arab market. The accessibility in CAT tools needs to be deeply tested and to explore other alternative CAT tools to be accessible to the visually-impaired translators. Initiatives are needed by the language and translation colleges and the localization and translation companies in order to involve the visually-impaired students and translators in the market. The universities can help the visually-impaired students by training them on the alternative/accessible CAT tools. The localization and translation companies can help the visually-impaired translators by hiring them and allowing them to use the alternative CAT tools that would be accessible to them as long as all the clients'

requirements will be met and the file will be delivered in the required formats.

Advantages of CAT tools are more than their disadvantages as per the survey's responses in the MA thesis conducted by the current researcher (Refaat 24); however, in the current researcher's point of view, the critical disadvantage of the most commonly-used CAT tools, like Trados and memoQ, is that it is not accessible for the visually-impaired translators. Developers of CAT tools should put into consideration this important market sector in order to not lose it and to not limit the job opportunities for the visually-impaired translators. There are alternative CAT tools rather than Trados and memoQ like: Fluency Now; however, it is not mostly required by clients and it is expensive, Smartcat and MateCat are online tools and free ones; however, they are not 100% accessible, and Wordfast Pro3 is a desktop tool and it is also not a 100% accessible. Such tools could be like other options/alternatives for the visually-impaired translators; however, developers of the most commonly-used CAT tools should consider them and improve the accessibility thereof.

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