

Moses, Time, and Crisis Translation

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Abstract: Training translators to react to sudden emergencies is a challenge. This article presents the results of a training experiment testing the speed of acquisition of the skills necessary to operate the open-source Moses statistical machine translation (SMT) system. A task-based approach was used with trainee translators who had no experience working with MT technology. The experiment is a feasibility study to ascertain whether training on Moses SMT could be considered for long-lasting crisis scenarios. The article reports its findings in four sections. The first section discusses the research context in which ‘crisis translation’ is defined; the second section illustrates the rationale of the experiment; the third section looks at the results of the training experiment; and the fourth at the trainees’ perceptions of their learning processes. The conclusion reflects on the viability of using Moses and on the next phases needed to refine the findings of this first experiment.

Keywords: machine translation; translator training; crisis communication; translation technology

Crisis communication and the position of translation

Notions of crisis communication are well-developed in several areas: There are protocols to follow when communicating during crises and emergencies, and there are also computer models to plan responses and simulate highly authentic scenarios to train field operators (Howe, Jennex, Bressler, and Frost 2013). Yet the terminology to define disruptive events is not universally accepted (Perry 2007; Quarantelli 2005; Shaluf, Ahmadun, and Said 2013); different disciplines attribute different meanings to core terms such as incident, emergency, disaster, and crisis. At times, some terms are used interchangeably; at times, their use triggers specific political responses or activates the deployment of resources (Alexander 2016); at times, their use changes the legal definition of the event and alters the response operations. O’Brien (2016) underlines the

link between crisis communication and translation and offers the umbrella term ‘crisis translation’¹ to define the linguistic mediations, predominantly in writing, that translators undertake over the duration of crises with specific commissioning bodies (e.g. NGOs, institutions, and individuals). Crisis translation shares some of its principles with community translation (Taibi 2016) and community interpreting (Hale 2007). Given the difficulty in accruing human and technological resources in crisis scenarios, there is a higher degree of pressure regarding resourcing crisis translation activities for those communities with very few, if any, expert bilinguals to serve as community translators (Federici and Cadwell 2018).

For this study, we consider crisis as a:

Threatening condition that requires urgent action. It is characterized by a fast evolution and high rate of uncertainty. However, crises and disasters are also interlinked. A disaster, by virtue of the scale of its destruction, will generate crises for those organizations that are directly affected by the consequences of the event. It may also serve as a trigger for a crisis elsewhere. (Pescaroli et al. 2014:86)

The disruption to societies and organizations often generates international support (by NGOs as well as international bodies) and calls for translators. Translation is also required as part of the logistic dimension when organizations and societies prepare responses to crises. In choosing O’Brien’s umbrella term of ‘crisis translation’ (2016),² we recognize the value and urgency of exploring an area of translatorial activity in which little is known — from its potential size to the composition of its members and their training needs. Crisis translation in this context should come under emergency management (see Federici 2016), intended as defined by the United Nations International Strategy for Disaster Reduction (2009) as “[t]he organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.” The potential role of translation in recovery and preparedness have barely been considered in translation studies or related disciplines so far.

¹ Used in the EU-funded project INTERACT Crisis Translation Network.

² This experiment took place when the authors were involved in the preparatory phases of the EU-funded INTERACT Crisis Translation network led by Sharon O’Brien. The network is proposing a comprehensive definition of this notion.

Translation tends to be linked with operations in disaster relief, seen as the predominant situation in which translations make a difference. The World Health Organization (WHO) defines “relief and emergency humanitarian assistance” as:

operations [that] are intended to respond to the immediate need to save lives, limit extraordinary suffering, prevent further injury to the population or damage to the society. Normally, these are operations of short duration. However, in complex emergencies when states are unstable or have failed, and the society has lost its ability to respond, protracted humanitarian emergencies requiring a sustained international presence can exist. (2003:5)

Long-lasting crises demand prolonged involvement of international actors (or of national agencies in multilingual and multicultural settings), which entails the need for translation to mitigate the cascading effects of crisis when language barriers affect communication.

The term ‘crisis’ is terminologically significant, adding complexity to our understanding of crisis translators. In disaster risk-reduction (DRR), extensive debates exist on the definition of core terms, such as emergency, disaster, major incident, *et similia* (Pescaroli and Alexander 2015), as the scale of the response and the financial resources available may depend on such definitions. . The terminology is therefore crucial in the sector of response, risk reduction, and humanitarian crisis action. In turn, the adoption of a flexible operational definition of ‘crisis translation’ becomes crucial in this research area. What we know so far is not enough; we need to better understand how translators are, or could be, trained to operate when translation services are deployed in emergencies, disasters, or long-term crises.

Recent translation-related studies (Businario 2012; Munro 2013; Moser-Mercer et al. 2014) show that linguistic mediation in crisis communications remains an issue for humanitarian operations (see also Cadwell and O’Brien 2016; Crowley and Chan 2011; Tanner and Obrecht 2015; Qadir et al. 2016). Meanwhile, research on the role of translation technologies during recent crises following natural disasters (Hester et al. 2010; Lewis et al. 2011) and on plans to enhance emergency response to natural disasters (Bulut and Kurultay 2001; Doğan and Kahraman 2011;

Doğan 2016) suggests the critical importance of a range of technological aids. Some of the key issues in this research area include automated retrieval systems (Gerbier et al. 2011; Munro 2010; Lewis et al. 2011), crowdsourcing (Hester 2010; Sutherlin 2013; Mulder et al. 2016), coordination through remote meetings (Jennex 2013), and support of “informal volunteerism” (Smith et al. 2012; Whittaker et al. 2015). Reflections on how quickly and effectively we could train new users of support translation technologies, however, are only now beginning to emerge (O'Brien 2016; Cadwell and O'Brien 2017), with some reports from locally organized initiatives suggesting some roles for translators and models for the deployment of interpreters (CLING 2011).

Evidence of translators' roles and the typologies of translation briefs needed in crises lacks the breadth necessary to consider specific issues such as training translators for crisis response. The ad hoc approaches to studying the role of translators in crises (who they may be, what they do, etc.) and the limitations imposed by the crisis scenarios themselves engender a complex field of study. Questions involving pre-emptive action, translation planning, and readiness are beginning to emerge: Which types of crises most need translators? When should translators become involved? Are translators likely to have a positive impact on emergency planning? Are translations needed prior to the inter-agency training of multilingual rescue units?

What is known of the operative role of crisis translators seems to be predominantly linked to the area of volunteerism (e.g., Translators Without Borders, Rosetta Foundation [now part of TWB] and their Kató translation workspace). Crisis translation in several instances relies on volunteers — with minority, unrecognized, tribal, or regional languages — who are not translators (O'Brien 2016; Cadwell and O'Brien 2017) but whose “informal volunteerism” provides services that help interrupt escalating communication issues in a crisis — similarly to what happens on longer-term contexts with community translators (e.g. Taibi 2016; Valero Garcés 2014). Telecommunication, communication aid, and circulation of information often rely on interpreters and translators in the aftermath of disasters; non-translation options contribute to “cascading crises” wherein the initial event affects other areas of activity because communication is not as efficient as it should be among responders and affected populations (e.g. Pescaroli and Alexander 2016).

Intuitively, the potential benefits of using MTs to assist crisis translators become clear when considering the immediacy of translation needs during crises, in which the volume of demand and necessity for speed suddenly increase exponentially (and so do the issues of handling translated data, see Mulder et al. 2016). A pedagogical action research (AR) experiment was designed to consider the learning impact of a Moses SMT training module, as a way of testing the feasibility of intensive MT training to respond to long-term crises. The AR project is a feasibility study intended to ascertain at which level, and for which potential purposes, MT-training modules could be deployed to deal with the overwhelming demand for translation in crises. Hence, the experiment focuses on speed of acquisition of MT skills to complement existing translation expertise, thus complementing the activity of professional and non-professional translators working in crises.

Moses SMT and training experiment

Carried out in Arabic-speaking countries, the experiment focused on trainees' response to the use of an unknown SMT engine in terms of their own assessment of effective learning, referring to recent work on self-efficacy in the use of translation technologies (Doherty and Kenny 2014) which has proven relevance in crisis translation (O'Brien 2016). The module (here intended as a complete standalone training course) obliquely yet ethically tested the trainees' response to the need of quickly learning to use an MT engine. Factors experienced by translators in crisis scenarios, such as emotional fatigue and specific psychological pressure, could not be simulated within the experiment; hence, we focused only on learners' speed of acquisition and perceived learning progress, as indicators of the potential viability of Moses as a *learnable* tool.

Participants did not need to be informed about the potential for the gathered data to ascertain the viability of this or similar approaches for crisis-response training.

O'Brien (2016) shows how intensive training and NGO involvement in crisis translation offer forms of immediate response. The hypothesis behind our experiment was that the training of linguists in the use of Moses SMT could be an additional option to support the readiness and recovery/reconstruction phases of a crisis.

The AR approach chosen for this study (see Cohen, Manion, and Morrison 2013; Hubscher-Davidson 2008; González Davies 2004, 2005; Kiraly 1995; Nunan 1993; Ulrych 2005) tests such a hypothesis. The experimental module was delivered first in Oman, the instructor conducted then a self-assessment of the syllabus before delivering it in Jordan with minor tweaks. Adding the MT training to the participants' existing routines, we sought to verify how far a number of trainee translators could be abruptly introduced to using a SMT system.

The Department of English Language and Literature at Sultan Qaboos University in Oman hosted the first iteration of the experiment, and the training module ran with master's students working from English into Arabic (data from Jordan are not considered in this study). At the outset, all trainees on the course were unaware of MT capacities, but had been introduced to computer-assisted translation (CAT) technologies – though the curriculum at the time of the experiment offered both undergraduate and postgraduate elective/optional modules with elements of translation technologies. The technological setups in the hosting institutions were unknown to the instructor until she arrived in situ; these circumstances represented ideal scenarios to simulate delivering the module in sub-optimal conditions. Because open-access MT engines safely operating from English into Arabic are few, we tested the MT in this combination. The MT engine was partially trained and relatively unstable while the module was being delivered, forcing trainee translators to deal with authentic constraints. Ten native speakers of Arabic with similar levels of proficiency in English as their second language (henceforth the *participants*) completed the module; seven participants were between 17 and 27 years old and three were between 28 and 38; six participants were female and four were male. Two participants had taken a CAT tool module; none had received any MT training.

Several technical issues occurred in the initial phases of the AR experiment. Moses runs on an open-source Linux operating system. University IT departments tend not to support Linux as an institutional platform because it requires additional IT support, so participants used their own laptops. The first session of the module taught them how to operate Linux alongside the operating systems that they habitually use. Direct access to Moses on their laptops allowed participants to manage their autonomous learning without constraints (lab opening times, clashes with classes, etc.) and offered the further benefit of testing the training when the MT was

deployed on machines with different specifications. In fact, for better performance, the installation and training of Moses required the laptop to have at least 4 GB RAM and 200–500 GB of available hard-disk space. Most of the participants' laptops did not fulfil these minimum specifications. The installation and setup phases were delayed as the instructor and trainees devised workarounds. As telecommunication issues and IT incompatibilities are common hurdles in crisis scenarios; these issues added a small degree of authenticity. Once the adjustments were completed, the full module was delivered as planned without simplifying or reducing its learning outcomes (LOs).

The module aims to train new adopters and discuss their response to the challenges of learning Moses SMT from scratch in three weeks. The study focused on the speed of acquisition and the level of deep learning as perceived by the participants, in contrast to findings from the researcher's observations on their progress. The training module, according to AR methods (Cohen et al. 2013), attempted to register the teacher's experience, as a reflective practice and as a way to mentor the learners' autonomy (see Kiraly 2000) within the ethos of producing "reflection in and on action" (Schön 1995). AR involves repetitive, reflective cycles of planning, information gathering/data collection, and implementing revised teaching modes, referred to as the action research "spiral" (Burns 2010).

Focusing on learners' autonomy and changes to their perceptions of learning at the end of their introduction to Moses SMT, the study considers participants' changes in levels of self-efficacy, in its classical formulation (Bandura 1977), as triggered by their acquisition of technical skills. The project tested the participants' ability to use Moses at the end of the training;

A task-based approach was adopted to design the SMT training syllabus (see Kiraly 1995, 2000; Hurtado Albir 1999, 2007; González Davies 2004, 2005); the participants' learning was measured by means of goal-driven assignments. The main goal for participants was to build their own functioning MT engine by completing tasks of incremental complexity. The learning process was task-driven and goal-oriented. The eight-lesson syllabus outlined in Table 1 includes tasks linked to measurable learning objectives, in which the overall goal could only be achieved once the participants had acquired all the skills introduced in teaching units (termed 'lessons') delivered as daily two-hour sessions over 15 days. Independent learning activities replicated the

classroom tasks and enabled the participants to work autonomously to consolidate learning at their own pace. At the end of each session, participants were requested to complete an assignment, requiring them to perform independent tasks aimed at evaluating their acquired skills, rather than knowledge.

Lesson Content

1	Overview of MT, history, approaches and linguistic issues. Statistical machine translation in action (SMT); Moses SMT
2	Introduction to basic Linux commands
3	Installation of Moses from source
4	Installation of essential tools needed to set up Moses, e.g. Mgiza alignment
5	Sourcing and preparing data to train the MT system
6	Running Moses
7	Using Moses to translate
8	Evaluating the quality of MT outputs

Table 1. – Syllabus

Trainee translators in a task-based learning process

The data on perception of learning were collected by means of two surveys and consensual classroom observation by the instructor-researcher (Al Sharou), using indirect ethnographic observational approaches (Hubscher-Davidson 2011). The instructor-researcher observed participant attitudes toward the module and reflected on her teaching methods by collecting data through a preliminary questionnaire (PQ; see Table 2), an end-of-module questionnaire (EMQ), and the participants' learning logs. The participants were a relatively homogenous sample.

In the instructor-led hands-on sessions, the participants were given handouts and readings to perform their classroom tasks and were then recommended tasks for independent practice. The participants could access URLs with indexes of MT resources as necessary. The task-based approach adopted in the classroom training allowed the participants to learn by working through

steps. The cumulative learning by practice increased their autonomy and motivation toward the goal of being able to use Moses independently. This learning cycle implicitly created participatory and proactive attitudes, as freely available online UN corpora enabled the participants to build their own authentic, individual MT engines. Participants used small sets for training the system, as the main aim was to train participants to build their own MT from scratch and to test their MTs by translating short texts. The issue of quality assessment of the output goes beyond the scope of this article, but it ought to be considered in follow-up studies since MT's viability as a crisis-translation support tool depends on output quality.

Adapted from Gaspari (2001), the questionnaires were designed to elicit standard demographic information (age, gender, etc.) as well as information about the participants' habitual computer use and their knowledge/experience using MT. The interest in participants' perception of learning and the link with self-efficacy principles were highly influenced by Doherty and Kenny's study (2014). In an attempt to replicate this study in a contextually different experiment, a section of questions intending to elicit data to assess participants' computer self-efficacy pre- and post-course was added to each questionnaire. Compeau and Higgins's (1995) ten-item questionnaire was revised to gauge participants' responses to their use of MT engines relative to their assessment of effective learning (see also Shank and Cotten 2014; Wright et al. 2014; and, with reference to crisis scenarios, O'Brien 2016). The English-language questionnaires were distributed at the beginning of the first session and after the last session. The PQ gathered essential data on the participants' profiles (e.g. native and second languages, professional and extracurricular experience related to translation, etc.), including their knowledge of translation technologies. The EMQ surveyed the general impact of the experience on students (e.g. positive and negative aspects, attitudes toward teaching methods, assessment of lesson content, etc.).

The PQ section on self-efficacy was devised to ascertain the participants' levels of initial confidence and ability (see Table 2). The same self-efficacy measure was included in the EMQ in which participants were given ten examples of contextually relevant situations for which they were asked to rate their ability to complete a task using a SMT system.

Q1	My knowledge about machine translation at this stage can be rated as:	Scale 1 2 3 4 5 (1 = very poor – 5 = excellent)
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Q2	What Machine Translation Tools you know/use?	
Q3	Machine translation is a synonym for computer-assisted translation.	true - false - don't know
Q4	On the Internet, there are on-line MT systems available for free to translate samples of texts or web pages among various language pairs (including Arabic both as source and target language).	true - false - don't know
Q5	Machine-translated texts can be unnatural from the point of view of register and style, but they are always correct as far as grammar and syntax are concerned.	true - false - don't know
Q6	An MT system that translates from language X into language Y can always translate the other way around, from Y into X.	true - false - don't know
Q7	Machine translation is a threat to human translators.	true -false - no opinion
Q8	Machine-translated texts can be of some help in the work of people who do not know foreign languages.	true -false -don't know
Q9	My idea of machine translation is:	negative - positive - no opinion
Q10	Having an idea of the impact of MT systems on translation and of their actual possibilities and potential is a component of the professional background of present day professional translators whose importance I rate as:	Scale 1 2 3 4 5 (1 = useless – 5 = important)
Q11	Considering my global training as a translator, I expect that this course devoted to MT is going to be:	Scale 1 2 3 4 5 (1 = useless – 5 = important)
I could complete the job using the software package... Yes/No		
Not at all Confident (1-3) – Moderately confident (4-6) – Totally confident (7-10)		
Q12	If there was no one around to tell me what to do	
Q13	If I had never used a package like it before	
Q14	If I had only the software manuals for reference	
Q15	If I had seen someone else using it before trying it myself	
Q16	If I could call someone for help if I got stuck	
Q17	If someone else had helped me get started	
Q18	If I had a lot of time to complete the job for which the software was provided	
Q19	If I had just the built-in help facility for assistance	
Q20	If someone showed me how to do it first	
Q21	If I had used similar packages before this one to do the same job	

Table 2. Preliminary Questionnaire

Only select data from the PQ and EMQ data are discussed here. As the experiment progressed, it became apparent that goal-driven training had the potential to confirm the hypothesis that Moses

SMT could become a further resource to meet translation demand in crises. Equally, it exposed some limitations of Moses. For instance, it could be better used in specific phases of a crisis, rather than when immediate responses are needed, a point considered again in our conclusions. The discussion of results and findings focuses on a select set of answers relevant to this perspective and omits the discussion of other pedagogical findings.

The participants' answers to the PQ give insight into their knowledge of MT. It is beyond the scope of this article to interpret the relationship between data and demographic parameters; it would be difficult to extrapolate statistically significant reflections on the small sample size. Q1–6 of the PQ illustrate the participants' knowledge of translation technologies and of MT at the onset of their training. Answers to Q1 reveal the participants' low levels of confidence in their knowledge of MT technology since two participants described their knowledge as “very poor” and eight as “poor”. In their answers to Q2, most participants could not understand or felt unsure about the differences between MT and CAT. They could nevertheless relate to the well-known statistical (now neural) MT engine behind the free MT system Google Translate.

Table 3 shows how respondents started with minimal and vague levels of knowledge of MT systems; seven participants answered Q4 and Q5 correctly and only two answered Q3 and Q6 correctly (correct answers highlighted in green).

Q No.	True	False	Do not know
Q3	6	2	2
Q4	7	0	3
Q5	1	7	2
Q6	3	2	5

Table 3. Answer to Q3–6 — PQ

Overall, participants' answers show they had erroneous ideas, thus representing an ideal sample of participants to consider as possibly difficult to train in using MTs during a crisis. The answers to Q7–11 of the PQ intended to assess participants' opinions and attitudes towards MT. Most participants thought that MT-translated texts could be helpful to people who do not know the language (see answers in **Error! Reference source not found.**) — one of the hypotheses currently in need of testing in terms of crisis translation — and six participants look at MT

positively (Q9). Their initial attitudes could be dictated by their knowledge of MT, or lack thereof, as it would explain the superficial incongruence of their considering participation in an extracurricular module important enough to take time from their full-time studies. However, Q7 shows that when MT is mentioned in relation to human translators, a higher number of participants considered it a threat (similar to survey figures from professionals, in Katan 2011).

Q No.	Option 1	Option 2	Option 3
	True	False	Do not know
Q7	5	3	2
Q8	8	0	2
	Negative	Positive	No Opinion
Q9	2	6	2
	Not Important 1-2	Intermediate 3	Important 4-5
Q10	3	5	2
Q11	2	3	5

Table 4. Answers to Questions Q7–Q11 – PQ

The objective of Q12–21 in the PQ was to assess the participants’ level of technological confidence before undertaking the course on MT. This section of the questionnaire draws on the concept of self-efficacy, in which a person rates his or her own ability to perform a task and confidence in those self-ratings (Doherty and Kenny 2014). To ascertain participants’ level of computer literacy and their skills in following a step-by-step guide to complete a task, the PQ asked participants to rate their ability and confidence to install anti-virus software under ten contextually relevant situations. Ratings for each example were on a range from 1 to 10, across three categories: not at all confident (1–3), moderately confident (4–6), and totally confident (7–10). A higher score indicated more confidence in that element of the basic skill set assessed by the scale. The participants’ scores are displayed in Table 5, which shows that most participants felt a limited degree of confidence.

NO.	Not at all Confident	Moderately confident	Totally Confident
Q12	6	3	1
Q13	8	2	0
Q14	3	5	2
Q15	1	5	4
Q16	0	6	4
Q17	2	3	5
Q18	0	4	6
Q19	3	1	6

Q20	1	3	6
Q21	0	5	5

Table 5. Self-efficacy Measure - PQ

We focus on whether participants developed the skills required to build the MT engine, so we do not extensively discuss the observational data on how and to what extent the participants' confidence grew, but only on the remarkable change as shown in the data from the EMQ.

From the PQ, only Q2 was omitted in the EMQ; five questions were introduced following Q9 (which is Q10 in the above PQ) and before Q12-21 of the PQ. In the EMQ, Q10 and Q11 were rephrased to reflect that the participants had completed the module:

Q10	As a result of this course is your overall knowledge of MT enhanced?	true - false - don't know
Q11	Considering my global training as a translator, I rate the importance of what I've learnt in this course devoted to MT as:	Scale 1 2 3 4 5 (1 = useless – 5 = important)
Q12	Has the teaching been effective in conveying information on the topics covered during the course?	Yes/No
Q13	Was the content presented in a well-organized and clear way?	Yes/No
Q14	Which word(s) best express(es) your feelings about the course (multiple answers possible): Interesting – Boring – Easy – Difficult – As expected – Unexpected - Other	

Table 6. Qs added to End-of-module Questionnaire

The completed PQ and EMQ provided valuable data for revising and refining collection tools for future iterations of the experiment.

In terms of acquired knowledge, the participants who completed the training module felt they had acquired a better understanding of MT in general, as attested to in the answers to Q1–5 of the EMQ. (The questions were left vague on purpose, as we expected the participants' logs to specify whether their assessment of MT knowledge was Moses-specific or transferrable; they were not taught any other MT in this module.) The questions were expected to elicit the participants' perspective, drawing on self-confidence and trust in their own ability to operate the SMT system efficiently. Seven participants (70%) rated their knowledge as fairly high giving it 4 out of 5; three participants rated their knowledge as intermediate. The figures show improved levels of self-efficacy, compared to the PQ, in which no participant felt they possessed even an intermediate level of competence with SMT. The data suggest a significant increase in the number of correct responses given to Q2–5 after the completion of the module; the number of correct answers to Q2 increased from 2 to 8 (60% correct). More participants managed to differentiate between MT and CAT as two distinct types of

translation technologies; uncertain answers decreased, suggesting the participants on average perceived an increase in their knowledge of MT after taking the module. Error! Reference source not found.

Table 7. EMQ answers to Q2–5.

The participants' change of attitude is the most significant parameter. The data conform to results obtained in comparable areas by other studies (Doherty and Kenny 2014; Bernacki et al. 2015). Participants realized and acted on achieving potential uses of Moses SMT. While understanding its limitations; they felt they had gained a better overall understanding of technological aids to translators as well (see answers to Q6–11, in Table 8), and only one respondent still viewed MT as a threat.

Their consideration of MT as an important component of the professional toolset increased, yet not above average (Katan 2011). The trainees' perception may be market-derived (or based on their current experience), as the national market and its operators generally do not expect in-house translators or freelancers in Oman to possess MT skills.

Participants' self-reflective approach

This section briefly compares the PQ and EMQ findings with the researcher's observations of participant progress over the course of their learning, which emerge from the instructor's assessment of the tasks and the participants' learning logs. Within the paradigm of AR, the module relied on a self-reflective practitioner, who is a critical observer of her/his own classroom methods. This was a way to mentor the learners' autonomy (see Kiraly 2000) by implementing changes and adjustments to enhance class dynamics and learning, which should encourage participants to become self-reflective translators (Federici 2010). Over the learning cycle, the instructor added and removed some tasks to respond to the evolving learning dynamics of the group and to ensure that participants would acquire the necessary skills to attain the learning outcome of the module (e.g. introducing step-by-step guidance to set up Mgiza). In a paced cycle, each lesson was designed for the students to restart their learning cycle by focusing on a new, yet interconnected, task and achieve lesson-specific LOs. At the end of the learning

process, participants developed the essential skills to produce a working MT, which they did, with some confidence in training Moses SMT engines.

Q No.	Option 1	Option 2	Option 3
	True	False	Do not know
Q6: Machine translation is a threat to human translators	1	8	1
Q7: Machine-translated texts can be of some help in the work of people who do not know foreign languages:	9	0	1
	Negative	Positive	No Opinion
Q8: My idea of machine translation is:	1	8	1
	Useless 1-2	Intermediate 3	Important 4-5
Q9: Having an idea of the impact of MT systems on translation and of their actual possibilities and potential is a component of the professional background of present day professional translators whose importance I rate as	3	5	2
Q10: As a result of this course, is your overall knowledge of MT enhanced?	1	3	6
Q11: Considering my global training as a translator, I rate the importance of what I've learnt in this course devoted to MT as:	1	2	7

Table 8. Participants' answers to Q6–11 — EMQ

On the whole, all participants state that the teaching approach conveyed information effectively on the topics covered during the module – attesting to the impact of the reflective approach. Nine participants considered the module as providing an “unexpected” and “interesting” learning experience; for one participant the module confirmed her/his initial impression of translation technologies finding Moses MT “confusing” (though other factors preventing this participant’s regular attendance may have disrupted the task-based learning). Q15–24 were expected to elicit whether there would be changes in the participants’ levels of confidence after they had taken the module. Table 9 shows the number of participants whose confidence level grew after completing the translation job using the Moses SMT engine that they had trained. The responses to “if there was no one around to tell me what to do” (Q15) remained constant with only minor differences, suggesting that the role of mentoring in fast-paced MT training modules remains crucial. The attitude to the unexpected pace of their learning progress was positive (Q20–24), with a shift

towards becoming independent users, after 30 hours of contact in instructor-guided training and possibly the same amount of time as independent users. With a 60% success rate in training, if the figures of this experiment were to be replicated on a much larger scale, it seems likely that even Moses SMT could be deployed with remarkable results in a long-running crisis. Of course, further testing would be required before deploying the module in an authentic crisis scenario.

Q No	Not at all confident	Moderately confident	Totally confident
Q15.	6	4	0
Q16.	5	4	1
Q17.	0	7	3
Q18.	0	4	6
Q19.	2	2	6
Q20.	0	3	7
Q21.	0	2	8
Q22.	3	4	3
Q23.	0	2	8
Q24.	0	2	8

Table 9. Self-efficacy Measure — EMQ

The conditions in which the participants felt totally confident increased from 3 to 6; the learning experience fostered their confidence to work independently on an MT. The graded nature of the tasks allowed learner autonomy to develop rapidly which in turn enhanced the participants' self-efficacy. However, this approach relies on extensive preparation on the part of the instructor, which may represent a drawback when urgent training is needed and training personnel limited.

Responses to questions in PQ show that participants' existing knowledge of MT was "very poor" before taking the course; the majority failed to answer correctly the more specific questions about MT. Initially, participants held only vague and naïve notions of MT. They reluctantly considered it important to their work as translators. Over the contact hours, the participants, guided by the instructor, developed an MT working from English into Arabic. The participants' knowledge changed from being "very poor" to "fairly high" after the module (Q2–5 in EMQ). Their increased self-efficacy and confidence correspond to a measurable success: they could translate with their MT engines. Despite failing to complete 17 tasks (which had been designed with a degree of redundancy to enable further practice), they still succeeded in their assessment as they built a second MT to translate Arabic into English

The responses “confirm the theoretical assumption that efficacy changes during learning and should be considered a dynamic component of the self-regulated learning cycle” (Bernacki et al. 2015), which is important in sustaining fast-paced learning in goal-driven settings, such as training to support communication in crisis scenarios. The end-of-lesson assignments, which included repetition of the tasks learned during the lesson, aimed to test a participant’s ability to reiterate the tasks independently achieving the same objectives.

Observing the participants’ performance when carrying out the tasks, drops in concentration caused them to miss steps in running command strings. These demand precision, especially for the installation phase, and participants were not used to the level of accuracy expected using commands in a Linux OS. As poor connectivity affected download and installation, the instructor provided a zipped file for the participants to install the operative system and Mgiza; alternatively, her mobile phone was used as a hotspot — a likely scenario for responders in natural disasters, which normally disrupt communication infrastructures.. The trial-and-error learning process, as described by one of the participants, motivated them as they acquired the perception that making mistakes was acceptable and solving them was possible, overcoming a reticence common in trainees and trainers (Samson 2005).

Learning logs encouraged the participants to reflect on their learning processes. The logs convey the feeling that, although working in the unfamiliar Linux shell OS was initially daunting, time-consuming, and complicated, learning to use Moses was interesting, as it allowed them to customize an MT. Significantly, their log entries underscore the high level of motivation in these participants who had opted to work with Moses SMT. Participants reported that the module had “revolutionized” their idea about teaching technologies and was different from other non-technical modules they had already taken. At the end of the module, they felt able to complete most of the steps without any problems, as the cyclical tasks had helped them move away from learning in a subaltern position, relying on the instructor, to one of discrete autonomy.

Concluding remarks

As a pedagogical experiment, the MT-training module was delivered within a scenario that presented several unknown conditions. Although not a full simulation of the crisis phases in which MT could be deployed, the experiment confirmed that more research on the use of translation technologies in crisis scenarios needs to be carried out – since the experiment was completed, server-based MT options such as TWB Kató platform have emerged, confirming that multiple approaches are needed as they are phase-dependent.

Rapid-reaction training options using Moses SMT seem to be a viable option, considering the participants' reactions to the learning process and their success rate in attaining the learning outcomes. However, the notion of “rapid” needs to be clarified: further testing on knowledge retention (an ideal follow-up study for this project) should be carried out. Moses SMT does not seem to be an option for a response within 48 hours, so scenario-based tests are also needed. Paraphrasing the participants' evaluations of their own learning, Moses SMT represents an addition to a complex toolkit, which must address the specific needs of the different phases of a crisis scenario.

Though the sample was limited, the findings suggest that it is possible for non-MT users to become familiar with MT systems (the findings should not be considered language-specific, as the MT engine is designed for any language combination), achieving a satisfactory degree of autonomy and confidence in three weeks. Moses SMT, a new system working on an unfamiliar operating system, was different from anything the participants had ever used before joining the module. Their SMTs were relatively unstable and learning problems were expected, as Moses SMT is not a ready-made MT with a simple interface. Yet, it is flexible and free. Furthermore, the experiment shows that it can work effectively on PCs operating below the preferred minimum specifications.

It is useful to add that a second iteration of this experiment in Jordan presented analogous results (see Al Sharou 2018). As results were replicated, the experiment validates the assumption that different operational contexts do not affect the training approach described in this article. Even though its deployment may be considered viable, it undeniably deserves further testing by also simulating the demands of authentic scenarios and by focusing on types of messages or phases of

a crisis in which its use would be most beneficial. This feasibility study shows that the use of Moses MT is promising for linguists who are already trainee translators.

The experiment also raised many issues. An iteration of the AR on a less homogenous set of participants is necessary. The AR proved though that intensive training makes it viable to use Moses SMT independently in a short amount of time, under supervision. Additional simulations with elements of crisis roleplay would give clearer indications on the speed of training relative to quality of output, depending on the crisis contexts. However, considering the lacunae in this particular research area, the project's results give evidence that it is worth trying a large-scale adoption of similar training approaches. MT-generated materials are tested from the point of view of responders who need to act in response to the translated messages. The findings suggest that intensive training offers an additional solution to the problem of translating volumes of texts to enhance responders' communication with crisis-affected populations (as identified in Lewis 2010), especially for those contexts in which speakers of low-resource languages cannot currently benefit from available technologies.³

The findings of this case study raise additional research questions relative to the possibility of deploying MT in crisis translation, which are worthy of further investigations. On the one hand, the sample is representative of training numbers, as it is unlikely that training in crisis scenarios would be imparted to larger cohorts. On the other hand, however, the participants were self-motivated learners, and it is highly unlikely that, in deploying this training module in the phases of a crisis to volunteers with a range of linguistic backgrounds, the participants would have the same high levels of intrinsic motivation. Based on the results, it is our contention that the delivery of the module should be retested at an intensified pace, assessing results after the module has been delivered in a week. Furthermore, iterations could test comparatively whether the levels of learning change if the MT is domain-specific and suitable to particular scenarios. Further research is necessary; a follow-up project would entail adopting this module to train translators in relatively stable crises (e.g. pandemic, migration, and earthquake response systems) and enable participants to build customized MT for their language combination in realistic

³ This is a one of the objectives of the EU Horizon 2020 funded INTERACT Crisis Translation network led by Sharon O'Brien.

scenarios. Several questions emerged deserving further study: Which types of cascading crises could benefit from training for translation supported by this MT engine? Could the training module be used as part of a risk-reduction strategy to develop translation capacity? Or should it be tested instead to assess whether the use of Moses SMT may be suitable for reconstruction and recovery phases? Although crises are by nature only vaguely predictable, great efforts have been made in raising levels of preparedness for crises, and the significance of interlingual communication will, by necessity, grow due to people displacement and climate change.

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