

# Machine-Aided Translation and Post-Editing: Matching Curriculum to Evolving Market Needs

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**Abstract**—In this age of digitalization and technological advancement, the labor market of translation has witnessed significant turns in response to market needs. Translation departments in Iraq, unfortunately, have neither updated their educational system nor their curricula to meet these needs. This paper aims to present a design of a supplementary course newly introduced in the Department of Translation, College of Languages, University of Duhok. The course title is Machine-Aided Translation and Post-Editing. Following the Bologna process which aims to improve the quality of higher education, this course has been added recently to the department's curriculum and taught to fourth-year students of the academic year (2022-2023) as part of the requirements of their graduation project, viz., translation project, which is their main course. Having completed the course, a close-ended questionnaire was distributed to seventy-five students to evaluate the course. Following the quantitative approach in this study research design, the course mostly achieved 'very good' results regarding question themes pertinent to the instructor, the course, and the student's self-evaluation. This study has significant implications for the educational process in that it stresses the need for continuous updating of the curriculum of the department and consequently students' competences to meet evolving market needs.

**Keywords**—Bologna Process, Course Evaluation, Feedback, Machine-Aided Translation, Post-editing.

## I. INTRODUCTION

Universities must remain aware of the changing labor market to ensure that their courses are up-to-date and relevant to the current job market. This requires periodic reviews and modifications to the courses' content and objectives. By doing this, universities can ensure that their students are prepared for the workforce after graduation.

In the academic year (2019-2020), the Bologna process was adopted in the Department of Translation, College of Languages, University of Duhok (UoD). The process, which originally consisted of several agreements between European nations, aims to standardize and raise the standard of higher education within the EU. It was first presented in 1999 at a meeting in Bologna, Italy, and has since been embraced by most EU nations in addition to several non-EU nations. The Bologna Process' main goal is to establish the European

Higher Education Area (EHEA), which will allow students to move freely between nations and have their degrees recognized throughout the continent (European Commission, n.d.).

Ever since its adoption of the Bologna process, UoD has constantly followed up curricula review and development. It accordingly formed a committee that included representatives from all colleges for this purpose. In 2022, UoD called upon the College of Languages to prepare for a workshop on the curricula and market needs. On 28 March 2022, the College of Languages organized a workshop entitled "Best Matching our Curricula with the Market Needs." The workshop was attended by committees from the three departments in the college as well as graduates in the workforce as full timers and freelancers. At the end of the workshop, the departments were required to identify the necessary steps to make their curriculum meet the market needs. As far as the Department of Translation is concerned, a gap was identified between the actual knowledge imparted to the students, and the desired knowledge, skills and attitudes needed in the digital transformation of the translation world and subsequently in the market of translation. This is what the concept of training needs analysis is concerned with. It is "a process in which the gap between the actual and the desired knowledge, skills, and attitudes... in a job are identified" (van Vulpen, 2023). The word 'job' here is important in our educational context because the ultimate training of our students is to help them succeed in their future jobs. According to the 2018 World Economic Forum Future of Jobs, certain "jobs will ... fundamentally change due to automation and other advancements in technology" (AIHR, Academy to innovate HR, 2020). Translation is one of these jobs that have fundamentally evolved because of automation and advancements in technology and that the educational setting must keep pace with.

## II. THE PROBLEM, AIMS, AND QUESTIONS

### A. Statement of the Problem

In the beginning of the academic year 2022-2023, UoD, as part of its endeavor to follow up the training of students, informed our department that our translation project for fourth-year students needed more credits to secure more training. What students basically do in their translation project is that they are required to translate no less than 5000 words from English into Kurdish or Arabic. Supervisors are assigned to groups of students. When they finish their translations, they

are evaluated by their supervisors and other examiners. The present researcher (the College of Languages' representative in the UoD's Curricula Development Committee) suggested to the Scientific Committee in the department the inclusion of a supplementary course to the main course of translation project. The name given to this course is *machine-aided translation and post-editing* (MAT & PE).

### B. Research Aims

The study aims to present a course on MAT & PE as has been designed and implemented in the Department of Translation, College of Languages, UoD. It primarily aims at evaluating the course in question to see whether it succeeded or not in terms of three themes: the instructor, the course itself, and the student's self-evaluation.

### C. Research Question

The question is: Will the supplementary course MAT & PE succeed in terms of the three categories of "*instructor-specific themes*," "*course-specific themes*," and "*student self-evaluation*?"

## III. THE SUPPLEMENTARY COURSE

### A. Rationale for the Supplementary Course

As globalization continues to expand, machine translation (MT) is becoming increasingly important in today's world. MT is the process of automatically translating content from one language to another using artificial intelligence. In the digital age, its significance has grown as more and more text is made available online in a variety of languages. It can save businesses money and time by processing documents in multiple languages quickly. The need for MT is obvious, and it will only grow in importance as the world becomes more connected.

Alongside MT, the use of computer software to assist human translators in their job is known as MAT "also known as computer-assisted translation (CAT)". These tools which are designed to automate the translation process have been around since the 1950s. The translator can enter the source text into the CAT software and use the interface to divide it into phrases, sentences, or paragraphs, known as segments. There is also translation memory which is a database that the software uses to keep each source segment together with its corresponding translation. As the translator translates more content, the software will be capable of reusing more translation matches. This kind of automation speeds up translation greatly and ensures consistency with earlier translations (Phrase, 2023). Translation memory is not the only feature of the many CAT tools in the market today. There are also four commonly shared ones (ibid.):

1. "Term base (translation glossary)": "Term bases," often called "translation glossaries," are databases that give explanations or step-by-step directions for employing terminology that has been translated. It functions similarly to a dictionary and can be used

with the translation memory to seek up terms associated with the business, organization, or institution that one is translating for. It helps to make sure that common or specialized terminology is accurate and consistent across all translation tasks. If it is properly integrated with the translator's translation memory, it enables the translator to work faster every day.

2. "Real-time collaborative teamwork": The translator can ask members of his or her team, reviewers, managers, clients, or other teams' members to offer input on certain translated documents using a cloud-based CAT software. Within the CAT program, they pre-translate the information, share it with their preferred partners, and jointly decide on elements like language or tone of voice. Additionally, the translator can work with his or her team on translation projects with due dates.
3. "Quality assurance functionality": Similar to how text editor software's spelling and grammar tools work, quality assurance (QA) features like internal spellcheck help to remove all kinds of errors in translation projects. QA tools can find missing text or tags, variations from accepted terminologies, and numeric mismatches. Before submitting a project for translation, the translator can start the QA process. They can continue the process during translation and editing, and even after the translation has been finished, they can carry out final checks.
4. "MT capability": Large volumes of text may be translated quickly with MT without the intervention of human translators. It can also be utilized together with human translators who undertake the process of post-editing (PE) the MT output.

As the usage of technology in the translation industry keeps expanding, it is becoming more and more crucial to include digital skills in translation education. Students must be equipped with the necessary skills to be able to fit into the market needs after graduation.

According to the Bologna process, students should acquire a variety of skills, known as the "Bologna key competences" (European Union, 2006) that are applicable to the contemporary labor market and that will help them succeed in their future careers. The competences that the present researcher is interested in because they are relevant to the supplementary course include:

1. "Digital competence": It is the ability to use technology (computers, the internet, and software) effectively and confidently for work and communication (p. 15).
2. "Learning to learn": It is the ability to continue learning, to organize learning, including effective time and information management, both individually and collectively (p. 16).

### B. Course Objectives

The course aims at empowering the students to

1. use MAT software,

2. undertake PE to MT output and their peers' translations to achieve better outcomes on the levels of speed, efforts made, and quality, and
3. engage in collaborative teamwork.

### C. Learning Outcomes

The students are expected by the end of the course to develop their skills in

1. using MAT software,
2. undertake PE to MT output and their peers' translations,
3. engage in collaborative teamwork.

### D. Prior and During Course Implementation Procedures

To fulfill the course objectives and achieve the course outcomes, the teacher followed these procedures:

1. The teacher co-signed a license agreement with the Hungarian software company memoQ Fordítástechnológiai Zrt. (memoQ Translation Technologies). According to the agreement, the company provided the Department of Translation with free licenses for the latest version of a CAT tool known as memoQ to 82 students and 4 teachers to use the memoQ software for 365 days. Viktor Mochnács, Translator Sales Representative, provided us with a welcome pack that included instructions on the use of the software. This is part of the memoQ Academic Program. Its goal is to provide cutting-edge translation technology to universities and students. Universities can apply for free educational licenses for their students and lecturers. Furthermore, if students and recent graduates want to continue using memoQ after they finish their studies, the Student Discount Program allows them to do so at a significantly reduced price (memoQ, 2023).
2. The teacher co-worked with one of the students who is efficient in the use of software during the summer holiday for one month to examine the potentials of the software before asking the students to download it. Instructions were provided afterwards to guide the students through the installation process. A presentation was also prepared to explain the potentials of the software. These steps were taken because this is the first time our students experience the use of a CAT tool.
3. Having started the course, the teacher explained the rationale of the course, its objectives, its expected learning outcomes, its organization, and how activities will be graded according to the course's standards of performance.
4. The students were introduced to the concepts of MT, MAT, and PE. As far as PE is concerned, the students were given the Error Typology of the Translation Automation User Society (TAUS) (*Error Typology Benchmark: TAUS Dynamic Quality Evaluation*, 2021), which was established in 2005 as a think tank with the goal of automating and innovating translation (TAUS, 2022). The typology was fully explained, students were provided with two samples

on how to do PE from English into Kurdish and Arabic, and how to assess the quality of the final product according to the TAUS Severity of Levels. It is worth noting that the Error Typology and the Severity of Levels were modified based on the MA thesis of the researcher's student currently working on "Post-editing English -into-Arabic machine translation by translation students." (Mohamad, 2023). The teacher also prepared a rubric for the students as post-editors to make the evaluation process well guided.

5. The students were divided into groups. Each student within the group was required to prepare a 500-word report and a presentation on a CAT tool. Though members of the group worked together, each student was responsible for his/her own report and slides within the joint presentation. The idea was to encourage the distribution of tasks in the group and the assignment of a group leader. The teacher prepared a list of CAT tools which were distributed among the groups. They were instructed to download the tool if it is a software or to work on the platform if it is online. They were told to work on the tool and examine its potentials and limitations for the purpose of evaluation and recommendation. The tools included the following: Wordfast, Crowdin, Smartcat, Virtaal, MateCAT, TextUnited, OmegaT, CafeTran, SDL, POEditor, and Localize.
6. Being supplementary to the Translation Project course, the students were required to commence the translation tasks and exchange them to undertake PE of MT output and their peers' translations. The reason why not only MT output was post-edited is that Bahdini Kurdish is not supported by MT engines like Sorani and Kurmanji Kurdish, and Arabic. Therefore, as far as the Bahdini speakers were concerned, they were required to post-edit their peers' translations.

## IV. COURSE EVALUATION

Having completed the course, the teacher moved to the next step of evaluating the course. The following methodology was adopted.

### A. Research Design

The research design adopted is the quantitative method which involves the collection and analysis of data.

### B. Participants

The sample was fourth-year students in the Department of Translation, College of Languages, University of Duhok, the academic year 2022-2023. Seventy-five students (8 students were absent on the evaluation day) took part in the provision of course feedback upon the request of their teacher who asked them to participate voluntarily without mentioning their names.

### C. Research Tool

The research tool is a close-ended questionnaire taken from the Berkely Center for Teaching and Learning, Course

Evaluations Question Bank (2023). Faculty focus groups from the Taskforce on Teaching Evaluation in 2009 developed the questions, with additional input and revisions provided by the Academic Senate's Committee on Teaching. The questionnaire contained three categories: "instructor-specific question themes" (6 questions); "course-specific question themes" (4 questions), and "student self-evaluation" (One question). It was supplemented with a Likert scale of five items ranging from poor to excellent.

*D. Data Collection and Procedures*

The data collection was carried out in December 2022. Before answering the questions, the teacher fully explained the items of the questionnaire and the aim behind administering it. Then the students were asked to work on their own when answering the questionnaire so that each student gives his/her opinion with being affected by the opinion of the other students. They were also instructed to ask the teacher should they have any queries.

**ANALYSIS OF RESULTS**

Tables 1, 2, and 3 show a higher number of students choosing 'very good' and 'excellent,' as compared to 'average,' 'below average,' and 'poor,' a lower number choosing 'average,' and the lowest choosing 'below average,' 'poor' or none of these two for the three categories. The results, therefore, appear to range between 'very good' and 'excellent' as the number of students choosing the other three evaluation items is very low, the highest being (15 students) opting for 'average,' as compared to (30) for 'very good' and (27) for 'excellent' in question number 5.

TABLE 1  
RESULTS OF INSTRUCTOR-SPECIFIC QUESTION THEMES

Evaluation	Instructor-specific question themes					
	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6
poor 1	0	0	1	2	0	1
below average 2	0	1	4	1	7	1
average 3	10	10	12	12	8	15
very good 4	45	37	30	29	29	30
excellent 5	20	27	28	27	31	27
number of participants	75	75	75	75	75	75
actual number of participants	75	75	75	71	75	74

TABLE 2  
RESULTS OF COURSE-SPECIFIC QUESTION THEMES

Evaluation	Course-specific question themes			
	Q.7	Q.8	Q.9	Q.10
poor 1	1	1	0	1
below average 2	1	2	1	5
average 3	9	13	12	8
very good 4	31	29	34	40
excellent 5	33	30	28	21
number of participants	75	75	75	75

actual number of participants	75	75	75	75
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TABLE 3  
RESULTS OF STUDENT SELF-EVALUATION QUESTION

Evaluation	Student Self-evaluation question
	Q.11
poor 1	0
below average 2	0
average 3	11
very good 4	41
excellent 5	23
number of participants	75
actual number of participants	75

Accordingly, Tables 4,5, and 6 show that the highest percentages appear within the evaluation items of 'very good' and 'excellent,' as compared to 'average,' 'below average,' and 'poor.' For the first category of "instructor-specific question themes," questions 1, 2, 3, 4 and 6 scored a high percentage of 'very good' (60%, 49%, 40%, 41%, and 41%, respectively), and question 5 scored a high percentage of 'excellent' (41%). It is worth noting that for questions 4 and 6, 71 and 74 students only answered the questions out of the total number of students which is 75 students, respectively. For the second category of "course-specific question themes," questions 7 and 8 scored a high percentage of 'excellent,' (44% and 40%, respectively) compared to questions 9 and 10 which scored a high percentage of 'very good,' (44% and 40%, respectively). For the third and last category of "student self-evaluation question," question 11 scored a high percentage of 'very good,' (55%).

TABLE 4  
THE PERCENTAGES OF INSTRUCTOR-SPECIFIC QUESTION THEMES RESULTS

Evaluation	Instructor-specific question themes					
	Q.1	Q.2	Q.3	Q.4	Q.5	Q.6
poor 1	0%	0%	1%	3%	0%	1%
Below average 2	0%	1%	5%	1%	9%	1%
average 3	13%	13%	16%	17%	11%	20%
very good 4	60%	49%	40%	41%	39%	41%
excellent 5	27%	36%	37%	38%	41%	36%
number of participants	100%	100%	100%	95%	100%	99%

TABLE 5  
THE PERCENTAGES OF COURSE-SPECIFIC QUESTION THEMES RESULTS

Evaluation	Course-specific question themes			
	Q.7	Q.8	Q.9	Q.10
poor 1	1%	1%	0%	1%
Below average 2	1%	3%	1%	7%
average 3	12%	17%	16%	11%
very good 4	41%	39%	45%	53%
excellent 5	44%	40%	37%	28%
number of participants	100%	100%	100%	100%

TABLE 6  
THE PERCENTAGES OF STUDENT SELF-EVALUATION QUESTION RESULTS

Evaluation	Student Self-evaluation question
	Q.11
poor 1	0%
Below average 2	0%
average 3	15%
Very good 4	55%
excellent 5	31%
Number of participants	100%

The following charts support the analysis of results already shown in tables 1,2, 3, 4, 5, and 6 and give a clearer picture of the results of each question.

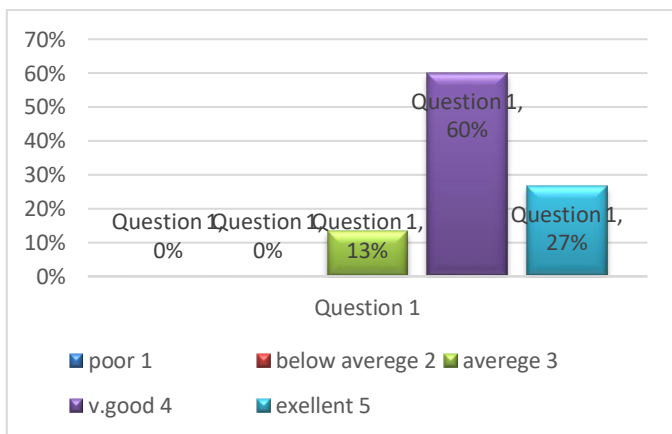


Chart 1. Question (1) “Presentation of Content: The instructor clearly presented the skills to be learned.”

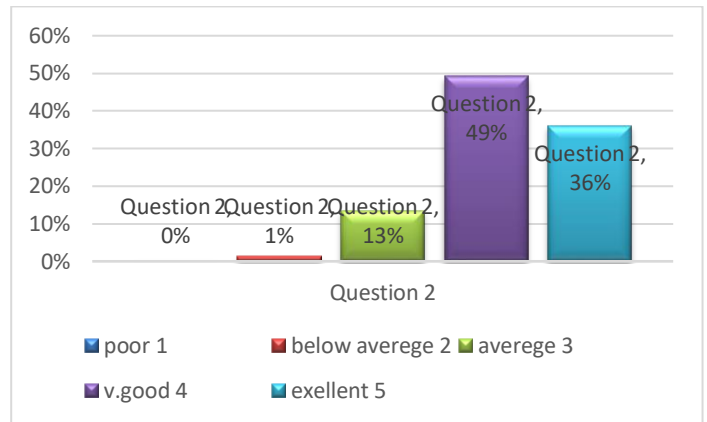


Chart 2. Question (2) “Clarity of Expectations or Directions: the instructor clearly articulated the standards of performance for the course.”

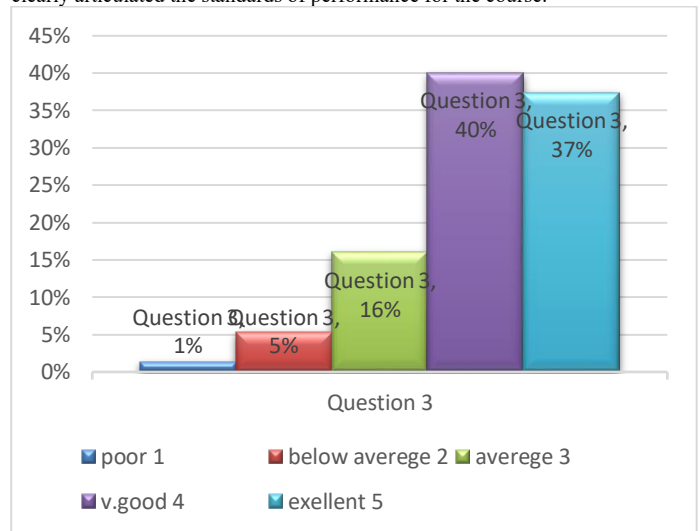


Chart 3. Question (3) “Helpfulness/ Availability: The instructor was helpful when I had difficulties or questions.”

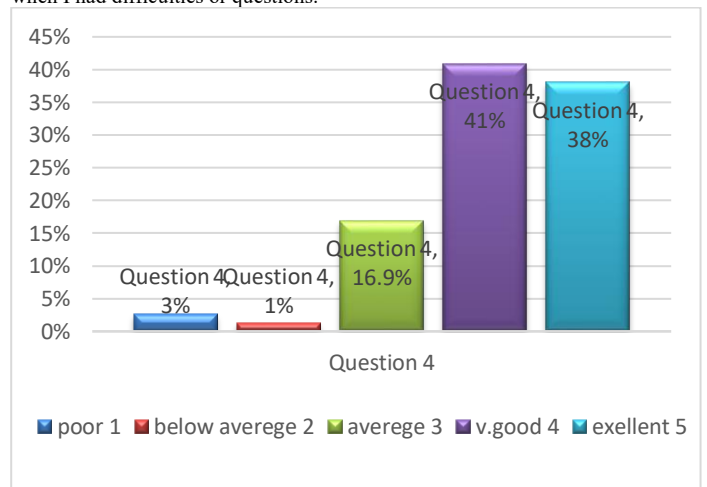


Chart 4. Question (4) “Useful/ Clear Feedback on Performance: The instructor provided clear constructive feedback.”

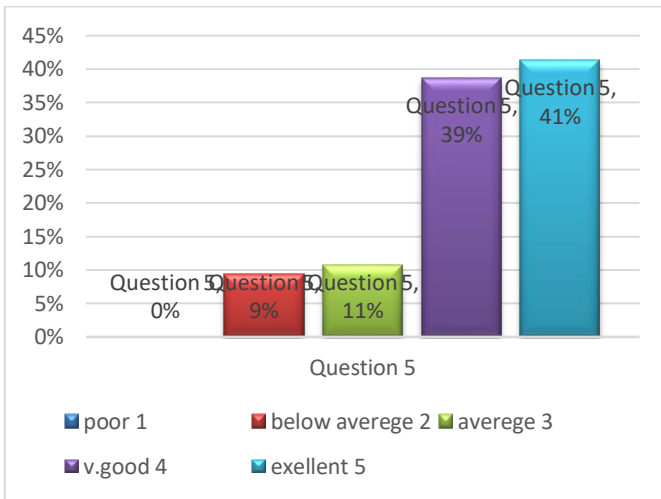


Chart 5. Question (5) “Encouraging of Participation/ Discussion: The instructor encouraged student questions and participation.”

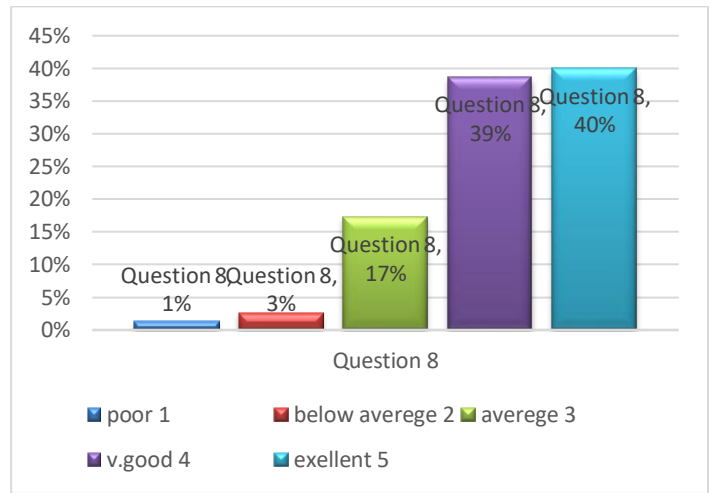


Chart 8. Question (8) “Application & Specific Skill Development: The course developed my abilities and skills for the subject.”

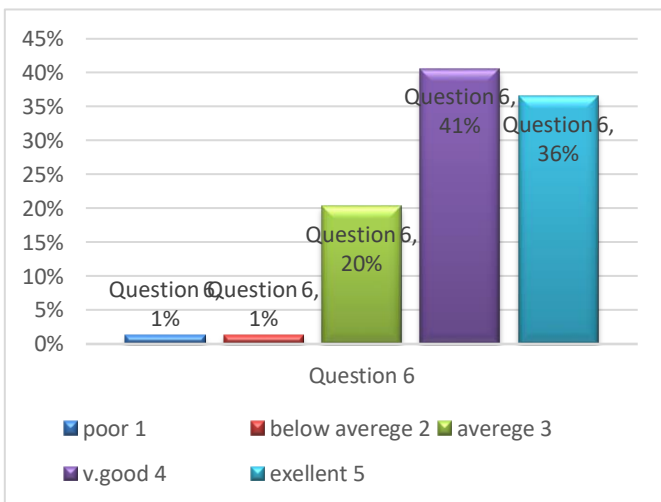


Chart 6. Question (6): “Overall Teaching Effectiveness: Considering both the limitations and possibilities of the subject matter and the course, how would you rate the overall effectiveness of your instructor?”

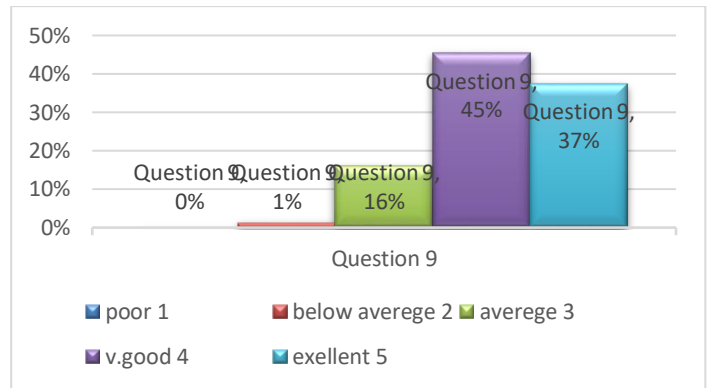


Chart 9. Question (9) “Theory/ Content Knowledge: The course provided the opportunity to practice the skills required in the course.”

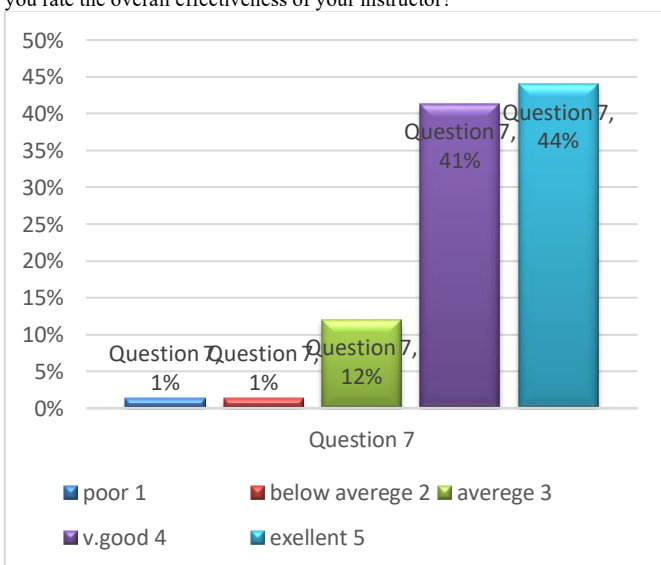


Chart 7. Question (7) “Course Content (Organization, Clarity of Expectations/ Directions, Balance/ Appropriateness): The course was effectively organized.”

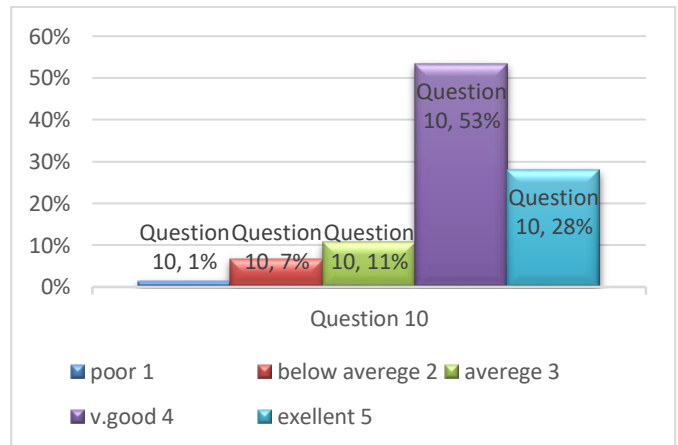


Chart 10. Question (10) “Course Overall: Considering both the limitations and possibilities of the subject matter and the course, how would you rate the overall effectiveness of the course.”

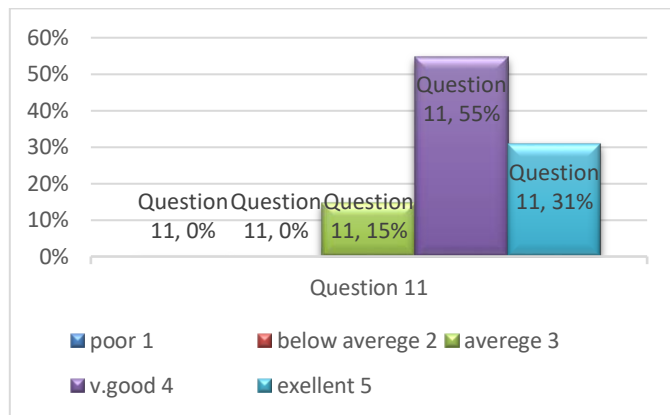


Chart 11. Question (11) “How satisfied were you with your effort in the course?”

## V. DISCUSSION AND FINDINGS

The analysis of results clearly shows that the feedback was highly positive, ranging between ‘very good’ (for the most part) and ‘excellent.’ If we compare **“the instructor-specific question themes”** that scored ‘very good,’ we will find that the highest percentage runs as follows:

1. Question 1: “Presentation of content” (60%).
2. Question 2: “Clarity of expectations or directions” (49%).
3. Question 4: “Useful/ clear feedback on performance” (41%).
4. Question 6: “Overall teaching effectiveness” (41%).
5. Question 3: “Helpfulness/ Availability” (40%).

As for **“course/ specific question themes”** that scored ‘very good’ and ‘excellent,’ the highest percentage runs as follows:

### Very good:

1. Question 10: “Course overall” (53%).
2. Question 9: “Theory/ content knowledge” (45%).

### Excellent:

1. Question 7: “Course content (organization, clarity of expectations/ directions, balance/ appropriateness)” (40%).
2. Question 8: “Application & specific skill development” (40%).

The results indicate that the course succeeded, and the students’ satisfaction was mostly ‘very good.’ Indeed, excellence is an ambitious objective that cannot be easily attained in such a course implemented for the first time.

## CONCLUSIONS AND IMPLICATIONS

As an attempt to improve the translation project course, the researcher designed a supplementary course with the aim of filling the gap between the actual knowledge imparted to the students, and the desired knowledge, skills and attitudes needed in the digital transformation of the translation world and subsequently in the market of translation. Having designed and implemented the course, the teacher conducted a course evaluation to see whether the supplementary course succeeded in terms of the three categories of “*instructor-*

*specific themes*”, “*course-specific themes*”, and “*student self-evaluation*”. The results have clearly shown that the course succeeded to mostly a ‘very good’ degree, followed by ‘excellent.’

The pedagogical implications of this study are that university courses need to be updated regularly to meet the accelerating development in the labor market which is becoming more digital than ever. The prime aim should be to train students and prepare them for the market, as this is the aim behind the educational process. The other key point is that students should be involved in this process of updating in the sense that their feedback should always be considered to monitor and develop the process which is ultimately meant for them and their future.

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