Computer Science Technical Report

Q-Aware: A Lightweight Crosscutting Track for Educating T-Shaped Quantum-Aware Computer Science and Software Engineering Students

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Michigan Technological University
Computer Science Technical Report
CS-TR-26-01
January 2026

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www.cs.mtu.edu

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Abstract

This paper introduces the Quantum-Aware (Q-Aware) track, an adaptable and lightweight curricular framework that can be integrated into existing CS/SE curricula for the preparation of quantum-aware graduates. Q-Aware graduates possess fundamental knowledge about QC and its differences from classic computing. There is an urgent need for "T-shaped" software developers, with breadth in Quantum Computing (QC) and depth in Computer Science (CS) and Software Engineering (SE) who can build the quantum-powered applications of the near future. Undergraduate degree programs are currently ill-prepared to handle this need: most quantum-oriented programs are limited to institutions with substantial resources, and there has been relatively little work on integrating QC topics into existing CS and SE curricula. This work presents the results of a study conducted on the integration of Q-Aware in Data Structures and Discrete Structures courses at Michigan Tech during Fall 2025. The goal of this study is to investigate the effectiveness of Q-Aware in helping students achieve the level of knowledge and skills for quantum awareness. In addition to great enthusiasm of students for participation in Q-Aware, we observe a substantial increase in confidence of students when it comes to understanding concepts such as qubit, quantum state, superposition and quantum measurement. We also trained the instructor who taught Q-Aware and students' feedback were positive about the effectiveness of lectures, motivating students, effective use of time and handling students' questions.

1 Introduction

The ***quantum-talent gap*** between the workforce needs of the quantum industry and the training that academic institutions can provide is a significant problem [10, 9, 2] and a national priority, as indicated in the recommendations of the National Strategic Plan (NSP) for Quantum Information Science and Technology (QIST) Workforce Development [15]. Among the components of the so-called "quantum stack", including quantum sensing and quantum communication, Quantum Computing (QC) is known to be the most important area of QIST in the future [4, 8, 17], and its market annual growth rate is predicted to be almost 14% from 2024 to 2030 [21]. The seriousness of the quantum-talent gap has been confirmed in several studies [3, 2, 9, 7, 10, 8] that report on the need for QC graduates in the next decade, which far exceeds the rate of producing PhD graduates worldwide. These studies identify three major categories of QC job skills needed in the industry: Graduates who possess minimum knowledge about QC and how it is different from classic computing are called *quantum-aware* graduates, whereas those who are knowledgeable in basic concepts of QC, but not necessarily skillful in quantum algorithm development and in programming are called *quantum-ready*. *Quantum-proficient* graduates have the skills for developing quantum algorithms and programs. The industry has a particular need for the so-called *T-shaped* Bachelor-level graduates, pairing *Quantum-Awareness/Readiness/Proficiency (QuARP)* (Figure 2) with the depth of knowledge and skills in a major such as Computer Science (CS) or Software Engineering (SE) [7, 10, 2, 9].

There are significant challenges to bridging the quantum-talent gap at the undergraduate level. First, a new undergraduate program or even a minor must be geared towards the needs of industry while considering the resource constraints of the institution as well as the requirements of higher education [3]. The situation is exacerbated by the already high number of course requirements in many programs. Furthermore, due to the interdisciplinary nature of QC and students' required background in quantum mechanics, it is a daunting task to teach QC to a population of students with diverse backgrounds, and students also suffer from QC's steep learning curve. Indeed, even instructors need training and assistance to adjust to the new normal of QC. As such, there is a pressing need for a lightweight and reusable program that has maximum flexibility in creating pathways for students to enter the program with a diverse set of backgrounds in computing-related areas. Likewise, students should have flexibility in choosing the level of competency along the QuARP spectrum that suits them best — with the understanding that a baseline of Quantum Awareness is now a requirement.

Most current approaches [19, 6, 1, 20, 7, 18] to bridging the quantum-talent gap rely on degree programs and minors offered in large (R1) universities with sufficient resources to invest significantly in quantum technology. Some examples include: a degree program in Quantum Engineering at the University of New South Wales in Australia, a Physics and Quantum Computing BSc major offered at the University of Pittsburgh, a degree on Quantum Information by University of Maryland, a minor in quantum hardware engineering at University of Michigan and a major on quantum technology offered at Aalto University in Finland. Moreover, the QuSTEAM project [18] provides a template consisting of six courses for an undergraduate minor and associate certificate. The aforementioned programs require significant numbers of additional courses and resources, and they have little focus on the algorithmic, programming, and software aspects of QC. While these efforts are commendable, the quantum-talent gap cannot be bridged in the near future without the participation of a wider range of institutions [16, 5, 14, 13].

We propose a different approach that can prepare T-shaped QuARP software developers and can be incorporated into existing CS and SE curricula without a significant increase in the number of required courses. The objective is to enable an equitable playing field for QC education, where academic institutions have the resources they need to prepare their CS/SE students for the new reality of QC. At the core of the proposed approach is a lightweight and replicable curricular framework, the *Q-Aware track*, for the training of Quantum-Aware graduates through the integration of QC into existing Computer Science (CS) and Software Engineering (SE) programs. The Q-Aware track (see Figures 1 and 2) includes a few small course modules, and offers students a pathway to becoming quantum aware. Module 1's objective is to educate students about QC ethics and can be integrated in any Computer Ethics course. Module 2 provides the basics for understanding concepts such as the quantum information bit (qubit) and its geometric representations, quantum states vs. classic states, quantum superposition and measurement in one-qubit systems. Module

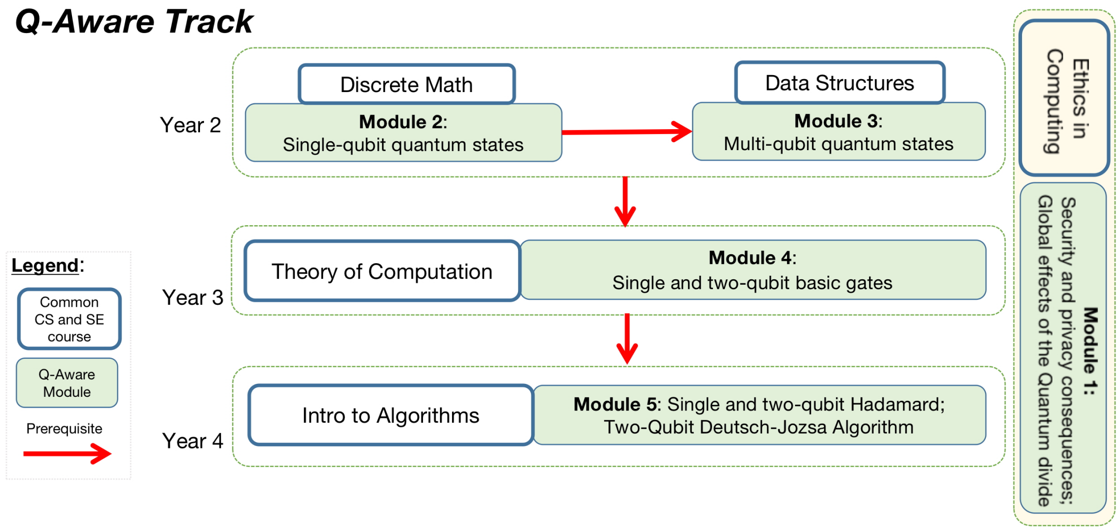

Figure 1: Q-Aware modules and their dependencies.

3 expands the topics into multi-qubit quantum states and their vector representations. Module 4 focuses on quantum transformations of quantum states, and lays the foundations for quantum algorithms. Module 5 provides an introductory coverage on quantum algorithms using a small-scale representation of Deutsch-Jozsa algorithm. Figure 1 illustrates the proposed host courses for each one of the modules. Q-Aware has been developed with extensibility in mind where optional modules can be added to it towards providing other pathways to quantum readiness and quantum proficiency. The course modules in Q-Aware crosscut existing courses in CS/SE curricula, called the *host courses*, with at most 3 hours of lecture, one quiz and one homework assignment. Each module is supported by recorded videos and office hours to enhance students learning. Institutions have the liberty to integrate Q-Aware modules in courses different from the proposed host courses in Figure 1, dependent upon their local constraints.

In this paper, we present our work on the development, implementation and evaluation of Module 2 of Q-Aware among a population of fifty five students enrolled in Discrete Structures and Data Structures courses who volunteered to participate in Q-Aware. We believe that Module 2 is the most challenging module of Q-Aware because it is the first technical module where freshmen or sophomore students get to learn about QC. Moreover, the minimum background required for Module 2 is to have passed Calculus I for students who are enrolled in Discrete or Data Structures. As part of the development of Q-Aware, we identify learning objectives of Module 2 in Figure 1 based on industry needs and the constraints of the host course in which the module is offered. This pilot project will help us investigate the challenges of integrating Q-Aware in existing CS/SE curricula, laying the foundations of a larger project that will implement the entire Q-Aware and will expand Q-Aware to QuARP with pathways to quantum-awareness, readiness, and proficiency (see Figure 2). Our objective in this work is to investigate the following research questions:

1. How effective is the Q-Aware track in helping students to achieve quantum-awareness learning objectives?

2. How readily and effectively can instructors adopt the Q-Aware track to integrate QC competencies into their instruction?

Organization. Section 2 introduces the challenges of implementing Module 2, and Section 3 presents its design. Section 4 evaluates the implementation of Module 2 with respect to the aforementioned research questions. Section 5 discusses related work, and finally Section 6 makes concluding remarks and discusses future work.

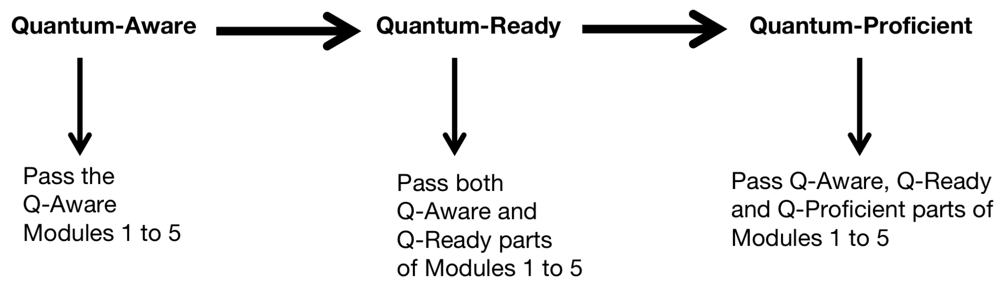

Figure 2: QuARP vision.

2 The Challenges of Integrating Module 2

As part of the development of Q-Aware, we identify learning objectives for Q-Aware modules (including Module 2) based on our three years of experience teaching a 3-credit QC course and based on learning objectives across a large portion of introductory QC courses in the US [20, 3, 18, 12]. This work investigates the challenges of integrating Module 2 in the following "host" courses: Discrete Structures and Data Structures. We propose the following learning objectives for Module 2, and shall evaluate their realizability in the context of the host courses that are crosscut by Module 2.

Module 2 Learning Objectives: Students will be able to

- explain what a complex number is and calculate its magnitude;
- specify a qubit as a vector and also in Ket notation;
- explain the concept of linear superposition in a single-qubit system;
- comprehend the measurement of a single-qubit system, and
- calculate probabilities of measurement outcomes.

Challenges. The challenges of integrating Module 2 into courses in the first/second year of an undergraduate CS/SE program concern with the fact that Module 2 will be the first exposure of students to QC concepts. As such, students' background and the contents that are included in Module 2 become important. Another factor that exacerbates such integration includes the fact that Module 2's organization should preferably require no background in Quantum Mechanics (QM). That is, freshmen and sophomore students can take Module 2 and successfully pass it without any background in QM. As a result, we should assume that students who will take Module 2 have passed only introductory programming courses and have taken/passed Calculus I. Another challenge is to provide necessary coverage for QM in a Just-In-Time (JIT) manner, considering students' background. Such a JIT coverage must take students' backgrounds into account.

3 Designing and Implementing Module 2

We design Module 2 while considering the alignment of its contents with the topics covered in the host courses. For example, Discrete Structures is often a second-year course covering the fundamentals of discrete mathematics (sets, trees, graphs, functions, relations, recurrences, proof techniques, logic, combinatorics, and counting) as specified in the ACM syllabus [11]. The topics in this module are well-aligned with those already in the Discrete Structures course and in fact complement them by providing meaningful context for their application. We first ensure that students will be able to 'Explain' and 'Apply' (based on Bloom's taxonomy) the following items: (1) *Complex numbers*: Students should understand complex numbers and should be able to calculate the magnitude of complex values. (2) Matrix/Vector: We teach vectors and their matrix representation where entries could be real or complex numbers. We start this vector and Ket representations in the context of single-qubit systems, and then generalize it to multi-qubit systems in Module 3. Specifically, we develop two 50-minute lectures with the following outline:

- *Lecture 1*: This lecture covers the basic concepts of quantum information encoded in sub-atomic particles, with a motivational discussion about the power of quantum computing vs. classic computing. Then, the discussions continue with an introduction to the Ket notation and the quantum state of a qubit represented as the linear superposition of classic states. Several examples are discussed, followed by a two-dimensional representation of a qubit. We also provide a brief discussion on what happens when a quantum state is disturbed, laying the foundation for the concept of measurement.

- *Lecture 2*: This lecture starts by continuing the discussion on measuring single-qubit states, and what a normalized state is. We also explain how to calculate the probabilities of measurement outcomes. Then, we teach how to represent qubits as vectors and the relation between vector and Ket notations. Students will also learn about representing qubits in a 2-D polar coordinates.

Assessment. The formative assessment of this module includes a quiz containing seven multiple-choice questions and a problem solving question about converting the Ket representation of a qubit to a vector. The summative assessment of this module includes a homework assignment formed of problem solving questions with a focus on quantum state representation, calculating probabilities of measurement outcomes and verifying the normalization constraint of single-qubit states.
Implementation. We implemented this module in the last week of October 2025. In September, we made an announcement in both host classes asking for those students who are interested in participating in the implementation of Module 2 as an extra credit activity whose grade will be taken into account for the course they are enrolled in (i.e., either Discrete Structures or Data Structures). Seventy nine students responded positively out of about 130 students in both classes. We held the two lectures on Oct. 28th and 30th in the evening and the class attendance was 55 and 59. The learning objectives of the module were given to students before they made their decision on attending the class. The lectures were interactive and well-accepted by students (see Section 4 for evaluation results), and we realized that there is potential to teach the 3D representation of qubits in polar coordinates; i.e., the Bloch Sphere.

4 Evaluation

This section provides the method we used to evaluate Module 2 of Q-Aware as well as presenting the results of such evaluations. We also reflect on the implementation and evaluation of Module 2. Our evaluation method is two-fold: evaluating the effectiveness of students' learning through an in-class quiz and a homework assignment (Subsection 4.1), and qualitative assessment through pre post-class surveys (Subsection 4.2). Subsection 4.3 presents the results of students evaluation about the performance of the instructor and the module organization.

4.1 Formative and Summative Assessment

Formative assessment of Module 2 includes an in-class quiz that contains seven multiple-choice questions and a written question as follows:

1. A qubit is similar to a classic bit except that qubit is probabilistic.
   (a) True
   (b) False
2. The state of a qubit can be specified as a linear combination of classic states 0 and 1, each having a complex amplitude.
   (a) True

(b) False

3. The two basis states $|0\rangle$ and $|1\rangle$ form an orthonormal system in a 2-D vector space.
   (a) True
   (b) False
4. The state of a qubit can be specified in at least two ways: (Please choose the most accurate answer.)
   (a) in Ket notation and as an addition of two values
   (b) as a vector and in Ket notation as a linear superposition
   (c) as the addition of complex amplitudes and as a vector
5. The probability of getting a specific outcome (i.e., a classic state $|0\rangle$ or $|1\rangle$) when we measure a qubit is equal to
   (a) The complex amplitude of the resulting classic state.
   (b) The real part of the amplitude of that classic state in the qubit.
   (c) The square of the magnitude of that classic state in the qubit.
   (d) The summation of complex amplitudes.
6. Measuring a qubit results in its quantum state collapsing into one of the classic states of $|0\rangle$ or $|1\rangle$.
   (a) True
   (b) False
7. An electron is in the ground state with probability $\frac{2}{5}$ and in the excited state with probability $\frac{3}{5}$. Does this sentence match with what Quantum Mechanics tells us about the position of an electron?
   (a) Yes
   (b) No
8. Write the qubit $(\frac{\sqrt{5}}{3}i)\,|0\rangle + (\frac{\sqrt{2}}{3} - \frac{\sqrt{2}}{3}i)\,|1\rangle$ as a vector. Explain your answer.

The last question has 30 points and each multiple-choice question has 10 points. The quiz was given to students in the middle of the second lecture and they had about 10 minutes to respond. The average grade of the quiz is 64 out of 100, and the median is 65 for 55 students who turned in their quiz. Students' performance on the quiz was acceptable, but not excellent for the following reasons: (1) Students seem to have difficulty in distinguishing the probabilistic nature of measurement outcomes from the state of the qubit before measurement. Questions 1 and 7 were focused on this notion and most students did not do well on these questions. 46 out of 55 students were wrong on both of these questions (i.e., about 83%). As for the last question in the quiz, 15 students did not earn any grade. This is the question focused on transforming the Ket representation of a qubit into its vector representation. On the same question, 26 out of 55 students received full grade. The remaining students received partial grade on the written question.

The summative assessment of Module 2 includes a homework assignment containing the following questions. Students had 8 days to finish this assignment. The average and the median are respectively 96.8 and 100 for 50 students who turned in their homework.

1. Consider the qubit $|\phi\rangle = \alpha\,|0\rangle + (\frac{1}{2} - \frac{\sqrt{2}}{2}i)\,|1\rangle$. Assuming that α is a real value, what can α be? Explain and show your work. (**40 points**)
2. After calculating α in the previous problem, answer the following: (**20 points**)
   - If we measure $|\phi\rangle$ (in the previous problem), what is the probability of $|\phi\rangle$ collapsing to $|0\rangle$?
   - If we measure $|\phi\rangle$, what is the probability of $|\phi\rangle$ collapsing to $|1\rangle$?
3. Is the following quantum state normalized? Explain and show your work. (**40 points**)
   $\frac{5}{3}\,|0\rangle - (\frac{4}{5}e^{i\pi/6})\,|1\rangle$

In summary, students did much better on the homework assignment, but their performance in the in-class quiz was also acceptable as close to half of the class earned a grade greater than 65% (indicating that about half of the class has a good understanding of most of the basic concepts).

4.2 Qualitative Assessment: Pre and Post-Class Surveys

We develop two surveys in order to qualitatively evaluate the effectiveness of Module 2. To this end, we designed a set of questions that were given to students before their participation in Module 2. Figures 3 and 4 present the question asked about the level of confidence of students in their understanding of six basic concepts of complex numbers, vectors, qubits, linear superposition, quantum vs. classic states and quantum measurement. The graphs in Figures 3 and 4 illustrate the results of this survey on a population of 79 students.

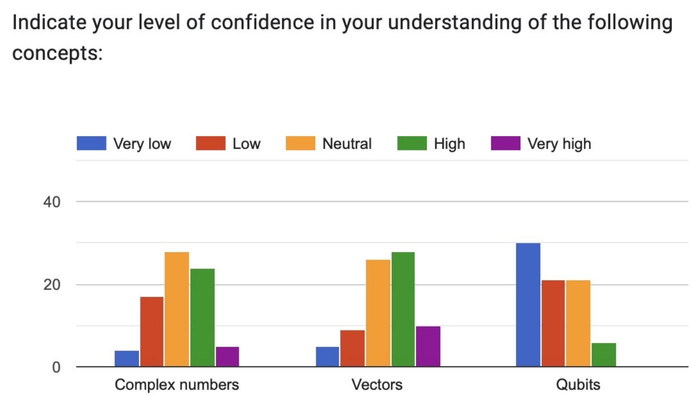

Figure 3: Pre-class survey on the concepts of complex numbers, vectors and qubit (amongst 79 respondents).

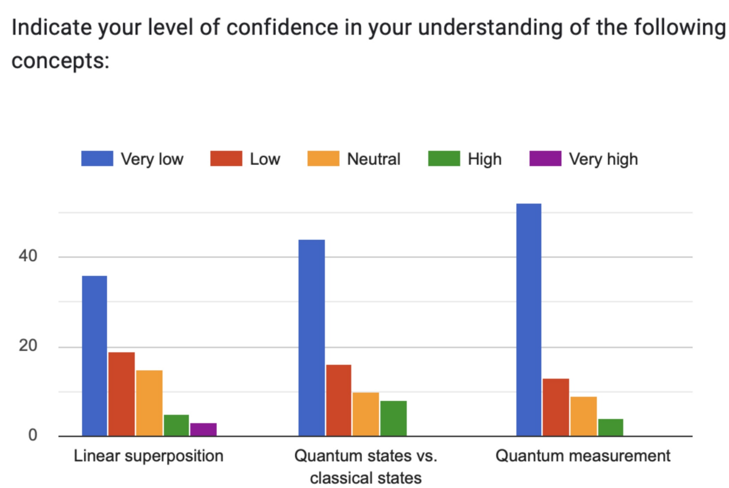

Figure 4: Pre-class survey on the concepts of linear superposition, quantum vs. classic states and quantum measurement (amongst 79 respondents).

Comparing these graphs with the graphs in Figures 5 and 6 demonstrates a substantial level of increase in students' confidence regarding these six basic concepts, especially for qubits linear superposition, quantum vs. classic states and quantum measurement. We then followed up by asking these two questions: (1) "Overall, this module increased my interest in learning more about Quantum Computing.", (2) "How likely would you be to take a similar module focused on more advanced Quantum Computing topics?". Figures 7 and 8 illustrate the responses we received by 46 out 55 students who actually participated in Module 2.

Table 1 presents the survey results in response to the following question: "Indicate your level of confidence in your understanding of the following concepts". We have included the results of both pre and post-class

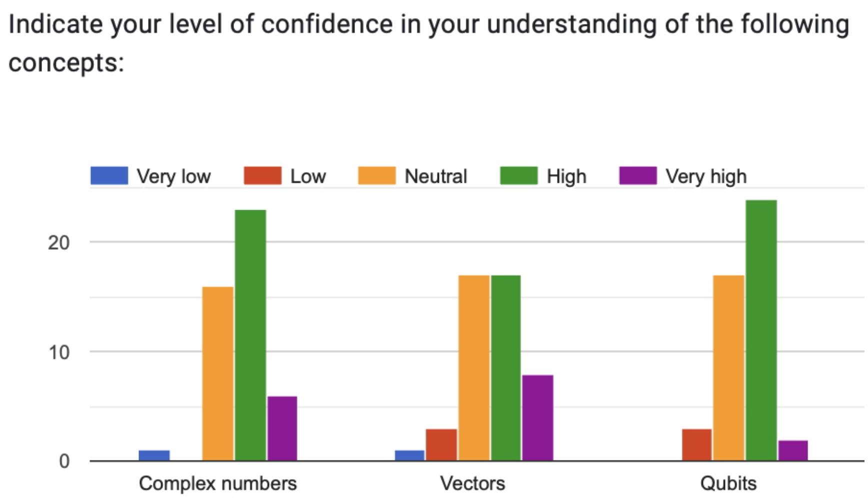

Figure 5: Post-class survey on the concepts of complex numbers, vectors and qubit (amongst 46 respondents).

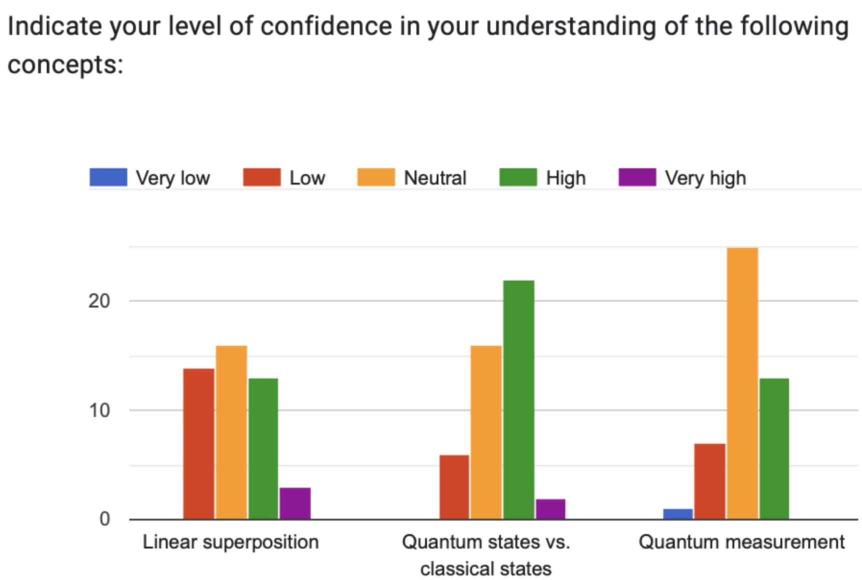

Figure 6: Post-class survey on the concepts of linear superposition, quantum vs. classic states and quantum measurement (amongst 46 respondents).

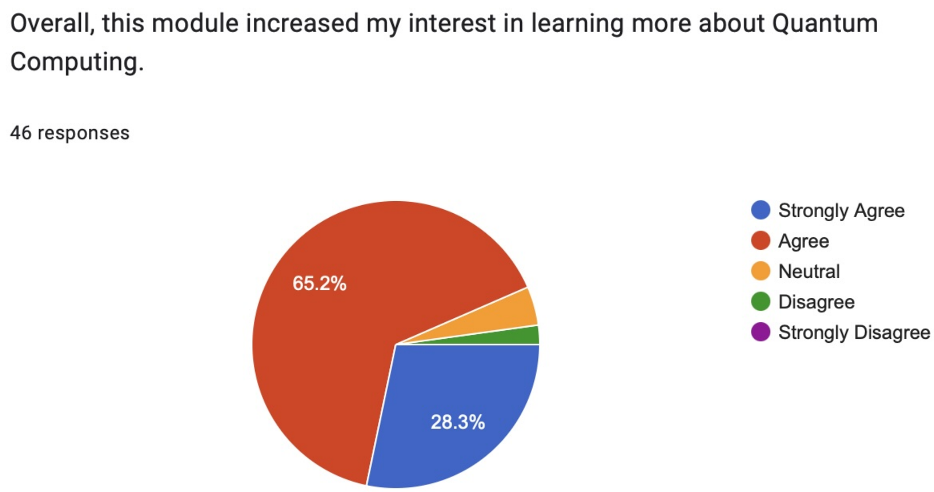

Figure 7: Post-class survey on the impact of Module 2 on increasing the general interest of students in QC.

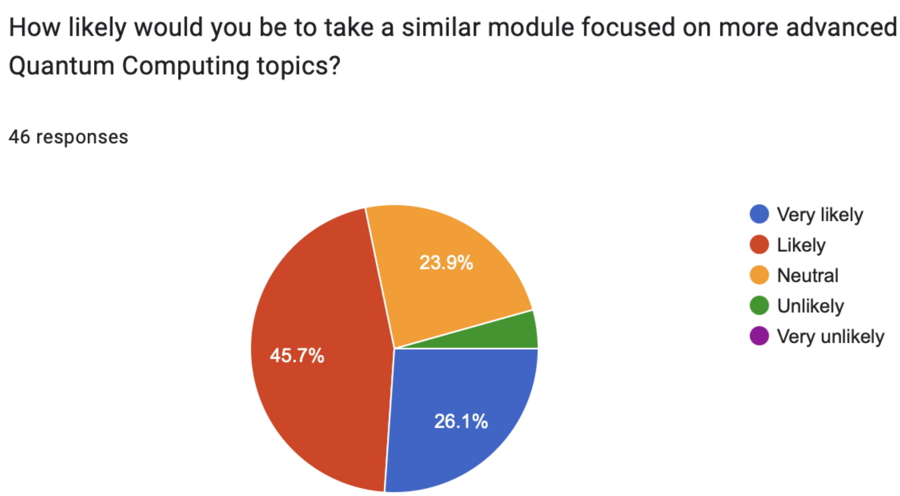

Figure 8: Post-class survey on the likelihood of students participating in other modules of Q-Aware.

surveys in the following format: "x, y" where x and y respectively represent the results of pre and post-class surveys. For example, looking at the row "Quantum Measurement" and column "High", we have '5%, 28.3%', indicating that before taking part in Module 2 only 5% of the respondents had a high confidence in their understanding of the notion of quantum measurement, whereas after taking this module 28.3% of respondents stated that have a high confidence in their understanding of quantum measurement. Before starting Module 2, more than 30% of students already have "High" or "Very High" confidence in concepts such as complex numbers and vectors, however, when it comes to QC concepts the overall confidence is below 11%. Regarding 'qubits' and 'quantum vs. classic states' students' confidence increases to 56.5% and 52.3%, and confidence in understanding 'linear superposition' and 'quantum measurement' respectively increases to 34.7% and 28.3%. These results are consistent with the results of our formative and summative assessments in the quiz and homework assignment where students did relatively poor in questions related to 'linear superposition' and 'quantum measurement'.

Concept	Very Low	Low	Neutral	High	Very High
Complex Numbers	5%, 2%	21.5%, 0%	35.4%, 34.7%	30.3%, 50%	6.3%, 13%
Vectors	5%, 2%	11.4%, 6.5%	33%, 37%	35.4%, 37%	12.6%, 17.4%
Qubits	38%, 0	26.6%, 6.5%	26.6%, 37%	7.6%, 52.2%	0, 4.3%
Linear Superposition	45.5%, 0	24%, 30%	19%, 35%	6.3%, 28.2%	3.8%, 6.5%
Quantum vs. Classic State	55.7%, 0	20.3%, 13%	12.6%, 34.8%	10%, 48%	0, 4.3%
Quantum Measurement	65.8%, 2.2%	16.5%, 15.2%	11.4%, 54.3%	5%, 28.3%	0, 0

Table 1: Survey results in response to "*Indicate your level of confidence in your understanding of the following concepts*". In each entry 'x, y' , x and y respectively represent the results of pre and post-class surveys.

4.3 Evaluating the Instruction and Module Organization

This section presents the results of evaluating the instruction and module organization. Specifically, we would like to address these research questions: (1) How effective are the instructional materials of Module 2, including the lecture slides, the quiz and the assignment?, and (2) How effective is the performance of the instructor in terms of the quality of teaching and communication? We also present the feedback provided to us by the instructor of Module 2. We would like to use the results of this study to draw some conclusion about the effectiveness of the training of the instructor.

Figures 9 and 10 present the results in response to the question of "*The lecture notes were effective in helping me understand the concept of* XXX", where XXX is in {complex numbers, vectors, qubit, linear superposition, quantum vs classic state, quantum measurement}. The number of respondents was 46 and only 2 students disagreed with the effectiveness of lecture slides. A strong majority of students believe that the lecture slides were effective in helping them understand the concepts. Figures 11 and 12 illustrate the responses in regard to Module 2's organization, appropriateness of contents and the level of complexity of the quiz and the assignment, as well as the effectiveness of the quiz and the assignment in enhancing students' learning. Among 46 respondents, 76% of students agreed or strongly agreed that the learning objectives were clearly communicated to them, and the same number agreed that the contents were well-organized. 65% of students (strongly) agreed that the quiz was at an appropriate level of complexity, and 80% found the complexity of the homework assignment acceptable. However, only 52% of students (strongly) agreed that the quiz helped them enhance their learning while 30% of students were neutral about this and 17% disagreed. This indicates that we will need to improve the quiz for future offerings.

Figures 13 and 14 provide the results in response to "*The instructor communicated the concept of XXX in an effective way.*", where XXX is in {complex numbers, vectors, qubit, linear superposition, quantum vs classic state, quantum measurement}. Out of 46 respondents, at least 63% of students (strongly) agreed that the concepts were communicated effectively. The lower level of agreement is with the concept of quantum measurement, and 69.5% and 84.7% of students respectively (strongly) agreed that linear superposition and quantum states were communicated effectively. Figures 15 and 16 show that a strong majority of students

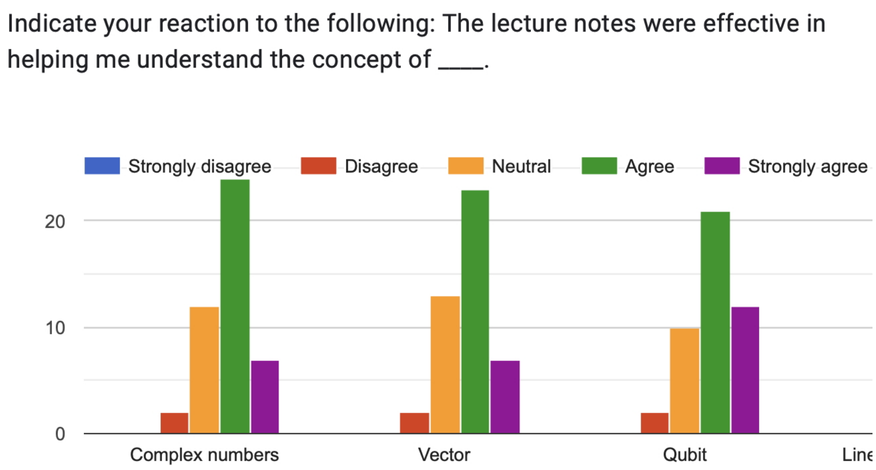

Figure 9: Effectiveness of the lecture slides.

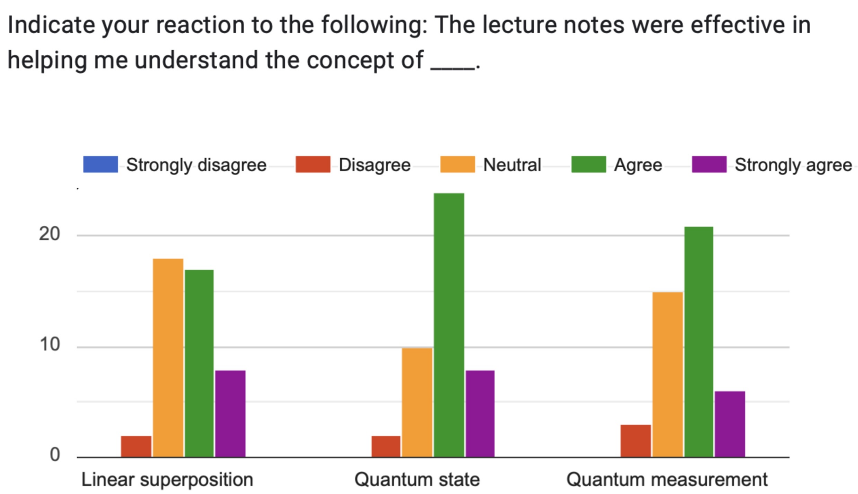

Figure 10: Effectiveness of the lecture slides.

(strongly) agreed that the overall performance of the instructor was very good. Notice that, when it comes to the propositions "Instructor effectively used time during class periods" and "Instructor was helpful addressing students questions" no one disagreed, and respectively 89% and 76% students (strongly) agreed.

Instructor's feedback. The instructor who taught Module 2 had no prior knowledge of quantum computing. We shared the lecture slides and some recorded video lectures with him, and to some extent he self-trained for this module. While the instructor found the teaching of Module 2 a "valuable experience", he had some concerns about the way he was trained. The instructor stated that a more in-depth training would have given him more self-confidence in answering students' questions. He specifically pointed to more practical motivation for different qubit representations (e.g., 2-D and Bloch Sphere). In summary, we plan to ask our instructors to either take or audit a 3-credit course we teach on Quantum Computing. This will provide a solid background in quantum mechanical concepts and quantum algorithms.

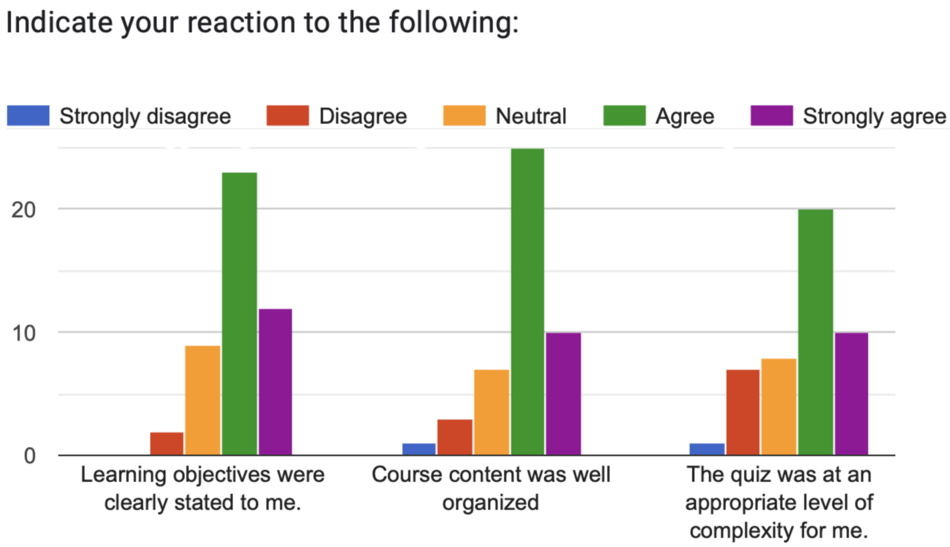

Figure 11: Effectiveness of course organization, quiz and assignment.

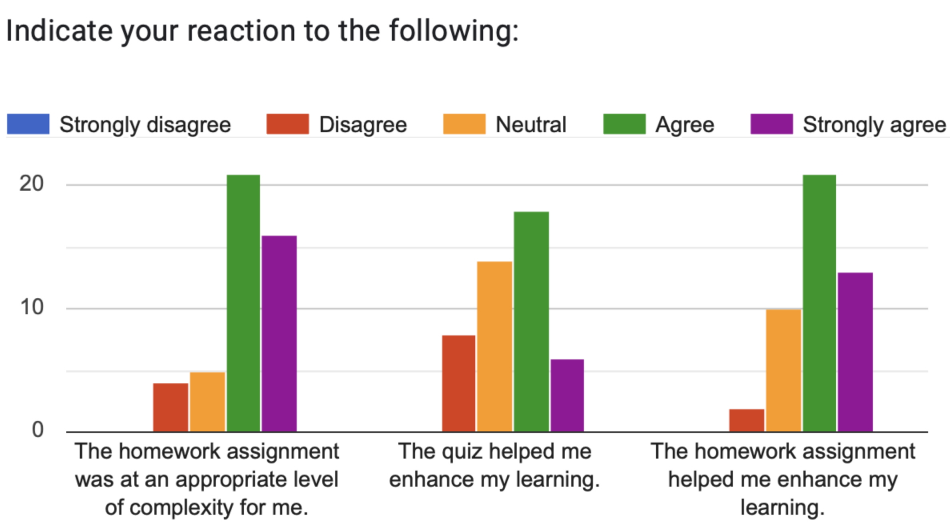

Figure 12: Effectiveness of course organization, quiz and assignment.

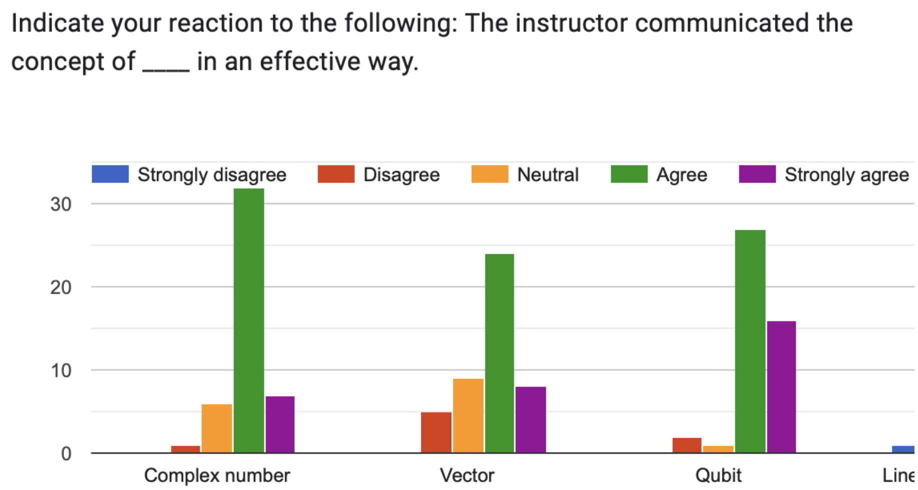

Figure 13: Effectiveness of teaching and communicating the concepts.

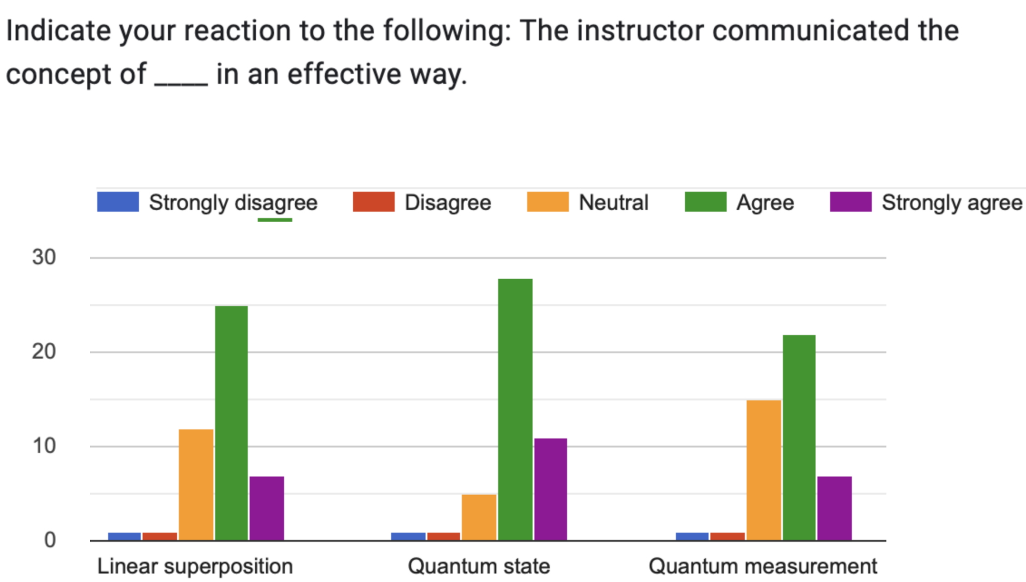

Figure 14: Effectiveness of teaching and communicating the concepts.

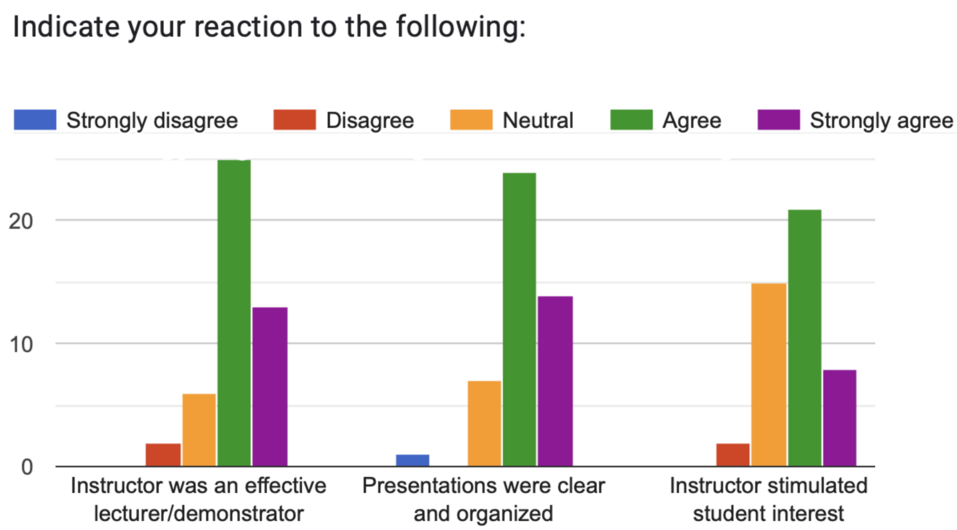

Figure 15: Instructor's performance.

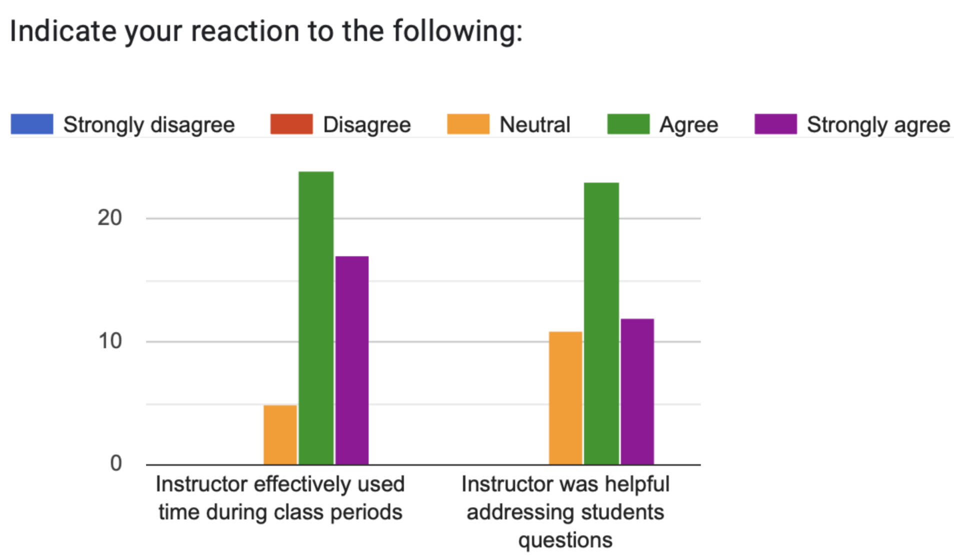

Figure 16: Instructor's performance.

5 Related work

In addition to the solutions provided by large institutions (discussed in Section 1), major examples of programs offered at R2 universities include the QSInitiative at Middle Tennessee State University (MTSU) and a joint program at West Chester University (WCU). The MTSU QSInitiative offers a four-course minor and a concentration, called EQUIS, in Quantum Information Science (QIS) for all STEM majors. MTSU also offers a certificate on quantum computing for professionals. The goal of EQUIS is to support community college and undergraduate students interested in QIS education and careers. EQUIS requires the completion of two courses: a 2-credit course on Fundamentals of Quantum Computing for Everyone, and a 3-credit course on Quantum Computing Applications. WCU and the University of Delaware (UD) offer a joint 3-2 dual-degree MSc program where students spend three years at WCU and two years at UD. The QuSTEAM project [18] provides a template consisting of six courses for an undergraduate minor and associate certificate. Currently, QuSTEAM contains four courses: Introduction to Quantum Information, Classical and Quantum Logic, Mathematical Methods for QISE and Quantum vs. Classical Lab. Only the second course focuses on classical and quantum programming.

While these efforts are commendable, the quantum-talent gap cannot be bridged in the near future without the participation of a wider range of institutions. Previous studies [16, 5, 14, 13] point to the disparities of access to QC education and warn that current QC programs mostly fail to reach low-income and rural students. The aforementioned programs require significant numbers of additional courses and resources, and they tend to focus on quantum hardware technology rather than the algorithmic, programming, and software aspects of QC. *We see a need for a different approach that can prepare T-shaped software developers and that can be incorporated into existing CS and SE curricula without a significant increase in the number of required courses.*

6 Conclusions and Future Work

This paper presented a lightweight crosscutting framework, called Q-Aware, for the integration of Quantum Computing (QC) in undergraduate CS and SE curricula towards achieving Quantum-Awareness level of skills. Q-Aware contains five modules that can be integrated at different levels of undergraduate education dependent upon the resources and limitations of the host institution. Each module contains two hours of in-person lecture along with some recorded video lectures. The formative and summative assessments of each module include a quiz and a homework assignment. This work reports on a pilot project where we implemented the first module of Q-Aware for a group of students enrolled in Discrete Structures and Data Structures courses. We implemented this module at Michigan Tech, where 55 students participated. We conducted both quantitative and qualitative assessments and the results indicate a significant increase in the understanding of student for concepts such as qubit, quantum state, linear superposition and quantum measurement. A strong majority of students (93.5%) indicated that this module increased their interest in learning more about QC. About 72% of students stated that they would be interested in participating in an extension of this module focused on more advanced topics. The instructor who taught this module was self-trained using the set of lecture slides and recorded lectures of this module. He found his involvement in this project as a "valuable experience" and mentioned that further training would have given him more self-confidence in handling students' questions. This is an issue that we will address in our future work. Based on our positive experience and students' interests, we will present Module 3 as an extension of this work. This will provide us more grounds for the implementation of the entire Q-Aware track.

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