

Gabriele Computer Reservation System Simulator for Developing Student Knowledge and Skills at Aviation Education Institutions

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DOI: 10.23917/ijolae.vxxx.xxxx

Received: January 1st, 2021. Revised: January 25th, 2021. Accepted: February 15th, 2021

Available Online: March 20th, 2021. Published Regularly: May 1st, 2021

Abstract

Learning using a simulator can improve students' abilities. This study aims to determine whether learning using the Gabriele Computer Reservation Simulator can improve students' ground-handling skills in terms of knowledge and ability to book and make tickets.

This research used 100 respondents who took ticketing and reservation training. The respondents were divided into two groups: the group that used the ticketing and reservation simulator and the group that did not. The data collected were theoretical test data and practical skills, and they were analyzed using an independent sample t-test.

The results showed that the group that used the simulator to learn had higher scores in theoretical understanding and practical skills compared to the other group. This finding provides evidence that the CRS simulator is not only effective in deepening understanding of the theoretical concepts taught but is also very helpful in honing essential practical skills in dealing with real-world situations.

Keywords: Gabriele Simulator, CRS, Ticketing and Reservation, Education

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1. Introduction

The aviation industry is a highly dynamic and complex sector involving many interacting elements, such as aircraft, airport personnel, and passengers. One of the most important aspects of maintaining smooth flight operations is ground handling, which involves a variety of tasks on the ground that ensure the aircraft is ready for takeoff. An essential component of flight operations, ground handling, entails a number of tasks that need to be completed precisely. Maintaining safe flights requires effective and efficient ground handling.

According to Kochan (2014) in his book *Airport and Aviation Security: US Policy and International Challenges*, ground handling activities involve coordination between various parties at the airport, ranging from baggage handlers, fueling, and security checks to passenger services. Errors in any of these tasks can disrupt the entire flight operation, resulting in aircraft delays and potential economic losses for the airline.

Traditional ground handling training, which involves live simulations on the ground, can be very expensive and requires complete facilities and large resources. In many cases, especially in developing coun-

tries, such facilities may not be available. Banerjee & Dey (2017), in their study published in the *Journal of Aviation Technology and Engineering*, stated that live training on the ground is high risk, especially for beginners who need more experience. Failure to perform procedures such as baggage handling or refueling can cause damage to the aircraft or even a fatal accident. Therefore, ground handling training requires a safer and more controlled approach.

As the industry continues to implement innovative solutions, education must adapt to equip aspiring professionals with the practical skills needed to effectively navigate these complex reservation systems. One of the training in ground operations education is training in making airline ticket reservations.

Computer technology in education refers to the use of computer hardware and software to enhance instruction. Computers can help connect with students, provide course material, and establish an immersive and interesting learning environment. A number of computer-based learning products, such as instructional software and e-learning platforms, give students access to information that will help them better comprehend the subject (Chen & Wang, 2018).

As Bates (2005) states, "The integration of computer technology in teaching and learning is a powerful tool that can enhance the learning experience, offering students more personalized, flexible, and engaging educational opportunities". This shows that computer technology provides opportunities for students to have more diverse and comprehensive learning experiences.

One of the primary benefits of employing computer technology in education is the increased ease of access to previously inaccessible instructional resources. The Internet gives students immediate access to scientific publications, papers, learning videos, and

other educational resources that might help them grasp particular topics.

According to Hepp et al. (2014), "The use of technology in education has transformed the way students access and interact with information, allowing them to take a more active role in their learning process". With technology, students are not only recipients of information. They can also explore and access materials from a wider range of sources, improving their critical thinking skills in learning.

Computer-based technology allows learning to be more interactive. Traditional learning that is often one-way, with the teacher as the center of information, can now be replaced by learning that actively involves students. Computer programs that combine multimedia elements, such as text, images, sound, and animation, can make learning materials more interesting and easier to understand. This can increase students' motivation and interest in learning because they are more directly involved with the material being taught (Smith & Johnson, 2018).

According to Mayer (2009), multimedia allows students to receive information through visual and auditory channels, which not only improves understanding but also makes learning more interesting and memorable. With interactive elements, students can be more involved in a fun and rewarding learning experience.

In addition to academic learning benefits, computer-based technology also supports the development of 21st-century skills that are very important for students. Skills such as problem-solving, creativity, collaboration, and effective communication can now be honed through a variety of technological applications and devices. For example, the use of software for graphic design, computer programming, or video production allows students to develop creativity and technical

skills that are very valuable in the workplace (Saavedra & Opfer, 2012).

To overcome the drawbacks of conventional teaching techniques, simulation-based learning has become a useful strategy. Students can participate in realistic situations, make decisions, and experience the outcomes of their activities in a dynamic while controlled setting through the use of simulations. This approach is particularly effective in areas where real-world experience is important, such as hotel management, tourism, and aviation (Chernikova, et al., 2020).

Technology's important role in stimulating creativity and efficiency in the travel and hospitality industry. Innovative reservation systems not only streamline the booking process but also offer data-driven decision-making, individualized customer interactions, and superior service delivery. Education programs must adapt to these technological developments to ensure that graduates have the necessary abilities.

By replicating the complexities of real-world reservation systems, educational simulators have the potential to provide students with a safe and controlled environment to experiment, learn, and apply student knowledge in a manner that reflects industry practices (Garcia & Rodriguez, 2019)(Liu & Zhang, 2018). Simulation-based education has been found to be essential for training students in the complexities of reservation system management (Talan, 2021). The challenges present in teaching reservation systems underscore the need for novel solutions, and simulation-based education is emerging as an encouraging strategy. The integration of technology in the travel and hospitality industry underscores the importance of aligning educational programs with industry trends.

Numerous studies have been done on the usage of simulators, including one by Be-

lohlay et al. (2024). An existing operator training simulator, which is essentially a digital twin of a new dicyclopentadiene plant, is used to educate and train students from a technical university. With this simulator, students can acquire sufficient knowledge for control, process optimization, and problem-solving under non-standard operating conditions. Dynamic process simulation in interface with real industrial control system elements and control interfaces, and especially online visualization of the results, helps students understand the physicochemical principles through their intervention and experience of the consequences. The ability of the training simulator to accurately reflect the ongoing process can be verified by students during a guided tour of the production plant. My experience with student learning so far shows that this is a very interesting and, most importantly, effective tool for expanding the teaching of chemical engineering and the control and automation of chemical processes.

Gustavsson (2021) performed research on the advantages of utilizing simulators in vocational schools, identifying key components of simulator-assisted instruction based on the experiences and inquiries of vocational teachers. The Background section contains a description of research on digitalization in other educational contexts and simulator teaching in other contexts, as well as teacher competence and school quality measures. The empirical evidence of the study consists of observations and discussions with vocational teachers. The Results section contains a description of the vocational teachers' questions in the form of identified problem areas. The Conclusions section of the study highlights simulator-assisted teaching and the importance of substantive aspects, as well as the relationship with professional knowledge and competence, the possibility

of adapting teaching based on student's needs, and the consequences of teaching for students' acquired professional skills and knowledge. The Discussion section discusses aspects such as issues related to teaching regarding transfer, the work of vocational programs and schools regarding the implementation of new technologies in the teaching process, and the role and situation of vocational teachers. In order to further develop knowledge about simulator-assisted teaching in vocational education, more studies are needed on the practice of students' learning processes and how such teaching contributes to the development of vocational skills.

This is in accordance with research by Gaviria et al. (2024), which concluded that this technology effectively mediates the teaching and learning process in higher education. The research findings show that using simulators in the classroom has positive effects, including knowledge consolidation, agility in performing application exercises, and a better understanding of the content. This study shows the positive impact of simulator-mediated learning in higher education for teaching accounting subjects, with a high level of acceptance by students, increasing student motivation, understanding of content, and participatory behavior in the classroom. Although this study highlights the effectiveness of simulators as a teaching tool, it also indicates the need for further research on issues such as implementation costs and affective impacts.

The use of computer simulation-based technology offers great potential. According to Culkin et al. (2016) in their article, simulation technology can provide a safer and more controlled training environment while allowing students to practice more without high risks. With the help of simulators, students can repeat the same exercises many

times to improve their skills without any disruption to airport or airline operations.

With the advancement of technology, one solution that can be applied to overcome the limitations in ground handling training is the use of computer-based simulators, especially the Computer Reservation System (CRS). Although CRS is better known in the aviation industry for ticket reservations, it has great potential in ground handling training. Through the use of CRS, students can learn to manage flight information, organize schedules, and handle various operational procedures related to aircraft and passengers.

Computer Reservation Systems (CRS) play a vital role in supporting operational efficiency in the aviation industry. These systems enable airlines and travel agents to manage ticket reservations, flight schedules, and passenger data management in real-time (Culkin et al., 2016). CRS was first developed in the 1960s and has since evolved into an essential tool that facilitates various aspects of aviation operations. Its existence is vital in optimizing various processes that previously required a lot of human effort and time.

One well-known example of a CRS is the Gabriele Computer Reservation System (Gabriele CRS), which was first introduced in the late 1980s by the Gabriele company, a technology solutions provider focused on the aviation industry (Banerjee & Dey, 2017). Gabriele CRS has proven to be very effective in managing various aspects of flight operations, not only ticket reservations but also flight schedules and passenger data, all of which are critical to the smooth operation of airports and airlines.

According to Garcia, et al., (2017), CRS systems like Gabriele enable airlines and airports to improve operational efficiency through more organized management of flight information. Previously, flight man-

agement required a lot of manual work and direct interaction, which was not only time-consuming but also prone to human error. With a computerized system like Gabriele, much of this process can be automated, increasing accuracy, reducing operational costs, and increasing productivity.

In the context of ground handling, Gabriele CRS plays a vital role in ensuring the smooth running of all airport activities, from flight information management to baggage handling, fueling, and passenger service management. Ground handling is a highly complex activity involving various elements that must be managed with high precision. With an integrated system, coordination between the various parties involved in airport operations, such as airport personnel, flight agents, and airlines, can be easier (Kochan, 2014).

The CRS system allows ground handling officers to monitor flight status in real-time and make more informed decisions about managing various flight-related tasks. For example, scheduling aircraft departures and arrivals, monitoring aircraft capacity, and handling registered passengers can be managed more efficiently through Gabriele CRS (Dastane & Purushothaman, 2018).

Gabriele CRS involves a number of operational tasks necessary for efficient ground handling procedures, such as Flight Schedule Management and Reservations, Passenger Data Management, and Customer Service. With Gabriele CRS, the training process can be done virtually, which provides a similar experience to real-world situations. As explained by Culkin, et al., (2016), simulation technology allows students to practice handling various situations that often occur in the field, including emergency conditions, improper baggage handling, and managing suddenly changing flight information.

Computer-based simulations have several benefits in ground handling training. One type of simulator that is starting to be widely applied is the Computer Reservation System (CRS). Although CRS is better known for ticket reservation management, in the context of ground handling, CRS offers several benefits, such as helping students understand how flight information is organized, how reservations and schedule changes are processed, and how airport personnel can coordinate with airlines in handling flight schedules.

Garcia et al. (2017), in their study entitled *Improving Ground Handling Efficiency with Virtual Simulation Tools* published in the *International Journal of Aviation Technology*, stated that the use of CRS simulators can improve the operational efficiency of ground handling by allowing students to practice managing flight schedules and handling information more quickly and accurately. Furthermore, this simulation allows students to deal with various emergencies that may occur, such as handling flight delays or sudden schedule changes.

Computer-based simulations allow students to learn more flexibly, given that they can access the simulator anytime and anywhere without having to rely on expensive airport facilities. Dastane and Purushothaman (2018), in *Simulation for Training in Aviation Ground Handling*, emphasize that training can be more efficient in terms of cost while still offering an experience that is closer to the real situation that will be faced in the field.

The use of CRS simulators in training offers many advantages. Students can practice in a safe and controlled environment and encounter situations that may be difficult to replicate in traditional training. In addition, CRS allows students to understand a broader and deeper operational flow, including flight information management, baggage handling,

and flight scheduling, all of which are critical skills in the day-to-day work at the airport.

Unlike the latest CRS system, which uses a Graphic User Interface, Gabriele CRS is a simulator with a Command-Line Interface system. This is an advantage because, by using the Command-Line Interface, Gabriele requires its users to memorize several commands and type those commands.

The Gabriele CRS simulator's application in enhancing students' ground-handling abilities is the main subject of this research. Errors that may arise during direct instruction can be minimized by using the simulator to provide students with practical experience managing real-world scenarios without needing to be in the field. This study aims to explore the effectiveness of using the CRS simulator in improving students' skills in making reservations and ticketing at the airport or airline.

2. Method

In this study, the population that is the object of study is all students at the College of Aerospace Technology who are taking the Ticketing and Reservation course. This course is part of an educational program that aims to prepare students with the knowledge and skills needed in the aviation industry, especially in ticket reservation management. This course is very important because the world of aviation today is increasingly dependent on sophisticated and effective reservation systems, which allow airlines to provide the best service to their customers. Therefore, a good understanding of this system will be very useful for students when they enter the world of work later.

The sample for this study was 100 students chosen at random from the general community. Random sampling was used to prevent prejudice and guarantee that every

student had an equal chance of being chosen. The purpose of this sample selection was to obtain a representative picture of how the use of technology in learning can affect students' understanding and skills related to the reservation system. With a large enough sample size, it is hoped that the results of this study can provide valid information and can be generalized to a wider population.

After the samples were taken, the students were divided into two groups of 50 people each. The first group consisted of students who learned how to use the Gabrielle Reservation Systems Simulator. Meanwhile, the second group consisted of students who did not use Gabrielle Reservation Systems in their learning. This group learned about the reservation system traditionally without using the simulator tool.

This study aims to evaluate the differences between the two groups, both in terms of theoretical understanding and practical skills in using the reservation system. Data collection was carried out in two different stages. The initial phase is to collect information on students' theoretical understanding of the reservation system. During this phase, students must reply to a series of questions regarding the essential concepts that underpin the reservation system. The questionnaire's questions are intended to assess students' comprehension of the ideas covered in this course. This theoretical understanding is very important because, with a strong theoretical basis, students will be able to operate a more complex reservation system in the future.

The second stage in data collection is the implementation of a simulation session using the Computer Reservation System (CRS). At this stage, students are asked to operate the reservation system that has been provided. This simulation evaluates students' practical skills in utilizing a genuine reservation sys-

tem. The course of this simulation will be supervised by instructors who have received particular training in providing assessments based on specified skill indicators. The practical abilities assessed include students' ability to search for flights, buy tickets, and execute reservation system transactions. Evaluation of these skills is very important because, in addition to theoretical understanding, practical skills in using the system are also very much needed in the workplace.

The questionnaire designed for data collection has several variables that assess how well students have mastered the material taught in the Ticketing and Reservation course. The first variable measured is students' theoretical understanding of the reservation system. This theoretical understanding is measured through a series of questions covering various key concepts in the reservation system using CRS in terms of ticketing and reservation creation with real-world simulation scenarios. The purpose of these questions is to assess how well students comprehend the concepts addressed in this course.

A second-stage simulation is used to evaluate students' practical proficiency with the reservation system in addition to their academic knowledge. The purpose of this simulation is to assess students' proficiency in using the reservation system in more realistic scenarios. Students are required to complete a number of tasks in this simulation that they would often complete in real life, including looking for flights, choosing seats, and verifying and completing ticket-buying transactions. The instructor supervising the simulation evaluates these practical abilities. Students' accuracy and speed in performing these exercises are among the specified indicators used to evaluate these practical abilities.

The last variable measured is the final grade of the students, which is a combination of theoretical understanding and practical skills acquired by the students during the study. This final grade will provide an overview of the extent to which students have successfully mastered the material taught in the Ticketing and Reservation course. This final grade can also be used to compare the two groups, namely the group that uses Gabrielle Reservation Systems and the group that does not use it. By comparing the final grades of the two groups, it is expected to be found whether the use of a simulation system in learning has a significant impact on students' understanding and skills in the field of reservation systems.

This study uses a frequently used statistical analysis, the independent t-test, to test whether there is a difference in the average between two different groups, especially if the data used is numeric and normally distributed. The independent t-test aims to compare two unrelated groups, or in statistical terms, it is called "independent samples." In this case, the two independent groups are the group that studies the ticketing and reservation course using the simulator and those that do not use it. Because there is no direct relationship between the members of one group and the other, the independent t-test is very suitable for this study. Therefore, the independent t-test will be used to determine whether the difference in the average test scores between the two groups is significant using statistical analysis.

The hypothesis in this study is the null hypothesis (H_0) that there is no difference in the average between the two groups. In contrast, the alternative hypothesis (H_1) states that there is a difference in the average between the two groups.

3. Result and Discussion

The results of the analysis of the collected data showed that the average theoretical understanding score for the group using simulation was 86.72 out of 100, while the group not using simulation obtained an average theoretical understanding score of 72.34 out of 100, as seen in Table 1. These figures indicate that students who use simulation in the learning process have a deeper understanding of the theoretical concepts taught in the ticketing and reservation course.

In addition, the data in Table 1 shows that the practical skills score for the group using simulation was 87.07, while the group not using simulation obtained an average score of 76.49 out of 100. The average final score for students using simulation was 86.89, while the group not using simulation obtained an average final score of 74.42.

Table 2 shows the results of the independent t-test for theoretical understanding, and Table 3 shows the results of the independent t-test for practical skills. The values in the t-test for both theoretical understanding and practical skills show a significance value below 0.05. These results indicate that the alternative hypothesis is accepted or that there is a significant difference between the group using the simulator and those not using the simulator.

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In addition, the data shows that the practical skills score for the group using

simulation was 87.07, while the group not using simulation obtained an average score of 76.49 out of 100. The practical skills referred to in this research include students' abilities in handling various real situations that may occur in the travel industry, such as handling reservations, managing tickets, and solving problems related to the booking system.

Overall, the average final score of students who used simulation was 86.89, while the group that did not use simulation obtained an average final score of 74.42. The significant increase in the group that used simulation illustrates the effectiveness of this method in improving the quality of learning, especially in mastering more applicable practical materials.

Simulation gives students the opportunity to practice the skills they are learning in a more realistic context. In a ticketing and reservations course, simulation allows students to interact directly with the ticketing system used in the travel industry. For example, students can learn how to process ticket orders, handle schedule changes, or even resolve customer complaints without having to deal directly with the consequences of their mistakes.

The results show that the use of CRS has a significant positive influence on the study participants' learning. Participants' students who study using CRS have a higher mark more ending high, indicating that they have a better understanding and more skills. Findings This supports the idea that integration technology like CRS in education can increase results. Study in a way that gives participants education superiority and competitiveness in the world of work.

The results obtained from this study indicate that the use of simulation significantly improves students' understanding of not only the theory they

learn but also the practical skills they need to deal with real-world scenarios. In this case, simulation not only helps students understand how a system works in theory but also gives them a deeper practical experience of applying the system in more complex and varied situations.

The importance of practical skills in areas such as ticketing and reservations is obvious, given that the industry demands the ability to solve problems quickly and effectively. Therefore, simulations can be considered a very useful tool in preparing students for the challenges they may face after graduation. By providing them with practice that is relevant to real-world scenarios, simulations improve students' employability and their ability to make the right decisions in different situations.

In contrast, the group that did not use simulations and relied solely on traditional learning methods showed lower results, both in terms of theoretical understanding and practical skills. Traditional methods that focus on lectures and case studies may be effective in teaching basic concepts but often need more hands-on experience that can enhance students' practical understanding. Without simulations, students are left to learn through text and theory without being able to practice their knowledge in a more real-world context.

While traditional learning methods still have their place in education, the results of this study suggest that more interactive and experiential approaches, such as simulations, can make a greater contribution to improving student learning outcomes. In the context of ticketing and reservation courses, the practical ability to deal with real-world situations in the industry is a very important factor, and this is what can be improved by the use of simulations.

Ticketing and reservation courses significantly impact students' theoretical understanding and practical skills. Simulation has proven effective in helping students not only understand the theoretical concepts taught but also hone the practical skills needed to face real-world situations. Therefore, it is recommended that the use of simulation be expanded in various courses related to practical skills, especially those related to industries that require handling complex and dynamic scenarios.

Simulations provide students with the opportunity to gain hands-on experience in situations relevant to their workplace, thereby enhancing their readiness to face real industry challenges. Thus, simulations are not only a learning tool but also a means to improve the quality of education and ensure that graduates have the skills needed in a competitive job market.

Table 1. Mean Score for Theoretical Understanding and Practical Skills Test

Test	Group with Simulator	Group without Simulator
Theoretical Understanding Test	86.72	72.34
Practical Skills Test	87.07	76.63

Table 2. Independent T -Test for Theoretical Understanding Test

Test	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
Equal Variances Assumed	34.433	98	0.000	14.380	0.418
Equal Variances not Assumed	34.433	96.395	0.000	14.380	0.418

Table 3. Independent T -Test for Practical Skills Test

Test	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
Equal Variances Assumed	11.701	98	0.000	10.58373	0.90448
Equal Variances not Assumed	11.701	97.580	0.000	10.58373	0.90448

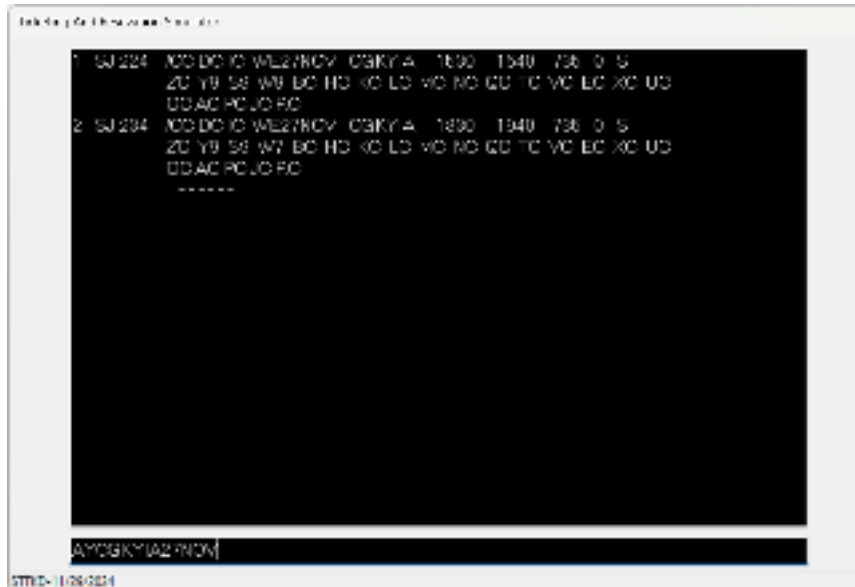


Figure 1. Simulator Screenshot– Seat Availability

4. Conclusion

Based on the findings obtained from this study, it can be concluded that learning using simulation, which is part of the experiential learning approach, has a significant influence on improving students' theoretical understanding and practical skills. The results showed that the group that used the Computer Reservation System (CRS) simulation in learning had higher scores in the aspects of theoretical understanding and practical skills compared to the group that did not use the simulation. This finding provides evidence that simulation is not only effective in deepening understanding of the theoretical concepts taught but is also very helpful in honing essential practical skills in dealing with real-world situations.

Simulation as a learning aid has been proven to be able to create an environment that resembles a real work situation, allowing students to experience firsthand the

challenges faced in the related industry. In the context of courses related to ticketing and reservation systems, the use of the Computer Reservation System simulation provides an opportunity for students to practice the theory they have learned in more dynamic and complex situations. This is very important, considering that the industrial world, especially in the travel and hospitality sector, often presents problems that cannot be solved with a theoretical approach alone.

Based on the results of this study, it is recommended that the use of simulation be expanded and applied in various courses that require mastery of practical skills, especially those related to industries that have complex and dynamic work scenarios. Simulation allows students to gain a deeper understanding of the application of theory in more realistic situations, which in turn will improve their readiness to face the

challenges of the professional world after graduation.

In this context, simulation not only functions as a fun learning tool but also as a means to ensure that students can master skills that are in great demand in an increasingly competitive job market. Therefore, the use of simulation should be further integrated into the higher education curriculum, especially in courses that emphasize the development of practical skills and direct problem-solving. This will enrich the learning process while improving the quality of education provided so that graduates are ready to face various challenges in the increasingly developing industry.

Thus, it can be concluded that the use of simulation as a learning method not only improves theoretical understanding and practical skills but also contributes to improving the overall quality of education. Simulation provides a more in-depth learning experience that is relevant to the needs of the industrial world. It ensures that graduates have the right skills to compete in a challenging global job market.

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