Applied chemistry demonstration learning for the Indonesian students' association in Taiwan

J-PEK
Vol. 10, No. 01, 2025, Page: 15-30

Anugrah Ricky Wijaya[1]*, Alif Alfarisyi Syah[1], Irma Kartika Kusumaningrum[1], Dima Vici Nadia Ariefianti[2], Angga Dheta Shirajjudin Aji[3], & Khoiril Amin[1]

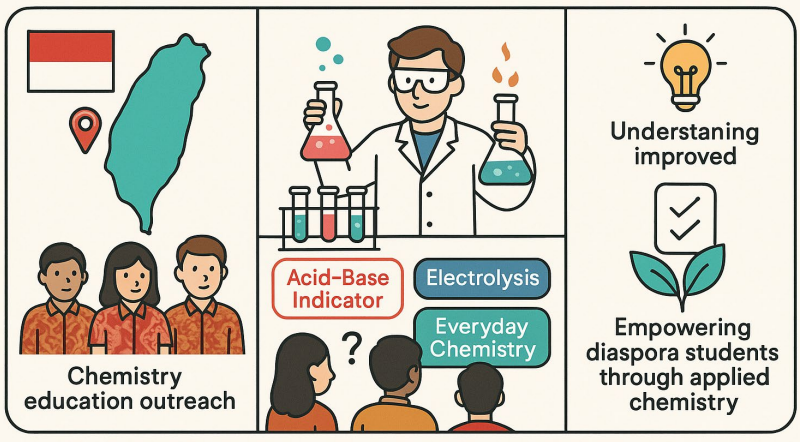
[1] *Chemistry Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Indonesia.*
[2] *Faculty of Engineering, Universitas Negeri Malang, Indonesia*
[3] *Biosystem Engineering Department, Faculty of Agricultural Technology, Universitas Brawijaya, Indonesia*

*Corresponding Author: anugrah.ricky.fmipa@um.ac.id

Abstract

Indonesian migrant workers (TKI) in Taiwan face various challenges, including social inequality, limited access to educational resources, and a general lack of community support. To address these issues, the Chemistry Department of UM provided training to PPI Chung Yuan Christian University (CYCU) Taiwan, equipping them to run programs featuring demonstrations of micro-scale chemical applications, including cation and anion determination, electrolysis, and the production of soap and candles. These hands-on activities aim to develop scientific skills among the younger generation and empower migrant workers with entrepreneurial knowledge for their lives in Taiwan. Program outcomes were evaluated through surveys assessing participants' understanding and satisfaction with micro-scale demonstrations and the production of soap and candles. Results indicated that electrolysis and aromatherapy soap-making were particularly well-received, as they were easier to understand and gained popularity, with participants passing on the skills to other migrant workers. Efforts were made to ensure the program's sustainability by actively involving the TKI community, with the hope that this initiative will help migrant workers develop valuable skills, broadening their opportunities for future success.

Graphical Abstract



Keywords:

micro-scale; PPI CYCU; Electrolysis; soap; candle

Submitted: Nov 2024
Revised: Dec 2024
Accepted: May 2025

Introduction

Taiwan is a country with workers mostly from Indonesia. Every year it develops and produces more and more generations of Indonesian people in Taiwan (Angelica et al., 2023). Some Indonesian Migrant Workers (TKI) work as factory workers, work in hospitals and work in households. The many busy parents as TKI cause the nation's generation to experience a crisis in educational knowledge, lack of self-confidence, and differences in social status (Cahyadi & Baskoro, 2022). This makes it possible for Indonesian Citizens (WNI) who go to Taiwan to work and do not return to have great potential to migrate to Taiwan. WNI who work and survive sometimes do not pay attention to population administration (Damarsidi, 2017). Not a few immigrants are caught up in cases regarding permits which have an impact on the social and academics of Indonesian children (Kartikasari & Muthmainah, 2023). Seeing this reality, the Education and Culture Attaché was moved to support educational services for TKI to all parties including the education team (Kwartawaty et al., 2020). Non-governmental institutions are expected to be role models and support non-formal academic activities to care about the fate of the nation's generation wherever they are, including Taiwan. Until now there have been no Indonesian schools in Taiwan unlike Indonesian schools on the Malay Peninsula (Raharto, 2017).

PDKT (Pembelajaran Demonstrasi Kimia Terapan in bahasa or Applied Chemistry Demonstration Learning) is a program of the Department of Chemistry Community Service Team with PPI Chung Yuan Christian University (CYCU) Taiwan to solve educational problems and introduce the nation's generation to Applied Chemistry demonstrations including the application of the properties of acidic and basic materials and their applications in everyday life as part of science. This program will be developed by PPI CYCU Taiwan into a sustainable PPI program to train the nation's generation to practice science skills (Rahman et al., 2021). Support for this program is expected to contribute to the world of education, especially science. Compulsory education still applies to children of Indonesian migrant workers in Taiwan to become the nation's bright generation (Ramadhan & Amaliyah, 2023). The initiation of the PDKT program is certainly with PPI CYCU and the community who are permanent residents will use this program gradually. This program uses acid-base titration demonstrations as superior demonstrations that are easy to understand as a scientific approach, especially for the target generation of the nation.

Analysis of Taiwanese community problems in Taoyuan identified among others the lack of educators and infrastructure. Educators will use the Department of Chemistry human resources as the first pilot at PPI CYCU and continue this program in the future. Temporary facilities and infrastructure use the hall where PPI will work together with the permanent resident TKI community to form a new studio. The demonstrations that will be given must be diverse and innovative so that the nation's generation becomes interested in learning.

After identification, there needs to be an innovative education service in the form of developing models or methods for group learning and solving cases according to university target associated with collaborative and participatory class. A unique learning demonstration is carried out using a portable science kit which will later be developed by PPI CYCU for the

sustainability of this activity. The problems of educators will be carried out routinely with a community service program which will later be continued by PPI CYCU. This service program will become a routine for teaching skills and innovative, up-to-date materials. The solution to the problem can be formulated as follows in the form of Innovative Education. The purpose of this study is to develop innovative education services that enhance group learning and case-solving skills among educators.

Method

Socialization of chemical science knowledge in the context of everyday life is very important for insightful learning, using environmental approach methods. The main targets of this service activity are the community and high school students around the Zhongli District area. The choice of chemical experimental topics in the form of experimental kits, especially determining cations and electrolysis, aims to provide practical knowledge and insight that can be widely applied in developing initial abilities in chemical processes. The activity began with training on determining cations in samples, aimed at upper secondary students so that they could pay more attention to the quality of the water used in their daily activities. Training is also provided to provide industry insight and skills, targeted at the general public. Activities involve electrolysis and electroplating for refining and electroplating copper. This training provides the essence of increasing educational insight that can be applied in the world of entrepreneurship or industry. The duration of this activity is four days, with the first day consisting of socialization and introductory training. The second day was filled with cation determination training, followed by electrolysis training for copper plating and refining on the third day. The fourth day ended with soap making and product evaluation and all activities. Training materials were provided by the Indonesian Student Association Team at CYCU Taiwan, and training was carried out at the PPI secretariat in Zhongbei Rd., Zhongli District, Taoyan City 32013 Taiwan. Evaluation of activities includes an assessment of community and student skills in chemical experiments, which are carried out in groups. For the student participants, they were organized into small groups, each consisting of 4–6 students. These groups worked collaboratively during the training sessions to conduct experiments, discuss findings, and present their results. Group work aimed to enhance teamwork skills, critical thinking, and problem-solving abilities in a practical context. Here are the topics covered in the community service program:

Experiment Procedures

Determination of cations (Na^+, Ca^{2+}, Mg^{2+}, Al^{3+}, and Zn^{2+})

To identify the metals Na^+, Ca^{2+}, Mg^{2+}, Al^{3+}, Zn^{2+}, and Pb^{2+} in tap water samples, the following procedural steps can be followed. First, use a marker to write down the cations to be tested (Na, Ca, Mg, Al, Zn, Pb) and the reagents to be used for the test (NaOH, NH_4OH, and KI). Then, take a 1-2 drops sample of tap water or water source to be tested. Next, 1-2 drops of reagent (NaOH, NH_4OH, and KI) to the water sample and stir using a stir bar. Observe the formation of the precipitate and note its color. If a precipitate forms, add 1-2 drops more reagent to the mixture and stir with the same stir stick.

Electroplating and electrolysis

The first step involves preparing the anode and cathode, with the anodes being made from the copper to be refined and the cathodes being made from pure copper. A copper electrolyte solution, usually a copper sulfate solution, is prepared to provide copper ions that can be transported by an electric current. Next, the $CuSO_4.5H_2O$, anodes and cathodes are placed in the electrolysis tank. Next, the anode and cathode are connected to a power source, the electrochemical process begins. Positive copper ions (Cu^{2+}) in the electrolyte solution at the anode are oxidized, while positive copper ions at the cathode are reduced and deposited as pure copper. The pure copper formed is then collected. This process allows the purification of copper from impurities, producing pure copper.

First, the object to be plated, called the cathode, is selected and placed in an electroplating tank. The material that will be used as the copper layer, called the anode, is also selected and placed in the tank. The anode and cathode are then dipped in an electrolyte solution containing copper ions (usually a copper sulfate solution). When the power source is activated, an electric current flow through the electrolyte solution from the anode to the cathode. During the electroplating process, positive copper ions (Cu^{2+}) in the electrolyte solution at the anode are oxidized to form released copper. On the other hand, at the cathode, positive copper ions in the electrolyte solution receive electrons and are deposited as a copper layer on the surface of the object. This process produces a layer of copper that is even and adheres to the surface of the object.

Production soap using used cooking oil

Mixing NaOH and Water. Slowly add NaOH to distilled water (distilled water), not vice versa, to avoid dangerous reactions. Stir gently until the NaOH is completely dissolved. This solution will be very hot, let it cool to room temperature.

Mixing Oil and NaOH Solution. Make sure the used cooking oil and NaOH solution are at the same temperature, namely room temperature. Pour the NaOH solution into the used cooking oil slowly while continuing to stir with a blender or manual stirrer.

Addition of Glycerol and Essential Oil. After the oil and NaOH mixture begins to thicken, add 5 ml of glycerol. Stir until smooth, then add 1-2 ml of essential oil (fragrance) according to taste to add aroma to the soap. Stir again until all ingredients are completely mixed.

Pouring into Mold. Pour the soap mixture into the soap mold. Smooth the surface of the soap with a spatula. Cover the mold with muslin cloth or plastic wrap to avoid dust contamination.

Hardening Process. Leave the soap in the mold for 24-48 hours until it hardens. Once the soap has hardened, remove it from the mold and cut it to the desired size.

Curing Process. Place the cut soap in a cool, dry place. Allow the soap to cure for 4-6 weeks to ensure all chemical reactions are complete and the soap is ready to use.

Candle Making. Melt Paraffin and Used Cooking Oil. Put the filtered paraffin and used cooking oil in a heat-resistant container. Stir the paraffin in the used cooking oil until it melts and dissolves.

Add Colouring. Add candle coloring to taste. If using crayons, cut them into small pieces and add them to the mixture. Stir until the dye is mixed evenly and reaches the desired color.

Add Essential Oil (Fragrance). Turn off the heat and let the mixture cool slightly. Add 10-20 drops of essential oil according to taste and mix well. Adding essential oils at this temperature helps keep the aroma from evaporating too quickly.

Mold and Wick Preparation. Prepare a candle mold and place the candle wick in the center of the mold. Use clamps or wooden sticks to hold the wick in place.

Pour the Wax Mixture. Pour the wax mixture into the mold slowly. Make sure the axis remains centered and does not shift. Let the wax harden at room temperature. This process can take several minutes to hours.

Wick Trimming. Once the wax has completely hardened, cut the candle wick to the desired length (approximately 1 cm from the surface of the candle).

Results & Discussion

Initial stage of experimental preparation

In the context of implementing the PDKT program for students in Taiwan, a series of experiments have been prepared with the aim of combining a scientific approach with practical applications that are relevant to everyday life and the community. Each experiment is designed to provide an in-depth understanding of chemical concepts while considering safety factors, use of readily available materials, and potential benefits to society. The first experiments carried out were related to the analysis of cations such as Na^+, Ca^{2+}, Mg^{2+}, Al^{3+}, and Zn^{2+}. This approach is very important for introducing analytical chemistry concepts to students. By using selective precipitation and color change methods, these cations can be identified qualitatively. Solutions such as NaOH and NH_4Cl are used in this experiment, where the reactions that occur allow the formation of specific precipitates for each cation, for example $Al(OH)_3$ for Al^{3+}. In a scientific context, these reactions provide an overview of basic acid-base properties, solubility, and equilibrium constants. Implementation of this experiment in a community context allows students to understand the importance of water quality and how simple analysis can be used to detect contaminants, which is relevant to public health.

Figure 1. Simple experimental form for determining cation analysis (a), Results of cation analysis testing (b)

In electrochemical experiments: electroplating and electrolysis are the main focus. The use of copper(II) sulfate ($CuSO_4$) as an electrolyte solution and copper as an electrode, produces a copper coating on the surface of another metal. This process utilizes the principle of electron transfer where Cu^{2+} ions in solution are reduced to Cu at the cathode. It provides a solid introduction to electrochemical concepts, such as electrode potential, electric current, and redox reactions. In terms of application, electroplating is not only relevant in an industrial context but can also be applied in the manufacture of more affordable jewelry or electronic components. Students learn how seemingly complex technology can be utilized in everyday life and in the context of community economic empowerment.

Figure 2. Form of electrolysis experiment (a), and electroplating (b)

Soap production from used cooking oil is a concrete example of the application of organic and environmental chemistry principles. The used cooking oil selected for soap production was pre-filtered to remove large food residues and impurities. To ensure the quality of the raw material, only oil with a maximum of two prior frying cycles was used. Oil exhibiting excessive darkening, rancid odor, or heavy particulate contamination was excluded from the production process. This quality control step was important to produce soap with better physical appearance, odor, and stability. The saponification reaction used in this experiment illustrates how triglycerides, found in used cooking oil, react with a strong base (NaOH) to produce carboxylate salts (soap) and glycerol. This reaction is important to understand

because it describes the process of converting waste into economically valuable products. From a scientific perspective, it teaches important concepts such as molecular structure, polarity, and reaction mechanisms. For communities, soap production from used oil not only helps reduce waste but also provides an opportunity to produce useful household items at low cost.

The final experiment being prepared is producing aromatherapy candles from used cooking oil. Used cooking oil, quality cooking oil, can be mixed with beeswax or paraffin and essential oils to produce candles that are not only environmentally friendly but also have added value in terms of health and wellbeing through aromatherapy effects. This process involves refining the oil through filtration and neutralization, as well as blending it with aromatic materials, demonstrating how waste materials can be transformed into high-quality products. From a scientific point of view, this provides an understanding of organic chemistry and refining techniques, while in a community context, making these candles could be an environmentally based small business opportunity. In every experiment, security aspects are always the main concern. All materials used in this experiment were chosen because they are relatively safe and easily available on the market, ensuring that anyone, both students and members of the public, can replicate this experiment with minimal risk. The approach taken in this program shows how chemistry provides not only theoretical understanding but also practical applications that can be applied in everyday life and community empowerment. Thus, the PDKT program aims to equip students and the community with relevant skills, which can be used to improve their quality of life and welfare.

Figure 3. Manufacturing process (a), and soap molding process (b)

Implementation of PDKT for Taiwanese students

The PDKT activity carried out in collaboration with PPI CYCU Taiwan aims to increase knowledge of applied science among Indonesian students in Taiwan. This program is designed to equip participants with scientific skills through a series of chemistry experiments that are applicable, relevant, and easy to understand. Participants involved in this activity are Indonesian students studying in Taiwan and actively involved in the PPI CYCU organization. Through this activity, students not only gain theoretical understanding, but also practical experience that can be applied in various scientific contexts and everyday life.

Figure 4. Manufacturing process (a), and wax printing process (b)

During the implementation of the program, we have conducted several chemical experiments, such as:

1. Participants learn methods for identifying metal ions in water samples. This experiment aims to provide an understanding of water quality and its impact on health and the environment. Participants are trained to use simple qualitative analysis techniques to identify cations in water used daily.
2. Electrolysis experiments in metal refining and copper electroplating. Through this experiment, participants understand how this technique is applied in industry to improve metal quality and increase product value. This understanding is important for students who are interested in the application of chemistry in the manufacturing and technology industries.
3. Producing Aromatherapy Soap and Candles Using Used Cooking Oil. In this activity, participants are trained to utilize used cooking oil, which is usually considered waste, into valuable products such as soap and aromatherapy candles. This experiment is designed to teach the basic principles of saponification and provide insight into the circular economy and waste reduction. In addition, participants learn how to produce products that are environmentally friendly and have potential selling value.
4. Acid-base titration experiments give participants insight into how to measure the acid or base content in everyday products such as vinegar and detergent. This helps participants understand the importance of product quality control and how this technique is widely applied in the food and household industries.

Figure 5. Seminar kit and several materials to support applied chemistry demonstration practice

Benefits and Advantages of Activities

This program provides broad benefits for participants, especially in improving scientific literacy and laboratory skills. Some of the main advantages of this activity include Relevance to Everyday Life: Every experiment carried out has practical relevance to everyday life, both from a health, environmental and industrial perspective. For example, determining cations in water teaches participants the importance of water quality, while making soap from used cooking oil provides insight into the circular economy and waste management. Application of Applied Chemistry Concepts: Participants gain a deeper understanding of applied chemistry concepts such as saponification reactions, and electrolysis. With this direct approach, students are able to connect theory with practice. This activity also strengthens interaction and collaboration between students. Discussions, group work and joint evaluations encourage active participation and increase the spirit of togetherness among PPI CYCU members. The PDKT educational demonstrations were conducted in Room B of the Alana multifunction hall CYCU Secretariat in Zhongbei Rd., located in the Zhongli District of Taoyuan, Taiwan. A total of 18 participants, 15 high school students from local schools and 3 members of the surrounding community took part in the four-day program.

Participants not only learn concepts, but also practical skills that have the potential to be applied in the world of work, especially in fields such as chemical analysis, waste processing, and industrial manufacturing. During the activity, the interaction between participants was very dynamic. Participants showed high enthusiasm in each experimental session, with many discussions taking place regarding the real-life applications of chemistry. Some participants expressed a deeper interest in electrolysis techniques and soap making because of their relevance to personal interests or future career prospects. Apart from that, the support provided by PPI CYCU is very significant in the success of this program. The facilities provided, as well as solid collaboration between the teaching team and participants, create

an environment conducive to learning. Many participants also expressed a desire to develop their skills further through similar programs in the future.

Figure 6. Demonstration of chemistry learning kits and Production of soap and candles

Student Response

During the demonstration activities, the students showed a very enthusiastic and positive response. They are actively involved in every experiment, especially in acid-base titration activities as well as electroplating and electrolysis. Their seriousness and interest is clearly visible when they try to understand chemical concepts as they are implemented in everyday life. Some students even asked more deeply about the processes that occurred during the experiment, such as chemical reactions in determining the levels of commercial vinegar and detergent, as well as the use of used cooking oil in making soap and aromatherapy candles. In addition, they really appreciate experiments that use simple and easily available ingredients, such as used cooking oil and other household products, because this gives them the insight that chemistry can be applied in ways that are relevant and beneficial to society. Students understand the importance of this knowledge to be applied not only in the laboratory, but also in everyday life, especially in the context of the TKI community in Taiwan. They see that developing these skills not only improves their understanding of science, but can also be a creative solution to improve society's welfare.

The students had great hopes that they could implement the knowledge and skills gained through this activity to the TKI community in Taiwan. They hope to make a real contribution through community service activities, such as teaching how to make environmentally friendly products to migrant workers, which could become a science-based business opportunity. Apart from that, they also hope that skills such as titration and simple chemical analysis can be utilized by migrant workers in their daily lives, for example to monitor the quality of drinking water or other household products, so that people can be more independent in practicing science.

Evaluation of Activities (Initial Knowledge and Interest in Microscale Chemistry Training Activities)

The pie chart above shows the main motivation of participants in taking microscale chemistry training. As many as 60% of participants took part in training with the main aim of developing

their laboratory skills. This reflects the strong desire of the participants to improve practical competence in managing and carrying out experiments, especially on a micro scale which is safer and more efficient. Meanwhile, 40% of participants focused on increasing theoretical knowledge, indicating that in addition to practical aspects, there was significant interest in understanding the theoretical concepts underlying laboratory activities.

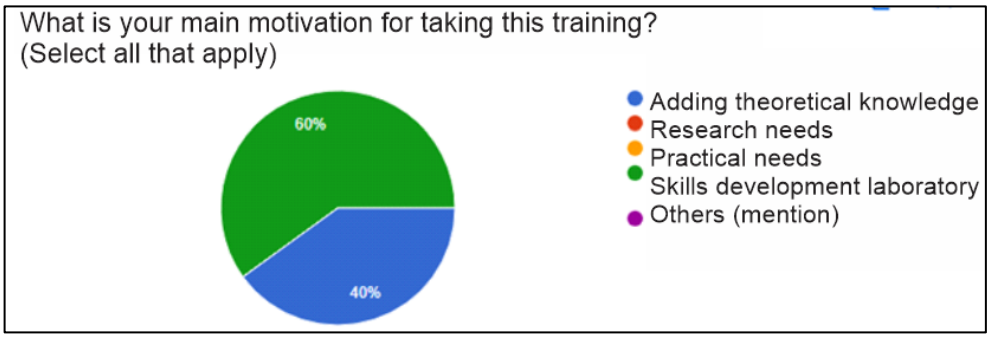


Figure 7. Participant responses regarding motivation for attending the training

These two motivations are very important, because the synergy between practical skills and theoretical knowledge will better prepare participants to face challenges in the world of work and in the implementation of technology and science in society, especially in the context of service to migrant workers in Taiwan. How would you rate the overall quality of the training session? (Select all that apply). The evaluation results show that the quality of material delivery in microscale chemistry training is considered good by the majority of participants, with 60% of participants assessing it as good and 40% assessing it as very good. This reflects that the participants felt that the material presented by the instructor met their expectations, both in terms of clarity and detail. As many as 60% of participants agreed that the instructor was able to explain concepts clearly and in detail, while the other 40% strongly agreed.

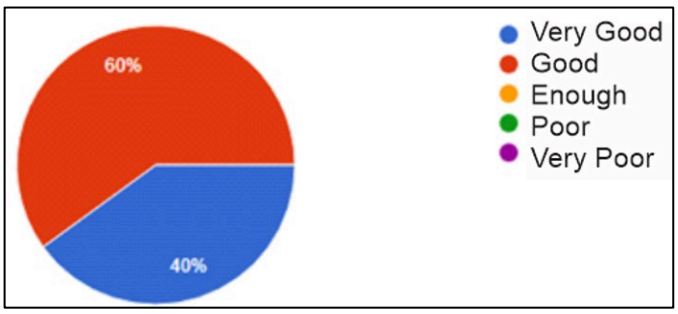


Figure 8. Participant responses regarding the overall quality of the training

This assessment shows the instructor's success in providing a deep understanding of complex chemical concepts, especially in the context of using microscale techniques that require precision. In addition, the use of microscale kits in training was considered effective by 60% of participants, with another 40% assessing it as very effective. This shows that the microscale kit used has succeeded in facilitating participants in applying theory into laboratory practice efficiently and effectively. This tool helps simplify complex chemistry

concepts to make them easier to understand, thereby improving participants' laboratory skills.

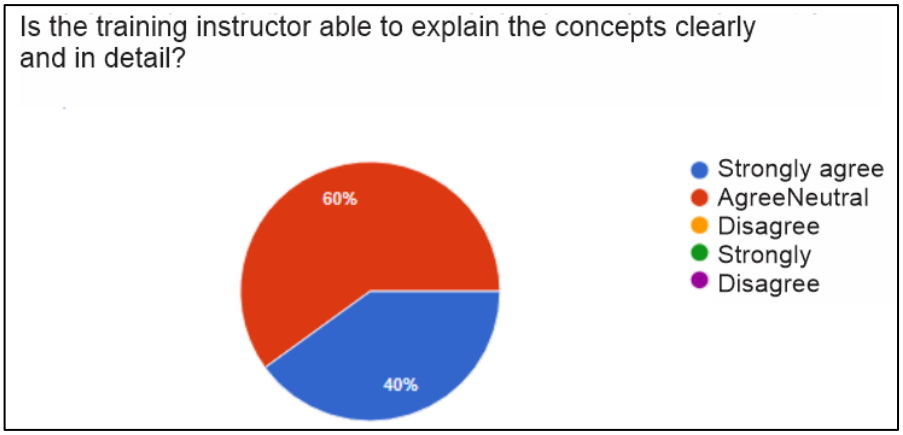


Figure 9. Participant responses regarding the clarity of the concepts presented

Furthermore, 60% of participants agreed that this training increased their knowledge and laboratory skills, with another 40% strongly agreeing. This evaluation confirmed that the training did not only focus on increasing theoretical knowledge, but also strengthened participants' practical skills in the laboratory. This additional insight is very important, as it provides a strong foundation for participants to apply these skills in more complex laboratory activities in the future. Overall, this evaluation illustrates the success of microscale chemistry training in increasing participant competency both in terms of knowledge and laboratory skills. The quality of material delivery, instructor clarity, effectiveness of using microscale kits, and improvement in laboratory skills all indicate that this training has gone well and is in line with participants' needs. Overall these results confirm that the training objectives, namely developing laboratory skills and increasing theoretical knowledge, have been achieved well.

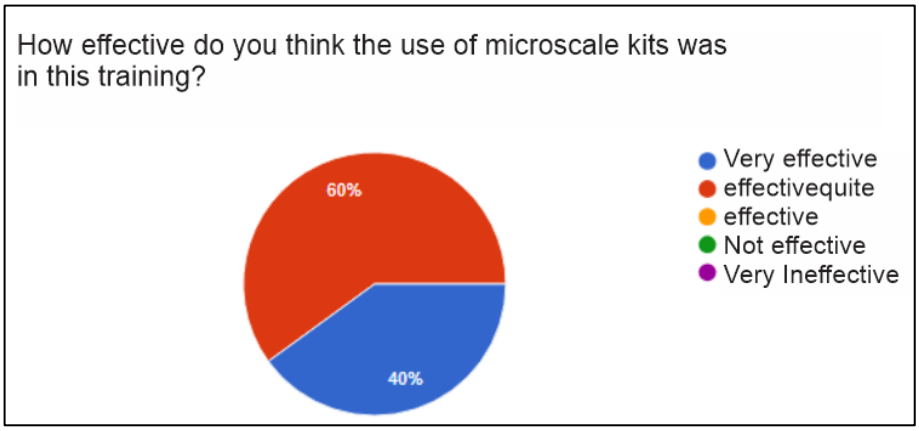


Figure 10. Participant responses regarding the effectiveness of microscale experiments

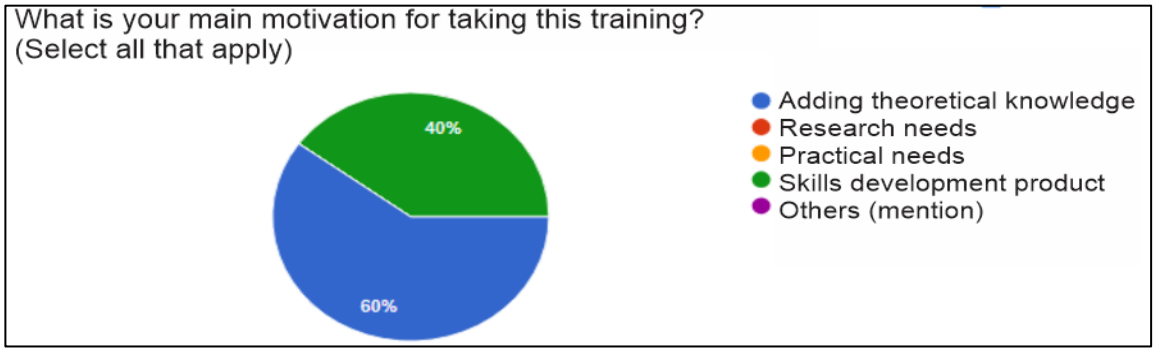


Figure 11. Participant responses regarding motivation for participating in microscale training

Evaluation of microscale chemistry training activities shows that participants have various motivations for participating in this training. Based on the data displayed in the pie chart, 60% of participants stated that their main motivation was to increase theoretical knowledge, while the other 40% focused on developing product skills. Most participants were motivated to deepen their theoretical knowledge in chemistry, reflecting an awareness of the importance of strong theoretical foundations as a foundation for understanding more complex chemical concepts and for applying these concepts in laboratory practice. On the other hand, 40% of participants focused more on developing practical skills related to the manufacture and testing of chemical products, which is very relevant in an industrial context.

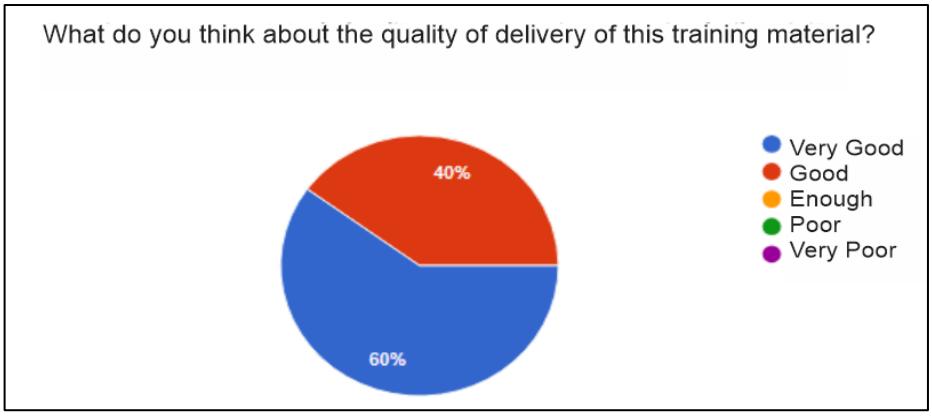


Figure 12. Participant responses regarding the quality of training delivery

This evaluation shows that microscale chemistry training successfully attracts participants with different backgrounds and needs, providing in-depth theoretical knowledge as well as opportunities to develop practical skills that can be directly applied in real contexts. This combination ensures that participants have comprehensive competencies, both in understanding basic concepts and in their practical application, so that this training can be considered successful in meeting different educational needs and building holistic skills. The following are examples of comments provided after these activities, as follows. Are there any suggestions for improving this training in the future? In my opinion, today's training was very good & delivery was also very clear and interactive. Made during the active semester so that many students can participate. More varied and the results of the practice can be used

directly. Held more often. Topics that are more interesting and in accordance with current development.

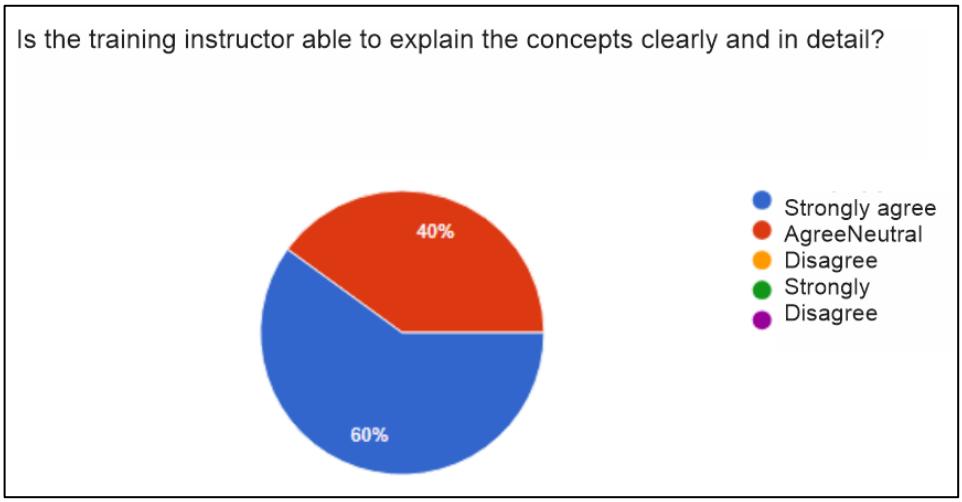


Figure 13. Participant responses regarding the quality of instructor performance.

Evaluation of the microscale chemistry training showed a very positive response from the participants, especially in terms of the quality of material delivery, the effectiveness of using materials and tools, as well as increasing practical skills in sustainable products. Data displayed in a pie chart revealed that 40% of participants rated the quality of material delivery as good, while 60% rated it as very good. This indicates that the majority of participants felt that the material presented during the training really helped them understand the concepts being taught. In addition, when asked whether the instructor was able to explain concepts clearly and in detail, 40% of participants agreed, and another 60% strongly agreed. This reflects that the instructor succeeded in presenting the material in a way that is easy to understand, ensuring that participants can follow and apply the knowledge gained effectively.

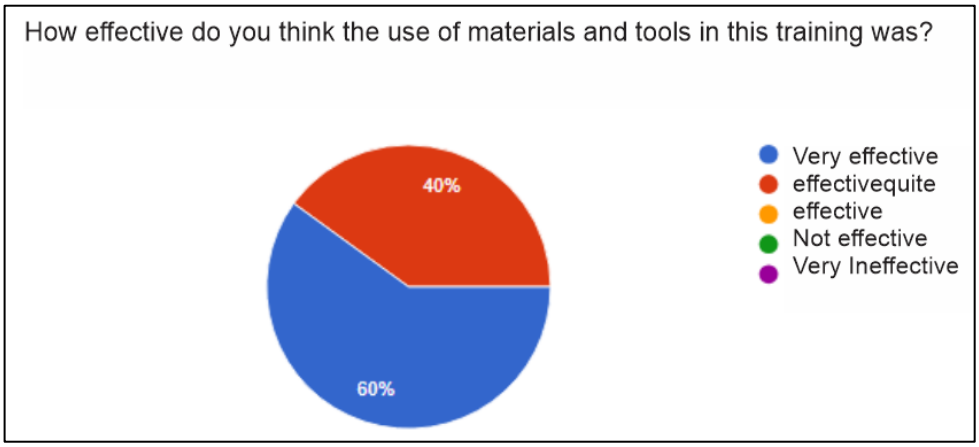


Figure 14. Participant responses regarding the adequacy of materials and tools provided

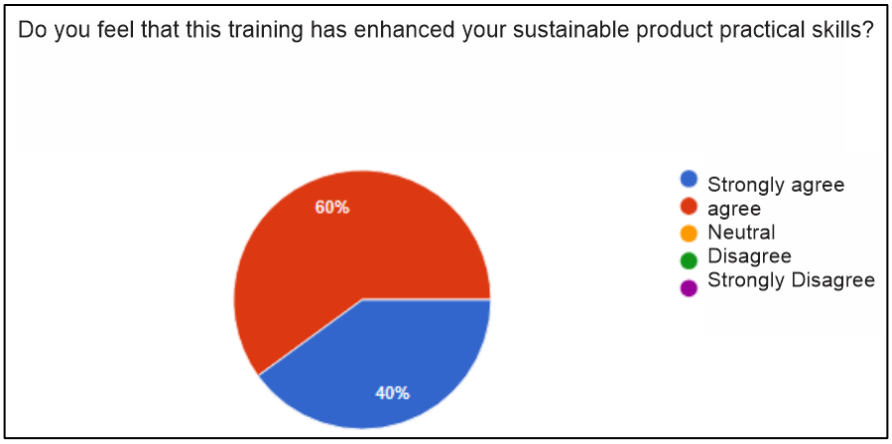


Figure 15. Participant responses regarding practical skills in producing sustainable products

Furthermore, the effectiveness of the use of materials and tools in training was also assessed as high, with 60% of participants stating that the materials and tools used were very effective, and another 40% assessing them as effective. This assessment shows that the methods and equipment applied in the training support participants in understanding and carrying out the practicum well, strengthening their learning experience. Finally, regarding the impact of training on sustainable product practicum skills, 60% of participants agreed that this training had increased their skills, while the other 40% strongly agreed (Ramadhan & Amaliyah, 2023). This indicates that the training not only enriches participants' theoretical knowledge, but also strengthens their ability to apply chemical concepts in practice, especially in the context of sustainability. Overall, the results of this evaluation show that microscale chemistry training has succeeded in having a significant impact on participants' knowledge and skills, with effective delivery methods and the use of materials and tools that support in-depth and applicable learning.

Conclusion

The community service program was successfully held in Room B of the Alana multifunction hall at CYCU Taiwan. Students at CYCU Taiwan displayed a wide range of interests, skills, and enthusiasm while participating in various training activities. The electrolysis and aromatherapy soap-candle making sessions were especially well-received, as the audience found them easy to understand, contributing to their popularity. Participants eagerly shared these skills with fellow migrant workers. Survey results further suggest that entrepreneurial potential can be cultivated by recognizing individual interests and supporting skill development through focused guidance and assistance.

Acknowledgement

The 2024 Overseas Service Team extends its gratitude to the 2024 PNBP UM *Skema Desentralisasi FMIPA* under Grant No. 5.4.1/UN32/KP/2024.

AI-assisted technology statement

In preparing this work, the authors used Grammarly to correct spelling errors. After employing this technique, the authors examined and revised the content as necessary, taking full responsibility for the material in the publication.

References

Angelica, R., Yoana Ledy Mutiara, Mufid Muhammad, & Salsabila Nink. (2023). Peranan Hukum Internasional Dalam Upaya Melindungi Tenaga Kerja Indonesia (TKI) di Taiwan. *Das Sollen: Jurnal Kajian Kontemporer Hukum Dan Masyarakat*, *1*(02 SE-Articles). https://journal.forikami.com/index.php/dassollen/article/view/300

Cahyadi, N., & Baskoro, H. (2022). Sosialisasi kewirausahaan pada pekerja migran indonesia dengan design thinking. *DedikasiMU : Journal of Community Service*, *4*(3), 282–289. https://journal.umg.ac.id/index.php/dedikasimu/article/view/4164

Damarsidi, H. R. (2017). Analisis Anomali Kebijakan Penempatan TKI: Eksploitasi Tenaga Kerja Indonesia sebagai Anak Buah Kapal Perikanan Taiwan. *Journal of International Relations*, *3*(4), 40–48.

Kartikasari, D., & Muthmainah, M. (2023). Pengaruh Pelatihan Keterampilan Koping Orang Tua terhadap Kecerdasan Emosi & Keterampilan Sosial Anak. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *7*(5 SE-Articles), 5506–5522. https://doi.org/10.31004/obsesi.v7i5.5100

Kwartawaty, N. N., Noviana, E., & Mahardhika, G. T. (2020). Pelatihan mini MBA secara daring terhadap pekerja migran Indonesia di Taiwan. *BERNAS: Jurnal Pengabdian Kepada Masyarakat*, *1*(4 SE-Articles), 661–666. https://doi.org/10.31949/jb.v1i4.543

Raharto, A. (2017). Pengambilan Keputusan Tenaga Kerja Indonesia (TKI) Perempuan Untuk Bekerja di Luar Negeri: Kasus Kabupaten Cilacap. *Jurnal Kependudukan Indonesia*, *12*(1), 39–54.

Rahman, R. A., Salim, A. A., & Anggriawan, R. (2021). Peran Pemerintah Indonesia dan Taiwan dalam Menanggulangi Kasus Pekerja Migran Indonesia "Kaburan." *Jurnal Wawasan Yuridika*, *5*(1), 81–99. https://ejournal.sthb.ac.id/index.php/jwy/article/view/414

Ramadhan, M. Z., & Amaliyah, R. (2023). Strategi indonesia dalam manajemen perlindungan pekerja migran Indonesia di Taiwan pasca new southbound policy. *SIYAR Journal*, *3*(1 SE-Articles), 74–90. https://doi.org/10.15642/siyar.2023.3.1.74-90