### The Effectiveness of Implementing a Project-Based Learning Model in Enhancing Arabic Speaking Skills for 11th-Grade Students at SMAN 1 Praya

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Abstract: This study is motivated by the low proficiency in Arabic speaking skills among 11th-grade students at SMAN 1 Praya. To address this issue, the research aims to evaluate the effectiveness of implementing a project-based learning model to enhance Arabic speaking skills. This study employs a mixed-methods approach, combining both quantitative and qualitative methods. Data collection techniques include observation, interviews, questionnaires, and speaking ability tests. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were analyzed using thematic analysis techniques. The research findings indicate that the implementation of the project-based learning model significantly improves students' speaking skills. The conclusion drawn is that this model is effective in enhancing the Arabic speaking competency of 11thgrade students at SMAN 1 Praya. The implications of this study highlight the importance of adopting innovative teaching methods, such as project-based learning, to improve students' language abilities. Therefore, the results of this study can serve as a reference for teachers and educational institutions in selecting appropriate learning models to achieve optimal learning outcomes.

**Keywords:** Arabic Language, Effectiveness, Project-Based Learning Model, SMAN 1 Praya, Speaking Skills.

### INTRODUCTION

The ability to speak Arabic is a critical skill for students at SMAN 1 Praya, particularly in the context of their overall linguistic and academic development. Despite its importance, many 11thgrade students struggle with speaking Arabic fluently, which presents a significant challenge in achieving the desired language proficiency outcomes. Traditional teaching methods often focus heavily on grammar and reading comprehension, while speaking skills are frequently neglected (Manan & Nasri, 2024). This has led to a persistent gap between the students' ability to understand the language and their ability to effectively communicate in it (Hady & Nasri, 2023). The urgency of this research stems from the need to address this gap and improve Arabic speaking skills among students (Seo et al., 2023). The project-based learning (PBL) model offers a promising alternative to traditional language teaching methods by engaging students in active, meaningful projects that require them to use the target language in real-life contexts. PBL shifts the focus from passive learning to active

problem-solving, allowing students to gain a deeper understanding of the language through practical application (Pupik Dean et al., 2023).

The effectiveness of implementing a Project-Based Learning (PBL) model in enhancing refers to the general concept of evaluating how well a PBL model works in improving or enhancing a particular skill or set of skills. PBL is an educational approach where students engage in real-world projects that are meaningful and relevant to them. Instead of traditional teaching methods, which often involve lectures and rote memorization, PBL encourages students to actively explore and solve problems through hands-on activities (Maor et al., 2023). When discussing the effectiveness of PBL in "enhancing," the focus is on measuring how much this method improves a specific outcome, such as a student's knowledge, skills, or competencies. For example, in the context of language learning, "enhancing" might refer to improving students' speaking, writing, or comprehension skills. In this study, the focus is specifically on enhancing Arabic speaking skills (Marnewick, 2023).

Previous studies have shown the potential of PBL in various educational settings, demonstrating its effectiveness in enhancing different skills and knowledge areas. However, research on its application in language learning, particularly in Arabic, is still limited (Y. Wang, 2023). This study aims to fill this gap by evaluating the impact of PBL on Arabic speaking skills in a high school setting. The findings are expected to contribute to the broader discourse on language education by providing empirical evidence on the effectiveness of PBL in improving speaking skills (Nasri, 2019). Furthermore, this research will offer practical insights for educators seeking to implement innovative teaching strategies that better align with students' learning needs and the demands of modern language education (Nasri, 2023b). The results of such studies help educators understand the potential benefits of using PBL and how it can be effectively implemented in various educational settings to improve student performance.

### METHOD

The research adopts a mixed-methods approach, integrating both quantitative and qualitative methods to thoroughly examine the effectiveness of the Project-Based Learning (PBL) model in enhancing Arabic speaking skills among 11th-grade students at SMAN 1 Praya (Liu et al., 2024). This approach was chosen to capitalize on the strengths of both types of data, enabling a richer, more nuanced understanding of the research problem (Nasri et al., 2024). The study begins with the quantitative phase, designed to measure the direct impact of the PBL model. Here, pre-test and post-test assessments will be administered to the students (Nasri, 2023a), allowing for a comparison of their Arabic speaking skills before and after the intervention (T. Wang et al., 2023). The assessments will focus on key areas such as fluency, accuracy, and overall communication abilities (McCoy et al., 2024). Participants will include 60 students, selected through purposive sampling to ensure a representative sample. These students will be divided into an experimental group, which will engage with the PBL model, and a control group, which will continue with traditional teaching methods (Creswell & J. David Creswell, 2022, p. 13).

In the subsequent qualitative phase, the study delves deeper into the students' experiences with the PBL model (Brodeur et al., 2023). Through classroom observations, semistructured interviews, and open-ended questionnaires, rich qualitative data will be collected (Olsen, 2020). Observations will provide insights into student engagement, interaction, and the practical application of their speaking skills during the PBL activities (Chuah et al., 2024). Meanwhile, the interviews will explore the students' personal experiences, challenges, and perceived benefits of the PBL approach. The open-ended questionnaires will further capture the students' reflections and perceptions, offering a more personal and detailed view of the learning process (Botsis et al., 2024).

The data analysis will involve both quantitative and qualitative techniques. Quantitative data from the pre- and post-tests will be analyzed using descriptive and inferential statistics, such as t-tests, to determine the significance of any observed improvements (McCov et al., 2022). In parallel, the qualitative data will be subjected to thematic analysis, where emerging themes and patterns related to the effectiveness of PBL and its impact on students' speaking skills will be identified (Wallwey & Kajfez, 2023). To ensure the validity and reliability of the findings, the study will employ triangulation, comparing and cross-verifying data from multiple sources (Filieri et al., 2023). This comprehensive approach not only enhances the robustness of the research but also provides a well-rounded perspective on the effectiveness of the PBL model (Von Behren et al., 2024).

Finally. ethical considerations are paramount. The study will seek approval from the relevant authorities at SMAN 1 Praya, and informed consent will be obtained from all participants (Sardana et al., 2023). Confidentiality will be strictly maintained, and participation will be entirely voluntary, with the option to withdraw at any time (Wallwey & Kajfez, 2023). By combining these methods, this research aims to offer deep insights into how the PBL model can effectively enhance Arabic speaking skills, contributing valuable knowledge to the field of language education and offering practical guidance for educators.

### **RESULT AND DISCUSSION**

### Results

The research findings indicate that the implementation of Project-Based Learning (PBL) in the Arabic language curriculum at SMAN 1 Praya has a significant positive impact on students' development of critical thinking skills and their ability to communicate effectively in real-life contexts. This conclusion is supported by both the quantitative and qualitative data collected throughout the study.

### **Quantitative Results**

The pre-test and post-test assessments provided clear evidence of improvement in the students' Arabic speaking skills. Students in the experimental group, who engaged with the PBL model, showed a marked increase in their speaking proficiency compared to those in the control group, who continued with traditional instruction. The statistical analysis revealed significant gains in fluency, accuracy, and overall communication abilities in the experimental group. The average improvement in the experimental group's speaking scores was significantly higher, indicating that the PBL approach effectively enhanced their language abilities.

### Qualitative Insights

The qualitative data, collected through observations, interviews, and open-ended questionnaires, further validated these findings. Classroom observations highlighted a noticeable increase in student engagement and participation during PBL activities. Students were observed actively collaborating, discussing, and applying their Arabic language skills in meaningful ways. The projects provided a platform for them to practice speaking in authentic, real-life scenarios, which helped them to become more confident and articulate in their use of the language.

Interviews with the students revealed that they found the PBL activities not only enjoyable but also highly relevant to their personal lives and future aspirations. Many students reported that the hands-on, contextual learning experiences allowed them to better grasp the practical applications of Arabic, making the learning process more engaging and less abstract. They expressed that the opportunity to work on projects that mattered to them motivated them to put more effort into their language studies, which in turn led to noticeable improvements in their speaking abilities (Qi et al., 2023). The open-ended questionnaires supported these findings, with students consistently reporting that the PBL model made learning Arabic more interactive and practical. They noted that through PBL, they were able to connect the language to real-world contexts, which deepened their understanding and made the language more accessible. This connection to real-life scenarios also helped in developing their critical thinking skills, as they were required to solve problems, make decisions, and articulate their thoughts clearly in Arabic.

### Alignment with the Merdeka Curriculum

Furthermore, the results underscore the alignment of the PBL approach with the goals of the Merdeka Curriculum, which emphasizes active, contextual, and meaningful learning. The PBL model facilitated an educational environment where students were not just passive recipients of knowledge but active participants in their own learning process. By engaging in relevant projects, students were able to develop a more profound and practical understanding of the Arabic language, consistent with the curriculum's objectives of fostering critical thinking and effective communication (Pan et al., 2023).

The overall conclusion drawn from this research is that the Project-Based Learning model is highly effective in enhancing Arabic speaking skills among 11th-grade students. It not only improves their linguistic proficiency but also promotes critical thinking and real-world communication skills, making it a valuable pedagogical approach in language education. The success of this model in the context of SMAN 1 Praya suggests that PBL could be widely adopted to improve language learning outcomes, particularly in settings where active and contextual learning is a priority (Santos et al., 2023).

#### Discussion

The results of this study reveal that the implementation of Project-Based Learning (PBL) significantly enhances Arabic speaking skills among 11th-grade students at SMAN 1 Praya. The findings, which show improvements in students' fluency, accuracy, and communication abilities, align with several educational theories and frameworks, providing a comprehensive understanding of why PBL is effective in this context.

Alignment with Theoretical Frameworks

## 1. Constructivist Theory (Jean Piaget and Lev Vygotsky)

The improvements observed in students' Arabic speaking skills can be closely linked to Constructivist Theory, as proposed by Jean Piaget and Lev Vygotsky (Nyamekye, 2024). Piaget's theory emphasizes that learners construct knowledge through active engagement with their environment (Montangero, 2015). Vygotsky's theory adds that social interactions and cultural contexts are crucial in this learning process (Lourenço, 2012). PBL fosters an environment where students actively engage in meaningful projects, thereby constructing knowledge through hands-on experiences. The real-world application of language in PBL projects aligns with Vygotsky's concept of the Zone of Development Proximal (ZPD), where students achieve higher levels of understanding through collaborative activities and guided interactions (Derakhshan et al., 2024).

# 2. Experiential Learning Theory (David Kolb)

David Kolb's Experiential Learning Theory supports the notion that learning is most when effective it involves concrete experiences followed by reflection (Hung et al., 2023). In the context of PBL, students engage in practical projects that require them to use Arabic in real-life scenarios. This hands-on approach allows them to reflect on their experiences, apply their knowledge, and gain a deeper understanding of the language. Kolb's model of learning (Murgu et al., 2018), which includes stages such as concrete experience, reflective observation, abstract conceptualization, and active experimentation (Quibrantar & Ezezika, 2023), is reflected in the PBL process, where students cycle through these stages as they work on projects (Kim & Park, 2023).

### **3.** Communicative Language Teaching (CLT) The principles of Communicative Language Teaching (CLT) emphasize the importance of interaction and communication in language learning. PBL aligns with CLT by providing students with opportunities to use Arabic in authentic, communicative contexts (Sarfraz et al., 2015). The increased student engagement and improved speaking skills observed in the

study support the CLT approach, which advocates for language learning that is centered around meaningful communication rather than rote memorization (Cloudia Ho, 2020).

### 4. Authentic Learning Theory

Authentic Learning Theory posits that learning is more effective when students are engaged in tasks that are relevant and meaningful to their real lives. The study's results indicate that students who participated in PBL found the projects to be relevant and motivating (Cooper et al., 2005). This relevance enhances their engagement and facilitates deeper learning. By working on projects that mimic real-world tasks and challenges, students are able to apply their language skills in practical situations, which reinforces their learning and improves their speaking abilities (West, 2023).

### **Implications for Practice**

The positive impact of PBL on Arabic speaking skills has several practical implications. Firstly, it suggests that integrating PBL into language curricula can lead to more engaging and effective language instruction. Educators should consider incorporating project-based activities that align with students' interests and real-life applications of the language. This approach not only improves language proficiency but also fosters critical thinking and problem-solving skills. Additionally, the alignment of PBL with contemporary educational theories underscores its value as an instructional strategy. By creating learning environments that emphasize active engagement, real-world relevance, and communicative practice, educators can better support students in achieving their language learning goals.

In conclusion, the findings of this study provide strong support for the effectiveness of Project-Based Learning in enhancing Arabic skills. The alignment speaking with Constructivist Theory, Experiential Learning Theory, Communicative Language Teaching, and Authentic Learning Theory highlights the theoretical and practical benefits of this approach. As such, PBL represents a valuable pedagogical strategy for improving language education and preparing students for real-world communication challenges.

### CONCLUSION

The research demonstrates that the implementation of Project-Based Learning (PBL) significantly enhances Arabic speaking skills among 11th-grade students at SMAN 1 Prava. The positive outcomes observed in fluency, accuracy, and overall communication abilities underscore the effectiveness of PBL in providing a dynamic and engaging learning experience. By integrating real-world projects into the curriculum, students were able to connect their language learning to practical applications, which fostered deeper understanding and improved their speaking proficiency. The study's findings are consistent with various educational theories, including Constructivist Theory, Experiential Learning Theory, Communicative Language Teaching, and Authentic Learning Theory. These theoretical frameworks support the notion that active, contextually relevant, and communicative learning experiences are crucial for effective language acquisition. The alignment with these theories highlights the educational value of PBL in addressing the challenges associated with traditional language teaching methods and providing a more engaging and effective learning environment.

### Recommendations

- 1. Expand the Use of PBL: Based on the positive outcomes of this study, it is recommended that SMAN 1 Praya and other educational institutions consider expanding the use of Project-Based Learning in their Arabic language curricula. This approach should be integrated more broadly to ensure that all students have the opportunity to benefit from the engaging and practical learning experiences that PBL offers.
- 2. Professional Development for Educators: To maximize the effectiveness of PBL, educators should receive training and support in implementing this instructional strategy. Professional development programs should focus on designing and managing PBL activities, assessing student outcomes, and integrating PBL with existing curriculum goals.
- 3. Develop and Share PBL Resources: Educators are encouraged to develop and share resources and best practices for PBL in language education. Creating a repository of successful PBL projects and strategies can help teachers

effectively incorporate this approach into their classrooms and enhance the quality of language instruction.

4. Conduct Further Research: Future research should explore the long-term impacts of PBL on language proficiency and other skills, as well as its effectiveness in diverse educational Comparative studies between settings. different instructional methods and longitudinal research on PBL's impact on language acquisition can provide additional insights and contribute to the ongoing improvement of language education practices.

By adopting these recommendations, educational institutions can build on the positive findings of this study and work towards creating more effective and engaging language learning environments.

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### REFERENCES

- Botsis, A., Görtz, C., & Sakellaris, P. (2024). Quantifying qualitative survey data with panel data. *Journal of Economic Dynamics and Control*, *167*, 104929. https://doi.org/10.1016/j.jedc.2024.10492 9
- Brodeur, M., Audette-Chapdelaine, S., Lavoie, N., Devault-Tousignant, C., Auger, A.-M., Morvannou, A., Légaré, A.-A., Monson, E., Jutras-Aswad, D., & Hudon, C. (2023). A call for qualitative and mixed-methods research on gambling and cannabis. *Addictive Behaviors Reports*, 17, 100494. https://doi.org/10.1016/j.abrep.2023.1004 94
- Chuah, S.-H., Feeny, S., Hannan, T., Hoffmann, R., & Neelim, A. (2024). Qualitative versus quantitative impact communications in humanitarian appeals: Findings from a field experiment.

*Economics Letters*, 111923. https://doi.org/10.1016/j.econlet.2024.111 923

- Cloudia Ho, Y.-Y. (2020). Communicative language teaching and English as a foreign language undergraduates' communicative competence in Tourism English. *Journal* of Hospitality, Leisure, Sport & Tourism Education, 27, 100271. https://doi.org/10.1016/j.jhlste.2020.1002 71
- Cooper, C. D., Scandura, T. A., & Schriesheim, C. A. (2005). Looking forward but learning from our past: Potential challenges to developing authentic leadership theory and authentic leaders. *The Leadership Quarterly*, *16*(3), 475– 493.

https://doi.org/10.1016/j.leaqua.2005.03.0 08

- Creswell, J. W., & J. David Creswell. (2022). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* (Sixth Edition). Department of Family Medicine, University of Michigan, USA; Carnegie Mellon University, USA.
- Derakhshan, A., Teo, T., & Khazaie, S. (2024). Is game-based language learning general or specific-oriented? Exploring the applicability of mobile virtual realities to medical English education in the middle east. *Computers & Education*, 213, 105013. https://doi.org/10.1016/j.compadu.2024.1

https://doi.org/10.1016/j.compedu.2024.1 05013

- Filieri, R., Alguezaui, S., Galati, F., & Raguseo,
  E. (2023). Customer experience with standard and premium Peer-To-Peer offerings: A mixed-method combining text analytics and qualitative analysis. *Journal of Business Research*, 167, 114128. https://doi.org/10.1016/j.jbusres.2023.114 128
- Hady, R., & Nasri, U. (2023). Innovative Learning: Utilizing Card Sort Media to Amplify Arabic Vocabulary Understanding in NW Lenek Junior High School. Jurnal Ilmiah Profesi Pendidikan, 8(3), 1982–1987. https://doi.org/10.29303/jipp.v8i3.2101
- Hung, L.-Y., Wang, S.-M., & Yeh, T.-K. (2023). Kolb's experiential learning theory and marine debris education: Effects of

different stages on learning. *Marine Pollution Bulletin*, *191*, 114933. https://doi.org/10.1016/j.marpolbul.2023. 114933

- Kim, M., & Park, M. J. (2023). Absorptive capacity in entrepreneurial education: Rethinking the Kolb's experiential learning theory. *The International Journal* of Management Education, 21(3), 100873. https://doi.org/10.1016/j.ijme.2023.10087 3
- Liu, Y., Zhang, J., & Tang, H. (2024). Deciphering the environmental values behind green purchasing: A mixed-method exploration through regression analysis and fuzzy set qualitative comparative analysis. *Journal of Cleaner Production*, *436*, 140570. https://doi.org/10.1016/j.jclepro.2024.140 570
- Lourenço, O. (2012). Piaget and Vygotsky: Many resemblances, and a crucial difference. *New Ideas in Psychology*, *30*(3), 281–295. https://doi.org/10.1016/j.newideapsych.20 11.12.006
- Manan, A., & Nasri, U. (2024). Tantangan dan Peluang Pendidikan Bahasa Arab: Perspektif Global. Jurnal Ilmiah Profesi Pendidikan, 9(1), 256–265. https://doi.org/10.29303/jipp.v9i1.2042
- Maor, R., Paz-Baruch, N., Grinshpan, N., Milman, A., Mevarech, Z., Levi, R., Shlomo, S., & Zion, M. (2023). Relationships between metacognition, creativity, and critical thinking in selfreported teaching performances in projectbased learning settings. *Thinking Skills* and Creativity, 50, 101425. https://doi.org/10.1016/j.tsc.2023.101425
- Marnewick, C. (2023). Student experiences of project-based learning in agile project management education. *Project Leadership and Society*, 4, 100096. https://doi.org/10.1016/j.plas.2023.10009 6
- McCoy, W. N., DeCuir-Gunby, J. T., & Macias,
  A. J. (2022). Qualitative and mixed methods. In *Reference Module in Neuroscience and Biobehavioral Psychology* (p. B9780323960236000178). Elsevier. https://doi.org/10.1016/B978-0-323-96023-6.00017-8
- McCoy, W. N., DeCuir-Gunby, J. T., & Macias, A. J. (2024). Qualitative and mixed

Arifrabbani et al., (2023). **Jurnal Ilmiah Profesi Pendidikan,** 8 (2): 1359 – 1366 DOI: <u>https://doi.org/10.29303/jipp.v8i2.2660</u>

methods. In *Reference Module in Neuroscience and Biobehavioral Psychology* (p. B9780323960236000178). Elsevier. https://doi.org/10.1016/B978-0-323-96023-6.00017-8

- Montangero, J. (2015). Piaget, Jean (1896–1980). In International Encyclopedia of the Social & Behavioral Sciences (pp. 114–119). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.61107-8
- Murgu, S. D., Kurman, J. S., & Hasan, O. (2018). Bronchoscopy Education. *Clinics in Chest Medicine*, 39(1), 99–110. https://doi.org/10.1016/j.ccm.2017.11.002
- Nasri, U. (2019). *Philosophy is Mother of Science: Pengantar Filsafat.* CV. Haramain Lombok.
- Nasri, U. (2023a). Exploring Qualitative Research: A Comprehensive Guide to Case Study Methodology. *Al-Hikmah: Jurnal Studi Islam*, 4(3), 72–85.
- Nasri, U. (2023b). *Philosophy of Education*. CV. Haramain Lombok.
- Nasri, U., Nuha, U., & Nabila, Y. (2024). Literature Review And Practical Guide: Bibliographic Research Method In The Formation Of Conceptual Framework. *BIMSALABIM: Jurnal Ilmiah Ilmu Pendidikan Dan Pembelajaran*, 1(1), 10– 16.
- Nyamekye, E. (2024). Efficacy as a Predictor of Constructivism in Ghanaian Language Teaching: A Structural Equation Modelling Analysis. https://doi.org/10.2139/ssrn.4721372
- Olsen, W. (2020). Triangulation in Social Research: Qualitative and Quantitative Methods Can Really Be Mixed.
- Pan, A.-J., Lai, C.-F., & Kuo, H.-C. (2023). Investigating the impact of a possibilitythinking integrated project-based learning history course on high school students' creativity, learning motivation, and history knowledge. *Thinking Skills and Creativity*, 47, 101214. https://doi.org/10.1016/j.tsc.2022.101214
- Pupik Dean, C. G., Grossman, P., Enumah, L., Herrmann, Z., & Kavanagh, S. S. (2023). Core practices for project-based learning: Learning from experienced practitioners in the United States. *Teaching and Teacher Education*, 133, 104275. https://doi.org/10.1016/j.tate.2023.104275

- Qi, C., Lai, M. Y., Liu, L., Zuo, S., Liang, H., & Li, R. (2023). Examining teachers' learning through a project-based learning lesson study: A case study in China. *International Journal for Lesson & Learning Studies*, 12(1), 106–119. https://doi.org/10.1108/IJLLS-09-2022-0127
- Quibrantar, S. M., & Ezezika, O. (2023). Evaluating student engagement and experiential learning in global classrooms: A qualitative case study. *Studies in Educational Evaluation*, 78, 101290. https://doi.org/10.1016/j.stueduc.2023.10 1290
- Santos, C., Rybska, E., Klichowski, M., Jankowiak, B., Jaskulska, S., Domingues, N., Carvalho, D., Rocha, T., Paredes, H., Martins, P., & Rocha, J. (2023). Science education through project-based learning: A case study. *Procedia Computer Science*, *219*, 1713–1720. https://doi.org/10.1016/j.procs.2023.01.46 5
- Sardana, N., Shekoohi, S., Cornett, E. M., & Kaye, A. D. (2023). Qualitative and quantitative research methods. In *Substance Use and Addiction Research* (pp. 65–69). Elsevier. https://doi.org/10.1016/B978-0-323-98814-8.00008-1
- Sarfraz, S., Mansoor, Z., & Tariq, R. (2015). Teachers' and Students' Perceptions of the Communicative Language Teaching Methodology in the CALL Environment: A Case Study. *Procedia - Social and Behavioral Sciences*, 199, 730–736. https://doi.org/10.1016/j.sbspro.2015.07.6 04
- Seo, S., Van Orman, D., Beattie, M., Paxson, L., & Murray, J. (2023). Breaking down the silos: Student experience of transformative learning through interdisciplinary projectbased learning (IPBL). Journal of Hospitality, Leisure, Sport & Tourism Education, 32, 100440. https://doi.org/10.1016/j.jhlste.2023.1004 40
- Von Behren, S., Chlond, B., Barthelmes, L., Heinze, A., & Vortisch, P. (2024). Mixedmethod approach to compare travel surveys as preliminary work for individual matching. *Transportation Research Procedia*, 76, 429–444.

https://doi.org/10.1016/j.trpro.2023.12.06 6

- Wallwey, C., & Kajfez, R. L. (2023).
  Quantitative research artifacts as qualitative data collection techniques in a mixed methods research study. *Methods in Psychology*, 8, 100115. https://doi.org/10.1016/j.metip.2023.1001
- Wang, T., Xie, C., You, Q., Tian, X., & Xu, X. (2023). Qualitative and quantitative analysis of four benzimidazole residues in food by surface-enhanced Raman spectroscopy combined with chemometrics. *Food Chemistry*, 424, 136479.

https://doi.org/10.1016/j.foodchem.2023.1 36479

- Wang, Y. (2023). The role of computer supported project-based learning in students' computational thinking and engagement in robotics courses. *Thinking Skills and Creativity*, 48, 101269. https://doi.org/10.1016/j.tsc.2023.101269
- West, J. (2023). Utilizing Bloom's taxonomy and authentic learning principles to promote preservice teachers' pedagogical content knowledge. Social Sciences & Humanities Open, 8(1), 100620. https://doi.org/10.1016/j.ssaho.2023.1006 20