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Investigating Student Generated Content & Co-Creation Learning's Outcomes and Impacts:

Wiki Public Administration

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I. Content

1. Research Motive and Purpose

Through the implementations of the MOE teaching research grants, the PI has discovered potential mechanisms for simulating students' learning motivation and interests: (1) students have higher motivation and learn more when they are asked to create the learning content; (2) students have higher motivation and learn more when knowing the impacts of the content; (3) students have higher motivation and learn more. However, in the previous projects, the processes of student generated content, such as their fundraising plans and event creation planning, were complex and opaque. Also, there were problems that students' contributions varied. To resolve those challenges, the PI intends to investigate further how student generated content learning approaches could enhance students' learning motivation and learning outcomes through this project.

As Kennedy et al. (2015) pointed out, "Wikipedia's platform provides unique learning opportunities: a method for students to share what they have learned publicly; explicit encouragement to reference sources; a large user community that can provide immediate feedback and discussion; public presentation of research; and an increasingly useful skillset for writing in business, government, and research." Furthermore, Wikipedia is the first source for students to learn about a new topic and is thus familiar to students. In particular, previous studies show that wiki improves the followings: better performance because of the peer review, work quality, collaboration, languages, critical thinking, Wikipedia knowledge and skills, and creativity (Trocky et al. 2016).

The purpose of this research grant proposal is therefore to investigate how technology-mediated student generated content can enhance students' learning motivation and outcomes. Specifically, this study proposes to adopt an online student generated content platform, Wikipedia, to create content in introductory public administration classes. Through this assignment, students will work jointly to create fundamental public administration concepts from a selected list by creating a 5-page report with additional figures, tables, and references. Our study adopt a mixed method to assess the outcomes and impacts from the adoption of a technology-mediated student generated content approach through Wikipedia assignment. In the mixed method, we will adopt the following two assessment methods: (1) pre- and post-survey; (2) stakeholder assessments from focus groups.

2. Literature Review

To implement co-creation learning approach, this study proposes that instructors in introductory public administration classes use Wikipedia as part of a classroom assignment. Our systematical theoretical review of 47 articles from 2008 to 2020 show Wikipedia's setting provides unique learning opportunities and has been adopted as a teaching tool in various disciplines in political science (Kennedy et al. 2015), science in library and information management (Chu 2008; Chu et al. 2013), English writing (Miyazoe and Anderson 2010), medicine (Sampaio-Maia et al. 2014), nursing

(Trocky et al. 2016), science education (Lawrie et al 2016), computer science (Nejkovic and Totic 2014), engineering (Wu et al. 2015), chemistry (William et al. 2010), management (Chu 2008), etc. Our review shows that Wikipedia or similar wikis application have been adopted in the higher education to support active and collaborative learning in a cost-effective way.

A recent review by Trocky et al. (2016) (Table1) shows that adoption of wikis on student learning increased: (1) learning motivation and action (Salaber 2014; Wang 2014; Wheeler and Wheeler 2009), (2) writing skills (Alshumaimeri 2011; Chao and Lo 2011); (3) collaborative skills (Elola and Oskoz 2010; Ioannou 2011; Ioannou et al. 2015); (4) learning outcomes and knowledge acquisition (O'Bannon and Britt 2012; Ras and Rech 2009; Wichmann and Rummel 2013). Wheeler and Wheeler (2009) show that students put more effort in their writing because their peers would read their contribution. Similarly, Wang (2014) show that wiki assignment increases students' motivation to learn English in Taiwan. Because wikis preserve the edits and changes from the contributors, it makes the learning process transparent to the peers and instructors. Therefore, studies show that wikis adoption increase writing and collaborative skills because one can observe how others approach or describe a topic (Alshumaimeri 2011; Elola and Oskoz 2010). Also, because wikis increase participation and opportunity for active learning, it further enhances learning outcomes (e.g. O'Bannon and Britt 2012).

Furthermore, the review shows substantial impacts were made beyond the classroom through adoption of wikis, including applying communication skills adopted from co-creation to patient care (Stephen et al. 2013), sharing of information in international students' own countries' context (Strickland et al. 2013), and for future references of the co-creation content by students and stakeholders (O'Bannon and Britt 2012; Kennedy et al. 2015), to name just a few. For instance, in a multi-disciplinary study, it showed that wiki facilitated the skills to share information about others' disciplines and unique contributions that the nurse and radiographer students could apply to their patient care and future learning. In another interesting study, 22 undergraduate students from different international backgrounds in the class reported that their learning satisfaction came from the opportunities to share the topic in their own countries' contexts. The Wikipedia pages co-created by political science students on the US elections has high viewing rates and visits even until now (Kennedy et al. 2015).

Further outcomes can be observed in practical experiments carried out by some literatures. Bates and McBride (2012) pointed out that wiki's peer review function can help students acquire a better understanding of the content by answering their peers' authorized questions and giving feedback. The authors employed the PeerWise online system that allows students to author their multiple-choice assessment questions as well as answer and comment on those created by their peers. They can also seek help from their peers if coming across any difficulties. They found that the students were in general agreement that their understanding of the course topics is improved by doing PeerWise. It is also clear that even those students who have lower activity in doing PeerWise attain better outcomes on the end of course examination. Chu et al. (2013) suggested that collaborative features make it easier for users to contribute their own knowledge to a knowledge-based platform, and formed a knowledge-creating company. The creation of a knowledge-creating platform helps students

precipitate brainstorming activities and increase collaborative problem-solving skills.

Wiki learning also plays a big role in crowdsourcing content creation and peer interactive learning outcomes. Self-generated information is proven to be more effectively remembered, leading to a more efficient learning outcome (Hills. 2015). Likewise, Goh et al. (2019) reiterates the correlation between peer review and improving learning outcomes. The author finds that through the peer review process, the learners create a self-assessment skill to respond to peer feedback, and analyze those feedbacks to improve themselves. One student in Cassell (2018)'s Wiki teaching project commented, "Knowing that by creating an article I would be inviting others to add to and criticize my work, I was more mindful about the quality and organization of my article." Moreover, Cassell (2018) also discovered that when the instructors are to deal with controversial topics in teaching, Wiki can serve as a mediator to alleviate challenges that typically occur when teaching about controversies, and thus leads to healthier discussions.

Timperley (2020) brought to light three significant outcomes of Wiki teaching: First, students can have a better understanding of how Wikipedia entries are created and how to engage with the medium. Second, their working experience on Wiki also acquainted them with how source quality affects research validity. Last, students expressed huge excitement with their assignments for the fact that the assignments involved "real-world" applications. The students also garnered a strong sense of satisfaction when they know their accomplishments will be viewed by people around the world. Some students have suggested that creating Wiki entries provided them with skills such as writing for a public audience and critical analysis, which can be good advantages in job interviews. Several other literatures also denote that Wiki learning generally enhances students' learning outcomes, such as Kayaalp et al (2020). Table 2 summarizes the outcomes and related studies that adopted wiki or content co-creation into classes.

However, prior studies that investigated linkages between adoption of Wikipedia or similar wiki tools mainly adopted case study and focus group interviews (e.g. Wheeler and Wheeler 2009; Wang 2014), experiments and surveys (e.g. Alshumaimeri 2011; Ras and Rech 2009), or mixed methods (e.g. Ioannou 2011; Salaber 2014). While those methods are sophisticated and sufficient to establish linkages between the adoption of Wikipedia and learning motivation, outcomes and impacts. There are some limitations in assessing the actual quality of the co-creation content and actual levels of participation in content creation by students. Such issues have also been reported by prior studies regarding quality of content and fairness (Kennedy et al. 2015). To resolve this issue, our study will further incorporate machine learning to assess the quality of content and level of participation by adopting a supervised and unsupervised learning techniques, adopted by Tucker et al. (2014). In the next session, we will further discuss our study design and assessment methodology.

Table 1: Existing empirical studies on adoption of wiki on outcomes

(modified from Trocky et al. 2016)

No.	Outcomes	Design	Sample Size	Key Findings	Authors, Year, Setting
1	Better performance because of the peer review and question generation	Case study	197/188 students in Physic 1&2	Students with higher levels of activity in the system scored significantly higher marks on the exam; this effect was seen for students of lower ability as well as for the highest performing students.	Bates et al. (2012) UK
2	Work quality improved, active learning facilitated	Case study	One group with MediaWiki (n=21) and the other with TWiki (n=16) in Information Behavior course	The findings indicate that both wikis were regarded as suitable tools for group projects, and that they improved group collaboration and work quality. Both wikis were also viewed as enabling tools for knowledge construction and sharing.	Chu et al. (2012) Hong Kong
3	Online collaboration, foreign languages, critical thinking enhanced	Case study	36/21/18 students in 2011/2012/2013 in a language exchange project	This study demonstrated that online intercultural collaboration projects provide language learners with an opportunity to learn not only about the target language culture, but also about the people who live in that culture. It also provides specific tips for conducting successful, online intercultural exchanges project.	Forsythe, E. (2014) Japan
4	Creative content, the outcome is shown with a website link in the article	Case study	98 students (72 females, mean age=21) students in Cognitive Psychology	The article found that direct instruction has its benefits; however, the article introduces several reasons to promote crowdsourcing content creation such as a production system that allows students to create their own choices or a learner-oriented production environment that facilitates a sense of ownership. Moreover, production environment directly motivates students to make sense of the world they live in, an idea at the core of constructivist theory.	Hills (2015) UK

5	Final research scores higher than first ones	Case study	45 students in a course on research methods	This study highlights that the engagement in providing peer feedback exerts an indirect effect on learning outcomes through learner-content interaction. Learner-content interaction fully mediates the causal relationship between engagement in providing peer feedback and learning outcomes.	Goh et al. (2019) Malaysia
6	Led to healthy discussions in class and on the talk pages	Descriptive	A course named The Politics of Inequality	This article used wiki as a tool to teach controversial political issues in reality world. The article found that wiki can be a great tool to avoid intense discussion inside the classroom. It also discovered that Wiki might be a tool that can lead to healthy discussions.	Cassell (2018) USA
7	Nuanced understanding of Wiki entries construction; source quality and research validity relation; generating excitement	Descriptive	An upper-level undergraduate course on New Zealand politics	Student feedback reports that the students had a more nuanced understanding of how Wikipedia entries are constructed, the epistemologies that it privileges, and a better Peer review is the foundational premise of Wikipedia; Many suggested that they became skeptical consumers of Wikipedia content, and acquired an improved ability to judge the credibility of the information presented on the internet.	Timperley (2020) New Zealand
8	Enhancing critical thinking on social science topics	Mixed methods	34 teachers studying at the 4th Grade at the School of Social Studies Teaching	The findings demonstrate that the levels of critical thinking skills of prospective Social Studies teachers showed a remarkable improvement within four weeks.	Kayaalp (2020) Turkey

3. Research Question

The following are three main research questions of this research:

- (1) *What is the effect of co-creation learning approach on learning motivation?*
- (2) *What is the effect of co-creation learning approach on learning outcomes?*
- (3) *What is the impact of co-creation learning approach on other relevant stakeholders?*

4. Research Methodology

To systematically assess the outcomes of adopting student generated content through Wikipedia assignment, this study will adopt a survey instrument developed by Goh et al. (2019). Goh et al.'s (2019) survey instrument not only includes questionnaires to measure content creation process and outcomes, they also include measurement of participation in peer review. Given that peer review is also essential for collaborative learning, our study will modify their measurements and questionnaires to fit our study content. Therefore, this study will adopt a set of pre- and post-survey to measure: participation in public administration content generation, participation in editing peers' content, students' interaction process, learning motivation, and learning outcomes. In particular, we will include the learning outcome measurement developed by Altanopoulou et al. (2015), which has been widely included in the assessment of wiki use for learning in various fields (Bower 2017; Pimlott and Tikasingh 2020; Teng et al.). This project-based assignment will last for 16-week. Students will be invited in the beginning and last lesson of the course to complete self-administrated questionnaires through SurveyCake.

We have also invited 8 professors who have experienced in teaching public administration from 7 different universities to evaluate Wikipedia articles wrote by the students. To systematically evaluate students' co-created work, we have included 12 questions in an online questionnaire by google form.

(1) . Research Design

Student generated content plays an important part of the learning process in these courses. Adopting the student generated content approach increases students' engagement and participation during the learning process and therefore stimulate learning interesting, increase attention, and learning outcomes (Collis 2008). During the co-creation learning process, students will also acquire analytical, communication, collaboration, and integration skills in order to complete the designed tasks (Collis 2008).

(2) . Research Object

The study has been implemented at the National Taiwan University. The participants will be

about 33 undergraduate public administration students enrolled in a one-year public administration fundamental courses. The public administration courses are carried over two semesters and are the required courses for students who major in public administration. The students mainly study in the Social Sciences college and the Law college. Two students came from the College of Engineering. Two students came from the College of Business. Students' ages are 20-23. At the pre-survey, we also evaluated students' computer skills to see how much assistance they should receive in terms of technical issues. The students' answers are transformed into digital values ranging from 1 to 5 in accordance with the answer options "I don't know what you mean by this", "With help from a technician", "With help from someone I know", "With some difficulty", and "Easily". As figure 1 shows, the students generally have good commands on computer skills such as using a browser, upgrading an operating system or downloading a file, in which the average values are close to 5 or exactly 5. However, as for advanced skills like installing a home network, protecting computers from cyber-attacks, installing a program or updating computer operating system, the students are shown to have some difficulties, or need the help from others, with average values less than 4.5.

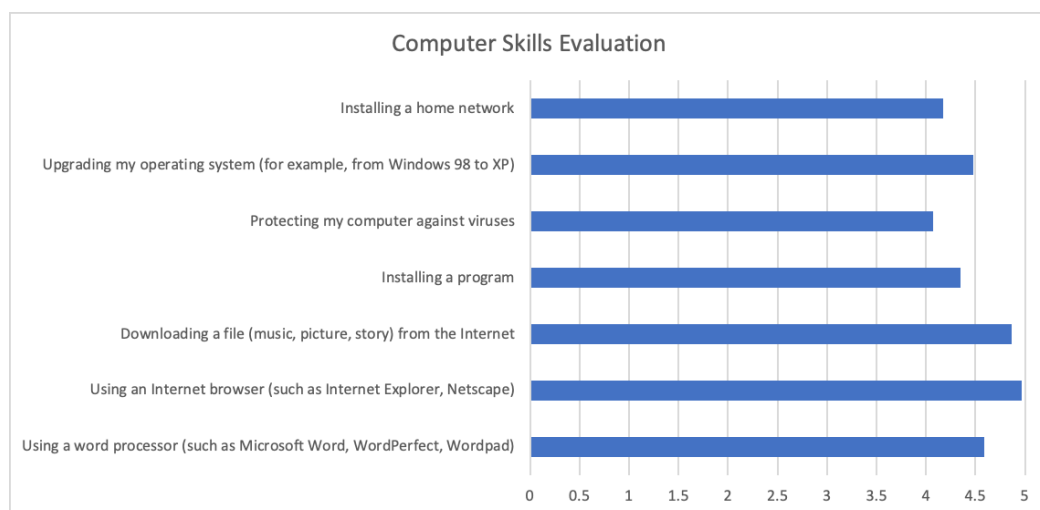


Figure 1: Computer Skills

(3) . Research Tools

The survey is constructed to evaluate students' learning outcomes, as shown in **Appendix I**. In the first section, we evaluate students' familiarity with computers. In particular, we design questions to identify students with difficulties using computers and then provide them with instructions if necessary. Second, since motivation serves as an important factor in encouraging content generation (Donlon et al. 2020), we include several questions to see what factors facilitate student's participation and motivate them to generate content. Additionally, early research has also pointed out that Internet publication could help students cultivate better writing skills (Cohen & Riel, 1989). Forte and Bruckman (2006) found that students tend to use peer evaluations to revise their reasoning and writing. Consequently, we also design questions concerning students' writing abilities to see how well the students can write at the beginning of the project and how much they consider writing as a necessary skill in life (Forte and Bruckman 2006).

As outcomes, we first evaluated students' understanding of Wikipedia by asking them to do self-evaluation on their Wiki skills. Students' initial levels of Wikipedia understanding helped us calculate how much improvement they have made by working with Wikipedia at the end of the project. Knowing students' grasp of Wiki tools also enabled instructors to offer help when they come across problems. Furthermore, we looked into student's learning outcomes. Since this class aimed to familiarize students with major theories and content in public administration, we surveyed students' understanding of major functions of public administration, such as policy network, and governance in the public sector. Also, students were expected to have a better understanding of how public administration is practiced in real life and to apply public administration framework and tools to deal with real-life public affairs at the end of the semester. Therefore, we formulated several questions to evaluate their learning outcomes in the context of public administration.

Finally, understanding students' Wiki learning experience helped us revise our project and rectify any possible mistakes. By studying the usefulness of Wiki learning, we can further extrapolate key features that only Wiki can offer but not the ordinary lecture-based class. We also examined students' willingness to contribute to Wiki community after the project to see if their learning experience with Wiki acutely encourages them to contribute more to academic community instead of stopping here (Camacho et al. 2016). Finally, we asked students to give us some feedback on the design of the project and whether they would like to change any aspects of it. Students were allowed to directly put their opinions into words in this section. We adopted a five-scale answer options from "very high" to "very low".

(4) . Data Analysis

After the data collection was complete, we compared the average scores for each question in the pre- and post-surveys. We have also reported the average scores for the 12 evaluation questions by the 8 professors. To protect the privacy of the students, we collected the data anonymously, all data or information has been stored with a unique number and no name is preserved in the database. All the results are presented in an aggregated form without disclosure of any students' names.

(5) . Research Procedures

The research procedures and Wikipedia learning activities are shown in Table 3.

Table 2: Wikipedia Learning Activity and Schedule

(Topic and Reading are based on Wikipedia Foundation Guide book)

Week	Topic	Reading	Activity
1	Wikipedia essentials	Handout: "Welcome to Wikipedia" brochure	Design and Conduct pre-survey
2	Editing basics	Handouts: "Using talk pages" handout and "Evaluating Wikipedia article quality" brochure	Google Wiki Group
3	Exploring the topic	Handouts: "Advice for choosing articles" and "How to get	Theory selection

	area	help”	
4	Using sources	Handouts: “Referencing on Wikipedia” and “Understanding Wikipedia’s copyright policy”	Research skills
5	Choosing articles	Activities: Discuss the range of topics students will be working on and strategies for researching and writing about them.	Topic selection/ writing research summaries
6	Drafting starter articles	Activities: Narrow it down to top three theories and begin research	Tutorial discussion/case discussion
7	Class presentations	Students give in-class presentations about their experiences editing Wikipedia.	In-class presentation
8	Moving articles to the main space	Handout: “Moving out of your sandbox”	Tutorial discussion/debate
9	Building articles	Handouts: “Illustrating Wikipedia: A guide to contributing content to Wikimedia Commons”	Tutorial discussion
10-12	Getting and giving feedback	As a group, have the students offer suggestions for improving one or two of the students’ articles	Google Wiki Group Review
13	Responding to feedback	Make edits to your article based on peers’ feedback.	30-minutes tutorial discussion
14	Class presentations	Students give in-class presentations about their experiences editing Wikipedia.	In-class presentation
15	Final Draft	Publish by the Wikipedia	Conduct post-survey

Furthermore, in each class, we spent about 30 minutes out of 100-minute class to walk through the making of Wikipedia page with the students in groups. Below is the Wikipedia assignment guidelines and tips. Also, we follow the guidelines published by the Wikimedia foundation to help students produce high quality Wikipedia content, as mentioned above.

Appendix A
Wiki Page Assignment Guidelines and Tips

Length, Style, and format

- 3-4 pages (no more than 1000 words)
- Memos must be typed on 8.5 X 11” or A4 paper with margins of one inch on all sides.
- Paragraphs should be single-spaced
- You may use any standard conventions for the layout of your memo, including numbering, bullets, indentation, etc. Do address the memo to your audience at the top of the page. See the attached sample for a suggested layout.
- Note: You are encouraged to include your analysis table, graph, or figure to strength your arguments.

Sample Grading Structure

In grading a “research and write an article” type of assignment, the following grading rubric has been successful:

5% (*4)	Participation grade for early Wikipedia exercises
10%	Participation in class blog or class discussions
10%	Peer reviews and collaboration with classmates
50%	Quality of your main Wikipedia contributions
10%	Reflective essay

5. Teaching and Learning Outcomes

(1) . Co-production of Wikipedia Articles

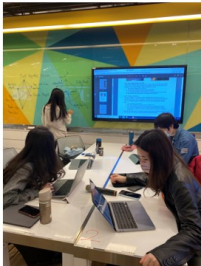
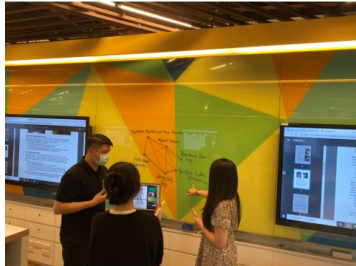
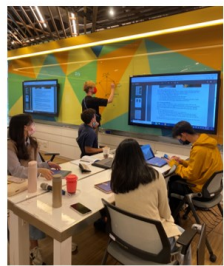
As Table 3 shown, we have planned 30-40 minutes per class for creating Wikipedia articles related to public administration theories and policies. In order to give students sufficient knowledge and skills to produce their Wikipedia articles, we adopted case studies, simulations, and debate during the class for them to obtain PA knowledge, theories, and managerial skills. For instance, we adopted a simulation of public policy network building for students to apply their knowledge of collaborative governance and public network into practices. In the simulation, they needed to create a network according to the case and discuss alternation of the network according to the situation, as shown in the upper part of the Figure 2. One of the group applied this knowledge learned from the case to produce an article on the contact information registration network, as shown in the lower left corner of the Figure 2.

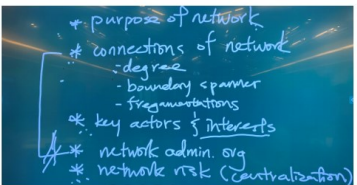


Step 4: Discuss initial questions and tasks
After you have mapped out this network, take a few minutes to discuss the following questions with your group. Then be prepared to discuss your responses with the rest of the class. Your instructor will lead a group discussion using these questions as guides.

- 1) Is the network "appropriately" connected?
- 2) Has the network cultivated important external relationships?
- 3) Are value-added collaborations occurring in the network?
- 4) Do underlying relationship qualities yield effective collaboration at the point of need?
- 5) Does organizational context support collaboration and momentum?

Step 5: Management Dilemma
Once steps 1 through 4 are completed, continue reading the final section of the case, the "management dilemma". Once your team has each individually read the management dilemma, follow the instructions and make any changes to your network based on this new challenge. After you have mapped out this revised network, discuss the following questions with your group:

- 1) What happened to your network?
- 2) How is each organization affected by this new configuration?
- 3) What changes can you recommend to the collaborative to strengthen the network?
- 4) Do you believe all organizations will remain in the collaborative, given the changes presented in the management challenge, or will they decide to try to solve this dilemma on their own?

Case Discussions of Policy Networks: Identify Network Actors & Construct Networks

Contact Information Registration Network [\[edit \]](#)

With fears of a worsening COVID-19 situation in Taiwan, the cabinet of the central government presented a new Contact Information Registration method, which enabled the government to track down movements and nearby contacts of patients diagnosed with COVID-19.^[4] In order for this application to work, various levels of government cooperated closely on differing levels of contact tracing. The government has opted for a collaborative approach in which central government health authorities work in tandem with local city and county health authorities to provide contact tracing for recorded COVID-19 cases.^[5]

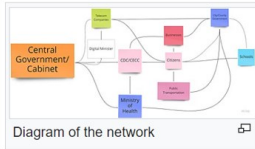


Diagram of the network

Applying Knowledge on Policy Network to Analyzing Contact Information Registration Network & Produce A Wikipedia Article (Students' Wikipedia Article Contact Information Registration in Taiwan)

Figure 2. The Process of Producing Wikipedia Articles

(2) . Pre- and Post-Survey Results

To understand the student's motive for contributing to Wikipedia, we conducted a survey of the students to discern their motivation (Figure 3). The students' answers were transformed into digital values ranging from 1 to 5 in accordance with the answer options "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree". As the Figure 3 shows, the students were motivated to make contributions mainly because they felt it was important to help others, gain experience for future work and they also wanted to contribute to what they think is important.

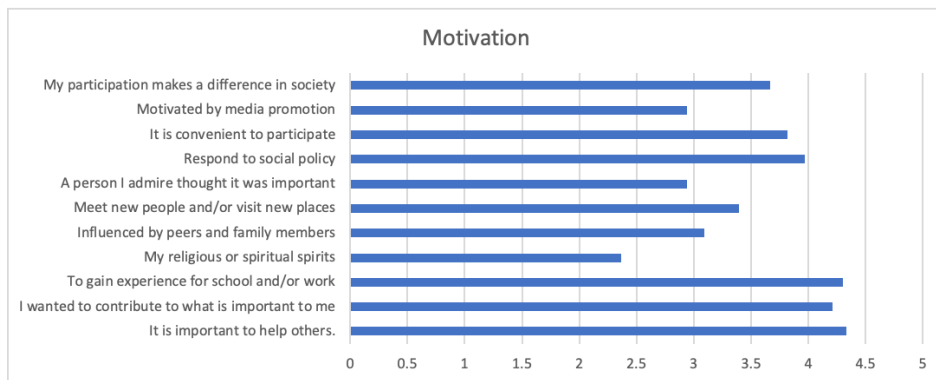


Figure 3. Motivation for Wikipedia Contribution

In the following section of the survey, we evaluated students' basic writing abilities before and after the Wiki project by asking them several questions regarding their writing skills, willingness and preference, as listed above. As shown in the bar chart (Figure 4) below, for the question "I will enjoy if there were more writing assignments in my classes" particularly, there is a significant increase of 0.4 in the post-test. Students gave significantly lower values, decreasing almost by 0.2-0.3, on questions "I write well" and "I learn more from reading about something than writing about it" in the post-test. Notably, the value remains approximately the same on the questions "I would enjoy being a journalist.", "I enjoy writing personal letters or emails to friends or family" and "Skillful writing is necessary for success in my writing."

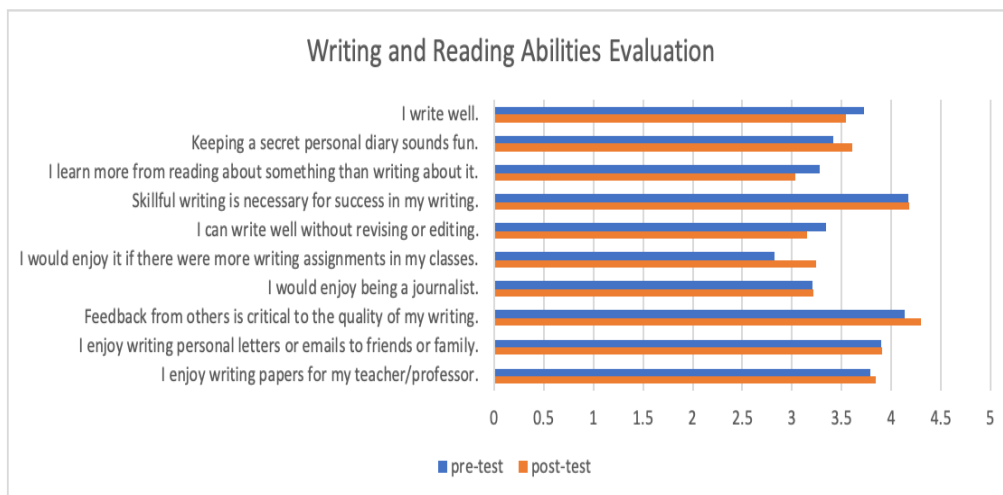


Figure 4. Writing and Reading Ability

In the second section, we examined students' knowledge on Wikipedia before and after the learning project (Figure 5). We can see in the pre-test the students estimated their level of skill at nearly 2.5, which is between "fair" and "satisfactory". After the learning project, the students' level of skill and knowledge significantly increases to around 3.2. The students also predicted in the pre-test that the level of knowledge fitness required of writing Wiki is 3, and the value increases by around 0.2 in the post-test. As for the question "The contribution of writing Wiki to your skill/knowledge level", the students also gave an average prediction of 3.1 and the number significantly increases by around 0.4 in the post-test. On the question "The contribution of writing Wiki to your skill/knowledge of fitness" the data presents a similar result: the actual contribution of writing Wiki is slightly higher than their expectations by 0.3.

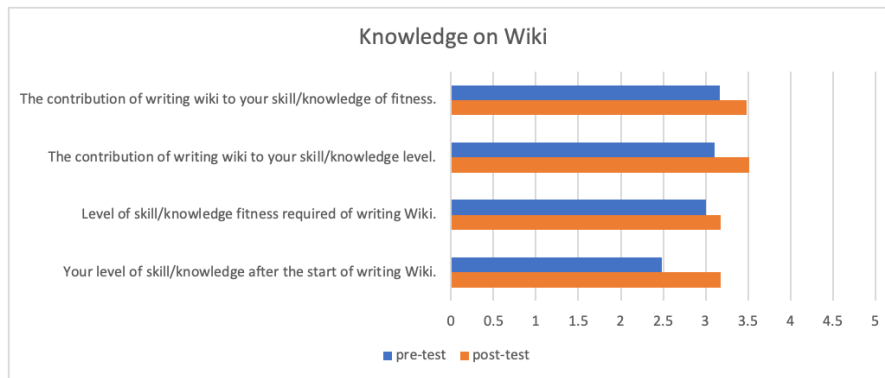


Figure 5. Wikipedia Knowledge

In this section we look into students' PA knowledge change between the two tests (Figure 6). From figure 6, we can see that the students generally gave higher values in the post-test. They gave a 0.24 higher average answer on the question "I can clearly describe major theories and content of public administration", and the similar amount of increase is also shown on the questions such as "I can recognize major functions of public administration, such as policy network, and governance in the public sector" and "I can recognize how the knowledge about public administration is deployed in real-life public sectors". For the question "I can apply different policy tools and framework to examine real-life public affairs in the local and international context", and the question "I can have a better understanding of public affairs by using the theories and content I learned", the students on average gave a 0.18 higher value on that question in the post-test. However, according to the t-test, the improves in scores are not statistically significant (Appendix III).

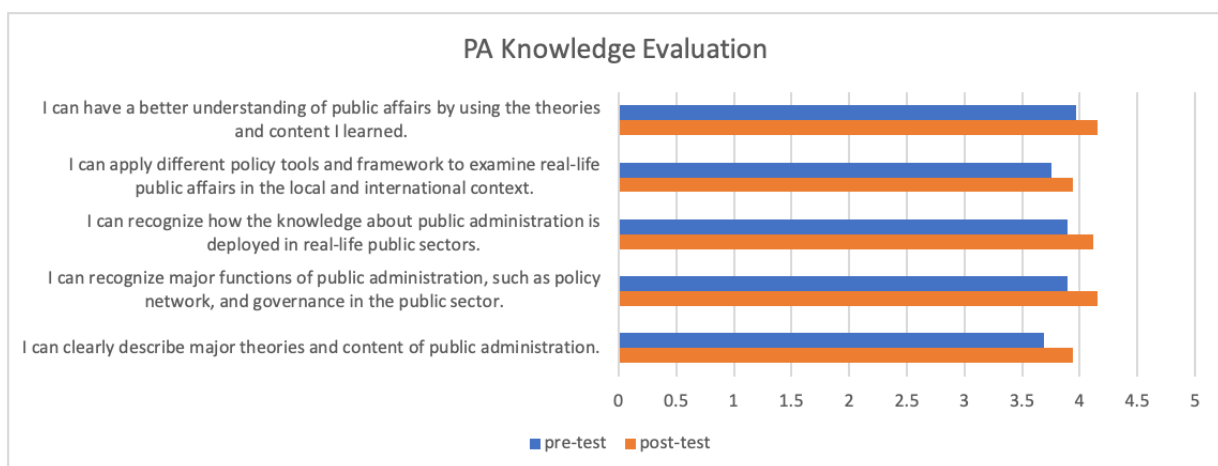


Figure 6. Public Administration Knowledge

In this section which is only included in the post-test, we examine students' Wiki learning experience. The students' answers were transformed into digital values ranging from 1 to 5 in accordance with the answer options "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree". From figure 7 below we can see that most students agreed that the Wiki tool is useful and it promotes team work, acquisition of concepts, the expansion of knowledge and can also be useful in subjects other than PA, with an average value of 4 on each of these questions. Also, on average the students held a positive attitude towards Wiki's content-adding functions, where the students gave an average "Agree" response with the final value being 4. Most of the students held a

neutral or positive attitude towards Wiki tool’s usefulness in other degrees, with an average of 3.87, with only one response below “Neutral”. Overall, the students show an average positive or neutral attitude towards Wiki learning experience.

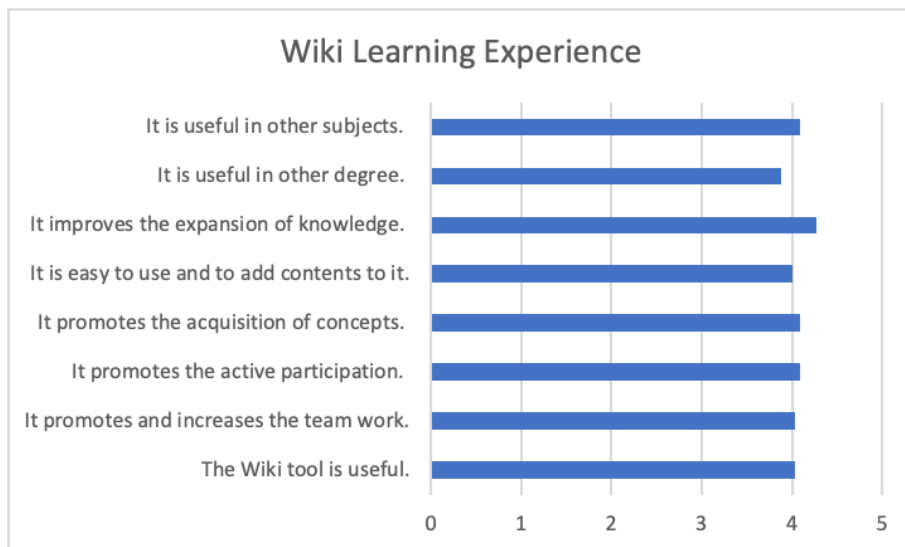


Figure 7. Wikipedia Learning Experiences

In this section we aimed to understand students’ learning results and their attitude regarding the future use of the Wiki tool (Figure 8). The students’ answers were transformed into digital values ranging from 1 to 5 in accordance with the answer options “Strongly Disagree”, “Disagree”, “Neutral”, “Agree”, and “Strongly Agree”. First, the students on average agreed that time adequacy is closely related to the performance of work, with an average value of 3.9 on that question. Second, most of the students held a neutral or positive attitude towards the question “Wiki allows the contact with the teacher”, with no responses below “Neutral”. The similar results can be observed in the question “It allows the contact with colleagues” but it presents a slightly higher value than that of the previous one, in which the average value is around 4.0. On average, the students agreed that Wiki writing allows improving other skills, with an average value of 4. As for the question “I will make reference to the Wiki in the future”, the average value on that question is 3.7, with nine students “Strongly Agree” and five students “Disagree”. Last, the students on average held a neutral attitude on the question “I will contribute to the Wiki in the future”, with the average value of 3.5.

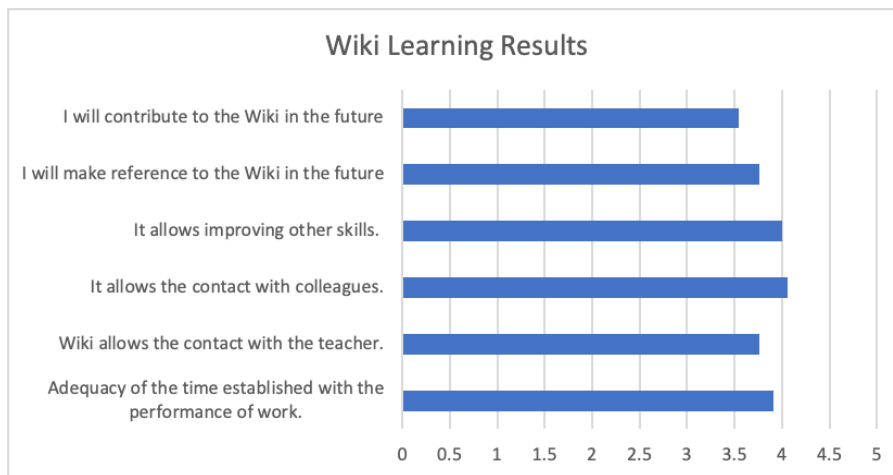


Figure 8. Outcomes from Wikipedia Learning Experience

(3). Evaluations from Public Administration Professors

The professors on average gave a score over 4.0 (out of 5) to the question about the students' understanding of the policies/programs in the articles and to the question about the contributions to Wikipedia about public administration knowledge in Taiwan made by the students' Wiki writing results. The professors gave an exact 4.0 score to the question about whether they would let their students read the articles written by the students in the project. On the other hand, the professors gave an average score of over 3.5 to the questions about the students' understanding of the government sector, the students' abilities to analyze a policy/program/event in regard to public administration, and the fluency and readability of the students writing in the articles. However, the professors gave an average score of 3.28 to the questions about the students' understanding of Public Administration related theories. The scores for the professors' responses are in the following orders: understanding of the policies/programs = contributions > willingness to let their students read the articles > understanding of the government sector > abilities to analyze = the fluency and readability > understanding of Public Administration related theories.

When compared with other first year Public Administration students the professors know, the professors gave an average score of 4.42 to the question about the students' understanding of the policies/programs in the articles and to the question about the students' understanding of the government sector compared with their counterparts. The professors also gave an average score of 4.14 to the questions about the students' abilities to analyze a policy/program/event in regard to public administration in comparison with their counterparts. Finally, the professors gave an average score of 3.71 to the question about the students' understanding of Public Administration related theories compared with their counterparts. The scores for the professors' responses in regard to the comparisons are in the following orders: understanding of the policies/programs = understanding of the government sector > abilities to analyze > understanding of Public Administration related theories.

(4) Student Feedback

After completion of the Wikipedia assignment, students were asked to reflect upon their participation in the assignment. They were asked three questions. Firstly, when preparing their

Wikipedia page, which topic discussed on the course they had found to be most helpful. Secondly, why had this topic been useful to their Wikipedia assignment. Thirdly, how had the named topic be applied to analyze the Wikipedia case that they had written. Their responses, overwhelmingly positive, demonstrate the wide range of outcomes which the Wikipedia assignment produced, some of which correlate with those found by Timperly (2020).

One of the primary objectives of the Wikipedia assignment sought to allow students to put into practice theory which they learnt from lectures. Student responses in regards to this were mixed. Some students found that no specific topic throughout the course had proved helpful to building of their Wikipedia pages. One student stated that the Wiki assignment had largely been about fact finding, rather than implementation or discussion of any particular theory. One student, while not finding any topic of particular benefit, did find the module as a whole helpful to completion of the Wikipedia assignment.

The majority of students, however, were able to point to specific topics in lectures which had contributed to their knowledge and ability to build successful Wikipedia pages. The week which had focused on crowdsourcing was referenced repeatedly, clearly on account of its relevance to Wikipedia as a crowdsourcing platform, and the students' direct participation in a crowdsourcing activity. Leadership and managing of successful organizational changes was also mentioned, as it had enabled effective understanding of leadership within government.

Students could reference specific papers which had influenced his team's Wikipedia project. "[D]uring our discussions our group did realize that the factors proposed by Fernandez and Rainey could still be applied to understand the changes brought about by this initiative/policy". Across the students who stated that the theory learnt in lectures had complemented their Wikipedia assignments, there was a broad range of topics referenced, evidencing the suitability of the assignment to enhancing theoretical learning of multiple topics on the course. The synthesis of lectures and the Wikipedia assignment from the student feedback was highly successful in helping students understand public administration. In the words of one student, "[t]he reciprocal effects of these two learning ways provide me a more comprehensive understanding of the topics."

There also arose from the student feedback a clear positive of the Wikipedia assignment which is its difference with traditional exam and lecture formats of learning and testing. Simulation again formed part of this, as students enjoyed direct application of theory. Students felt that direct application of theory was more worthwhile than memorization for exams which would later be forgotten. They also saw the assignment as a novel way to learn. Part of this positive contrast with traditional examination also concerned the freedom which students had to choose their own topic and pursue their own research materials. One student stated the influence of freedom to choose a topic on his motivation in class, saying 'In my previous studies, I was often severely limited in the choice of topics in term papers and presentations, or had no choice at all in exams. In my personal experience, this had a negative effect on my motivation in some cases, because you couldn't pick the subtopics that interested you the most.'

An unexpected result from the feedback from the Wikipedia assignment was the effect that it

had on the overall development of the students in several ways. Students mentioned how key academic methods had been instilled in them through the process of completing the assignment, including professionalism, referencing and research methods, and academic integrity. The need to create the page unbiased from any opinion further challenged the students to present purely the facts of the policy at hand, requiring students to critically evaluate data and their origins. One student remarked, “Wiki Learning trains our skills in independent research within a collaborative environment.” Additionally, those students who frequently used Wikipedia had a much greater understanding of how Wikipedia works after the assignment, being able to talk critically about where data comes from and how to present a successful Wikipedia page.

3. Teachers' Reflection & Discussions

For the first part of the project, we hypothesized that after the writing of their Wikipedia, the students would have significantly improved their writing abilities and be more willing to have writing assignments in future classes. In general, the students did not feel they could write well after the project. This may result from the fact that they realized they had a lack of writing skills after the project since the writing skills required for writing a Wikipedia page on public administration in a way close to academic writing are possibly beyond the undergraduate's abilities. This can also be observed in their answer to question “I can write well without revising or editing”, which is also lower in the post-test.

Interesting, the students’ responses to the question about adding more writing assignments to the classes are considerably more positive than before, with an increase of nearly 0.4. This may reveal to us that the project did actually help students develop interests and increase their acceptance on writing assignments instead of discouraging or daunting them. Similar indication was generated to show that the students evaluated the significance of peer reviewing and feedback from the peers in writing more in the post-test, with a slight higher change in the average value of the responses by 0.16. However, the students did not seem to enjoy writing papers for teachers/professors more after the project, probably because writing papers require more advanced writing skills that deter them after they realized that their writing skills barely sufficed to finish the Wiki projects as discussed earlier.

For the second part, we hypothesized that the students’ knowledge about Wikipedia would increase after the project. By the term “skill/knowledge (of) fitness”, we attempted to investigate if students’ skill or knowledge adequacy about writing Wiki is sufficient to help them complete the Wikipedia writing task and if the Wikipedia writing project can help them increase their skill/knowledge fitness. The results gave us a general picture of students’ increased knowledge on Wiki after the project. All the questions were given more positive responses on average in the post-test. Especially on the question “Your level of skill/knowledge” after the start of writing Wiki, the increase is up to nearly 0.7, which proves that the Wiki writing project did equip students with a high level of skills and knowledge. Similarly, the students on average showed a more positive attitude about the contribution of writing to their skill and knowledge acquisition, and also increased their skill/knowledge fitness. Also, the students felt the required skill/knowledge fitness of Wiki for finishing the writing was actually slightly higher than they expected before the project, which shows that after the writing the students realized the Wiki writing did need more prerequisite knowledge

about Wiki than what they'd anticipated. This is in accordance with our presumption in the previous section that writing Wiki is actually harder for them so they gave a lower average value when asked if they write well.

For the third part, the formulated hypothesis suggests that the PA knowledge of the students would significantly improve. Just as what we hypothesized before the project, the PA knowledge evaluation presented more positive results in the post-test in general. The results showed that the students did acquire more knowledge on PA after the project in terms of applying theories to examine real life situations, applying policy tools/frameworks to analyze real life public affairs, recognizing functions of public administration and describing the major theories and content in this subject by giving more positive responses to the questions. The increase in each of the questions varies from 0.18 to 0.2. Therefore, we can conclude that the writing of a Wikipedia on the subject of Public Administration serves as a good method to boost students' understanding and memorization of the theories. Moreover, since the writing of Wiki requires a profound understanding of the theories and concepts, the students have higher incentives to use extra time to study and lucubrate how to properly use the theories to analyze real life cases. Also, having students take the initiative to do the relevant research helps them cultivate better comprehension about the resources and research tools that are used in the study of public administration.

As for the fourth part, the results generally show that the students gave positive responses to the questions in this section. As what is shown in the chart, the students acknowledged that Wiki is useful in other subjects besides public administration and also useful in other degrees besides bachelor's as well, by which we can see Wiki as a universally useful tool for students in many fields and in various levels of study. Also, most of the students agreed that Wiki is helpful in expanding knowledge, and promotes the learning of concepts. This may come from the fact that Wiki makes knowledge more accessible to common people with its large number of entries in different languages and its unlimited access. Likewise, on average the students agreed that Wiki is easy to add contents to. However, this may be subjective and vary individually since some of the students complained about the cumbersomeness and unsolved technical problems of writing Wiki in the feedback, which may suggest a necessary assistance to those who have difficulties with Wiki. Moreover, this can be used to explain why the students felt that Wiki did promote active participation and teamwork. For some students, adding contents to Wiki was not an easy job that can be done without any trouble, and thus they found that it needs collective work to solve the problems and finish the writing, so they will actively have turned to their group members for help. Its inconvenience in terms of adding content (for some students) also promotes the troubled students' active participation and interaction with group members in order to complete the project on time.

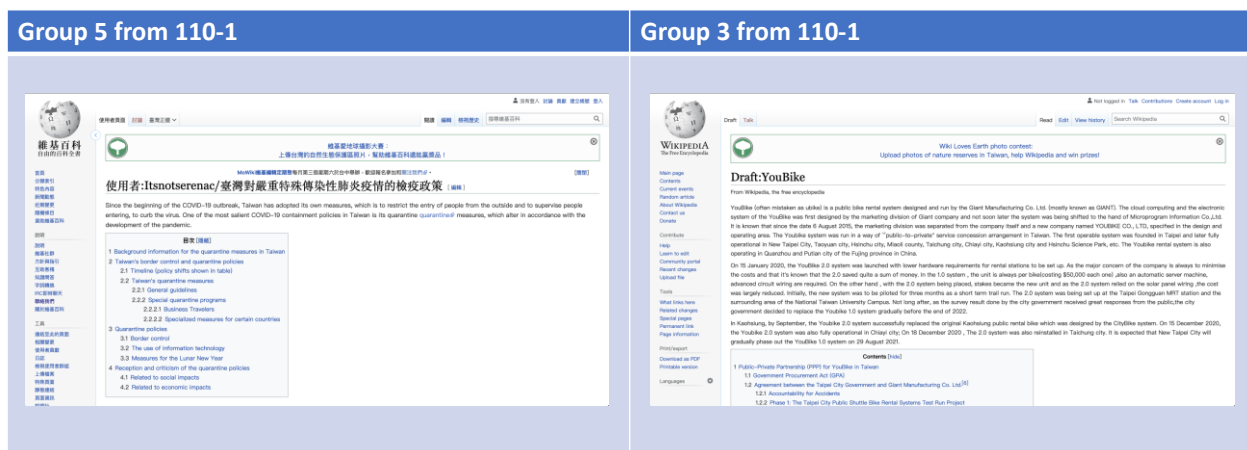
For the fifth part, most of the students did not show positive attitudes about continuing their contributions to Wiki in the future, which may result from its requirement of collective work to efficiently add new contents, with the responses only slightly higher than "Neutral". Similarly, they did not respond in a significantly positive way on the question about making reference to Wiki, but this time the average response was close to "Agree". This can possibly be explained by the fact that making reference to Wiki is generally not acceptable in academic writing because its credibility is

hindered by Wiki's acceptance for everyone to add contents regardless of the reliability of cited sources. Nonetheless, the students mostly agreed that Wiki learning helps improve other skills and it does allow contact with both the colleagues and the instructor. The instructor was expected to provide assistance when the students encountered difficulties, which was the case in this project and thus promoted interactions between the students and the instructor. Notably, the students also showed an agreement on the relationships between the amount of time and the outcomes of work, which suggests that when the time is adequate, better performance of work can be expected.

For the last part, the collected feedback from the students on the project shows that on average the students felt the involvement required for the project was high, with an average value of around 3.5. The involvement was guaranteed by making these projects part of the class grades, which accounts for a large percentage in their final grades. This likely galvanized the students to involve in the project more in order to get high grades. Apart from that, the small size of the group also ensured that any irresponsible students would be easily identified and then punished, thus the students had higher incentives to get themselves involved in the project.

(3) . Learning Outcomes: Wikipedia Articles

The students participating in this course are divided into 4-5 groups with 4-5 persons. At the end of the one year, 9 Wikipedia articles have been produced. In the first semester, four articles have been co-produced: (1) New Public Management Reform in Taipei City; (2) Transit Privatization; (3) YouBike; (4) Policy Responses to Covid-19. In the second semester, five articles have been co-produced: (1) Contact Information Registration; (2) Plan of Power System Improvement and Air Conditioners Installation for Public Schools under Universities; (3) vTaiwan; (4) Bicycle sharing system; and (5) Family Policy in Taiwan.



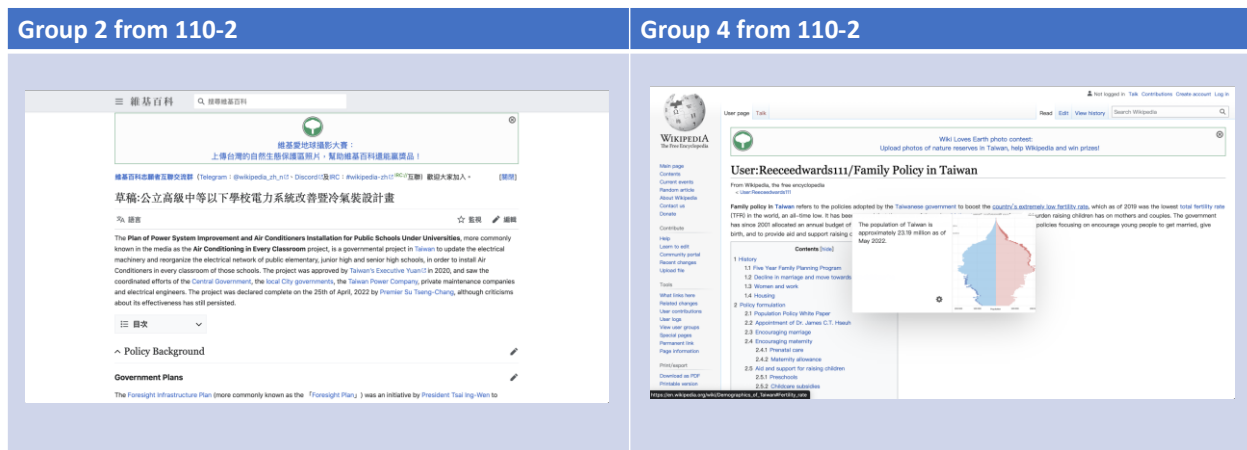


Figure 9. Samples of Co-produced Wikipedia Articles

6. Recommendations and Reflections

To carry out an effective Wiki program, there are several crucial points and key elements that need to be highlighted.

First, instructors should always be ready to give students advice on their project instead of letting them fumble with their projects. As our study suggested, the students might have difficulties conceptualizing the PA concepts and applying them in real world cases since the class is an introductory class for freshmen students. Oliveira et al. (2011) suggested otherwise: the instructors are served to provide assistance when participants have difficulties working together. As shown in the post-test, the students in our project generally felt the Wiki project allowed their contact with the instructors, which signaled that the students did have needs for instructor’s counsel.

The second important element is to provide a list of workable topics and let students choose which they prefer, instead of designating topics to students. By doing this, students are able to find which topics in the field of study is their favorite, helping them explore their potential passion. Besides, enabling students to freely choose their favorite topic is also expected to reinforce their incentives to put more effort and time on the project.

The third crucial element is to narrow down the scope of the project. This can be done in two ways: first, asking students to only write wiki pages based on the reading provided in class, such as compulsory readings or additional selective readings. In this way, students will not be at a loss but have a clear goal and useful resources to start, not to mention it also deepening their knowledge on core readings of the class.

Moreover, the do’s and don’ts are based on the students’ feedback of the Wiki project we conducted. According to students, there are a few ways to improve the project, which should be taken seriously. First, the students asserted that the length of the project can matter a lot. If the length of the project could be shortened, the students would have focused more on the project rather than getting distracted. Hence, we recommend future Wiki projects to take the time issue into consideration and avoid making projects long-winded.

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Appendix I: Pre- and Post-Survey

A. Basic Information (omitted here)

B. English Writing and Reading Abilities Afterwards

In this section, we evaluate your writing and reading abilities.

(Strongly Agree/ Agree/ Neutral/Disagree/
Strongly Disagree)

- a. I enjoy writing papers for my teacher/professor.
- b. I enjoy writing personal letters or emails to friends or family.
- c. Feedback from others is critical to the quality of my writing.
- d. I would enjoy being a journalist.
- e. I would enjoy it if there were more writing assignments in my classes.
- f. I can write well without revising or editing.
- g. Skillful writing is necessary for success in my writing.
- h. I learn more from reading about something than writing about it.
- i. Keeping a secret personal diary sounds fun.
- j. I write well.

C. Wiki Knowledge Evaluation

In this section, we evaluate your knowledge on Wiki.

(Poor/Fair/Satisfactory/Very Good/Excellent)

- a. Your level of skill/knowledge after the start of writing Wiki.
- b. Level of skill/knowledge fitness required of writing Wiki.
- c. The contribution of writing wiki to your skill/knowledge level.
- d. The contribution of writing wiki to your skill/knowledge of fitness.

D. PA Knowledge Evaluation

(Strongly Agree/ Agree/ Neutral/Disagree/
Strongly Disagree)

In this section, we evaluate your learning outcomes.

- a. I can clearly describe major theories and content of public administration.
- b. I can recognize major functions of public administration, such as policy network, and governance in the public sector.
- c. I can recognize how the knowledge about public administration is deployed in real-life

public sectors.

d. I can apply different policy tools and framework to examine real-life public affairs in the local and international context.

e. I can have a better understanding of public affairs by using the theories and content I learned.

E. Wiki Learning Experiences

In this section, we evaluate your Wiki Learning Experiences.

(Strongly Agree/ Agree/ Neutral/Disagree/
Strongly Disagree)

- a. The Wiki tool is useful.
- b. It promotes and increases the team work.
- c. It promotes the active participation.
- d. It promotes the acquisition of concepts.
- e. It is easy to use and to add contents to it.
- f. It improves the expansion of knowledge.
- g. It is useful in other degree.
- h. It is useful in other subjects.

In this section, we evaluate your Wiki Learning results.

(Strongly Agree/ Agree/ Neutral/Disagree/
Strongly Disagree)

- a. Adequacy of the time established with the performance of work.
- b. Wiki allows the contact with the teacher.
- c. It allows the contact with colleagues.
- d. It allows improving other skills.
- e. I will make reference to the Wiki in the future
- f. I will contribute to the Wiki in the future

In this section, tell us what improvements we can make?

Appendix III: Pre-and Post-Survey Results (with t-test)

English Writing Ability

	Mean	Std. Err.	[95% Conf. Interval]	Sign
I enjoy writing papers for my teacher/professor				
Pre	3.793	0.125	3.542 4.044	
Post	3.848	0.138	3.572 4.125	
I enjoy writing personal letters or emails to friends or family				
Pre	3.897	0.167	3.562 4.231	
Post	3.909	0.171	3.568 4.250	
Feedback from others is critical to the quality of my writing				
Pre	4.138	0.155	3.828 4.447	
Post	4.303	0.154	3.996 4.611	
I would enjoy being a journalist				
Pre	3.207	0.195	2.818 3.596	
Post	3.212	0.167	2.878 3.546	
I would enjoy it if there were more writing assignments in my class				
Pre	2.828	0.157	2.513 3.142	**
Post	3.242	0.157	2.928 3.557	**
I can write well without revising or editing				
Pre	3.345	0.200	2.944 3.745	
Post	3.152	0.190	2.771 3.532	
Skillful writing is necessary for success in my writing				
Pre	4.172	0.141	3.891 4.454	
Post	4.182	0.147	3.887 4.476	
I learn more from reading about something than writing about it				
Pre	3.276	0.221	2.833 3.719	
Post	3.030	0.202	2.627 3.434	
Keeping a secret personal diary sounds fun				
Pre	3.414	0.176	3.063 3.765	
Post	3.606	0.168	3.270 3.942	
I write well				
Pre	3.724	0.164	3.397 4.052	
Post	3.545	0.157	3.231 3.860	

** p<0.05 * p<0.1

Knowledge from Wikipedia

	Mean	Std. Err.	[95% Conf. Interval]	Sign
Your level of skill/knowledge at the start/after of writing Wiki				
Pre	2.483	0.196	2.091 2.875	**
Post	3.182	0.111	2.961 3.403	**
Level of skill/knowledge fitness required of writing Wiki				
Pre	3.000	0.157	2.686 3.314	
Post	3.182	0.154	2.875 3.489	
The contribution of writing wiki to your skill/knowledge level				
Pre	3.103	0.181	2.741 3.466	**
Post	3.515	0.164	3.188 3.842	**
The contribution of writing wiki to your skill/knowledge of fitness				
Pre	3.1724	0.1724	2.8277 3.5172	
Post	3.4848	0.1576	3.1696 3.8001	

** p<0.05 * p<0.1

PA Knowledge Evaluation

	Mean	Std. Err.	[95% Conf. Interval]	Sign
I can clearly describe major theories and content of public administration				
Pre	3.690	0.150	3.390 3.989	
Post	3.939	0.123	3.694 4.185	
I can recognize major functions of public administration				
Pre	3.897	0.143	3.610 4.183	
Post	4.152	0.152	3.849 4.454	
I can recognize how the knowledge about public administration is deployed in real-life public sectors				
Pre	3.897	0.143	3.610 4.183	
Post	4.121	0.161	3.798 4.444	
I can apply different policy tools and framework to examine real-life public affairs in the local and international context				
Pre	3.759	0.154	3.450 4.067	
Post	3.939	0.157	3.626 4.252	
I can have a better understanding of public affairs by using the theories and content I learned				
Pre	3.966	0.136	3.694 4.237	
Post	4.152	0.169	3.813 4.490	

** p<0.05 * p<0.1