Research on College Students' Applied Consciousness of Mathematics and Chemistry

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Abstract

Some researchers found that most students did not make connections between textbooks and real-life problems and, as a result, did not discover the applications of elementary scientific subject knowledge or regarded the concepts as far from actual theories. So this study aims to have a deeper insight into students' real tendency towards applications of Mathematics and Chemistry in their daily life situations. Using questionnaires, this study focuses on students mostly majoring in Mathematics and Chemistry and finds that the students have acknowledged the importance of applications of these subjects while not putting them into practice.

Keywords: elementary scientific subjects daily life applications students

1 Introduction

With the universalisation of nine or twelve years of compulsory education and an increasing number of students enrolled in upper secondary education, they have studied elementary scientific subjects such as Mathematics and Chemistry which intensively enable students to apply scientific knowledge and scientific thinking in their daily occasions.

Based on existing knowledge, what students have learnt before college allows them to optimise their budget when shopping, to calculate how much ingredients they need when cooking and baking, to judge if the food they have every day is safe or healthy and so on.[1][2][3]

Even though many students have realized that mathematics is "a school subject useful for everyday life, for work and future studies" or "developing intellectual and problem-solving abilities"(Atallah, 2003)[4] the previous research does not demonstrate all the students think like that(Aksu

[1] ALLEN Overseas. Math in Daily Life: Uses, Importance and Facts. https://www.allenoverseas.com/blog/math-in-daily-life-uses-importance-and-facts/.

[2] What Is the Application of Chemistry in Daily Life?. https://www.advancedchemtech.com/what-is-the-application-of-chemistry-in-daily-life/, February 21, 2022.

[3] Ellier Leng. Applying Chemistry to Everyday Life in the Classroom. https://www.latinhire.com/applying-chemistry-to-everyday-life-in-the-classroom/, July 17, 2023.

[4] Atallah F. Mathematics through their eyes: Student conceptions of mathematics in everyday life[D]. Concordia University, 2003.

et al., 2002, Yavuz et al., 2018)[5][6] and the students have put those learnt in the classroom into practice or connected the concepts in the textbooks to the confronted real-life problems(Putranto, Ratnasari, 2022)[7].

Therefore, this study mainly focuses on the potential motivations and triggers contributing to the phenomenon of students not using their basic knowledge to tackle the confronting problems in their lives.

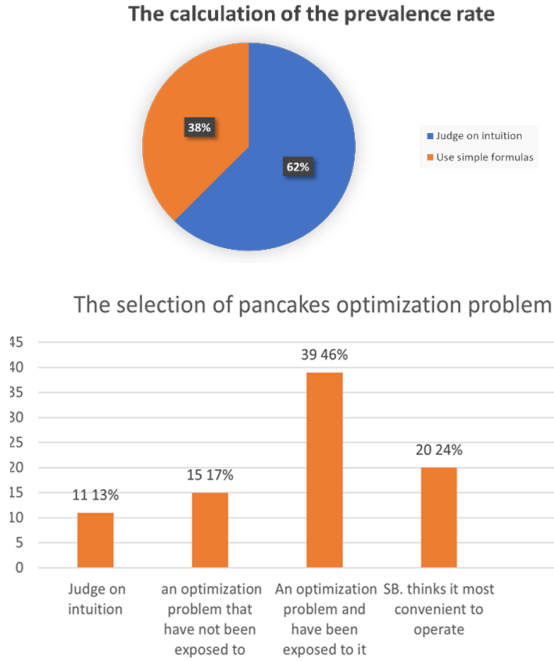
2 Method

To find out the situation in which students utilize elementary scientific subjects to solve practical problems in life and what may cause the obstruction, an online survey based on a questionnaire was designed. The questionnaire, which includes 11 simple daily chemistry and mathematical questions, can be found in the appendix. We got a total of 85 samples and made preliminary statistics on them to get our results.

Our data is presented with pie charts as well as bar charts, to be able to more intuitively see the distribution of respondents' answers.

3 Result

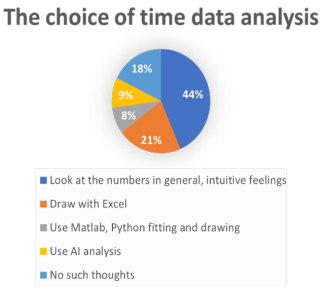
Of the Q1, Q3 and Q5 about math and computer use, 38 percent, 67 percent and 38 percent, respectively, chose to use related content. On average, only 48 percent, or less than 50 percent, chose to use related content.



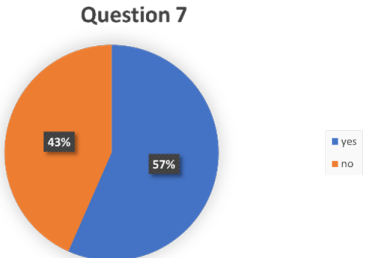
[5] Aksu M, Engin Demir C, Sümer Z. Students Beliefs about Mathematics A Descriptive Study[J]. 2002.

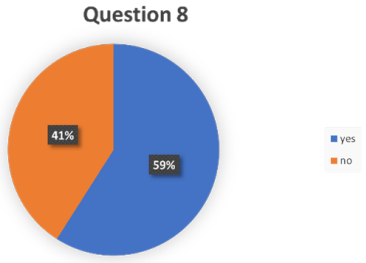
[6] Yavuz Mumcu H. Examining Mathematics Department Students' Views on the Use of Mathematics in Daily Life[J]. International Online Journal of Education and Teaching, 2018, 5(1): 61-80.

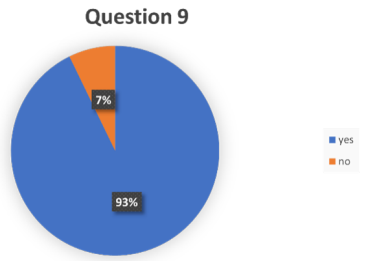
[7] Putranto S, Ratnasari G I. Why i am confused to apply mathematics concept: student perspective of mathematics role in life[J]. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 2022, 11(1): 538-549.



In Q9, only 7% of people thought that the reading would not help them. But in Q7 and Q8, 45% and 40% of people would not look up the relevant content in the face of cosmetics and food promotion respectively.







In the practical example of a face mask, 60% of people only use their intuition and impressions to determine the use frequency of the face masks.

In conclusion, it is generally believed that the use of mathematics, chemistry and other related knowledge will help their own, but the actual implementation of the people are few.

4 Conclusion

The application of mathematical chemistry and other knowledge to life will bring great convenience and help, such as helping people to make consumption decisions, simplifying the solution of problems encountered in some situations, and so on. However, there is still no definite

practice in the exploration and application of knowledge. If people use this knowledge more skillfully and consciously in their lives, their lives will become significantly more convenient and scientific.

5 Discussion

Q2 and Q5 respectively are examples of the two basic disciplines of Mathematics and Chemistry in helping people deal with life problems more scientifically under the application of daily life. Whether it is the infiltration of the concept of “optimization” in mathematics or the popularization of the principle of daily cosmetic ingredients in chemistry, they have significantly enabled the subjects to achieve a higher correct rate in this questionnaire survey, which is a better solution to the problem. Both these survey data and research in related fields indicate that being aware of and having the ability to apply the existing basic disciplinary knowledge in daily life can not only help us live better but also improve the knowledge level of the whole nation to a certain extent.

The results of Q1 and Q4 tell us that the subjects are not unaware of the existence of these advantages. On the contrary, as the vast majority of people recognize the importance of basic disciplines in education (Atallah, 2003), the vast majority of the subjects can recognize the benefits of the life-orientation of basic disciplinary knowledge. However, there are mainly two major obstacles that prevent everyone from achieving the purpose of using disciplinary knowledge to solve life problems: the Weak application consciousness and the Relatively low subjective initiative. The former leads to people having difficulty considering that basic disciplinary knowledge can be used when encountering problems, and the latter causes people to be “too lazy to do it” and confused about where to start to look for knowledge or put it into use. These two together have led to the current application status of basic disciplinary knowledge in the current society that “the knowledge that one doesn’t know can’t be found and used, and the knowledge that one knows can’t be thought of and used”.

Referring to the requirement in the compulsory education curriculum standards of our country that in the teaching process, guiding students to use information technology to solve mathematical problems is to strengthen the consciousness while providing students with a reference for the application method of knowledge under the current era, emphasizing and encouraging students to base on the advantages of the era and use the tools born of science and technology to apply this knowledge in daily life[8]. We have also conducted an investigation in this aspect: in Q3, in the face of statistical analysis problems in daily life, some students have been able to use tools to solve them and have been continuously implementing them. Although more than half of the students still think it is “troublesome” or “unnecessary”, as long as everyone can realize that these technological tools are indeed a feasible solution with a low threshold, the subsequent

[8]中华人民共和国教育部. 义务教育数学课程标准 (2022 年版)[S]. 北京: 北京师范大学出版社. 2022.

implementation and choice vary from person to person.

This is also what the country advocates and what our research team expects: not blindly asking everyone to master and use basic disciplinary knowledge as much as possible in daily life, but advocating the consciousness of "applying what one has learned", hoping that more people with knowledge can use and be able to use knowledge to give a helping hand when needed. In the era of rapid development of science and technology, knowledge is shared, and the "ability to use knowledge" has increasingly become an important field that distinguishes humans from machines such as AI. Therefore, our research team chose to conduct research from this perspective, explore the current situation, and think and analyze solutions.

6 Limitations and Future Research

The surveyed group is not universal and has a relatively small base. The answers mainly received by this questionnaire are from undergraduates of Jilin University, and there is a lack of investigation and statistics for older intellectuals with life experience.

Due to the limitation of the questionnaire form, the investigation of the respondents' answering mentality is based on the pre-judgment and set options of the research team, and both the comprehensiveness and credibility of the survey results are slightly lacking.

Considering that we have not yet rigorously explored the impact of technology and the knowledge threshold on the enthusiasm for applying knowledge and the correlation therein, that is to say, the attribution in this thesis is not necessarily strongly correlated. Therefore, in the subsequent research work, research on the causes behind this phenomenon should be carried out. After that, to experimentally explore how to call for and effectively enhance the public's awareness of the practicality of basic disciplinary knowledge, to better help achieve the educational goals of the country.

References

[1] ALLEN Overseas. Math in Daily Life: Uses, Importance and Facts. https://www.allenoverseas.com/blog/math-in-daily-life-uses-importance-and-facts/.

[2] What Is the Application of Chemistry in Daily Life?. https://www.advancedchemtech.com/what-is-the-application-of-chemistry-in-daily-life/, February 21, 2022.

[3] Ellier Leng. Applying Chemistry to Everyday Life in the Classroom. https://www.latinhire.com/applying-chemistry-to-everyday-life-in-the-classroom/, July 17, 2023.

[4] Atallah F. Mathematics through their eyes: Student conceptions of mathematics in everyday life[D]. Concordia University, 2003.

[5] Aksu M, Engin Demir C, Sümer Z. Students Beliefs about Mathematics A Descriptive Study[J]. 2002.

[6] Yavuz Mumcu H. Examining Mathematics Department Students' Views on the Use of Mathematics in Daily Life[J]. International Online Journal of Education and Teaching, 2018, 5(1): 61-80.

[7] Putranto S, Ratnasari G I. Why i am confused to apply mathematics concept: student perspective of mathematics role in life[J]. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 2022, 11(1): 538-549.

[8] 中华人民共和国教育部. 义务教育数学课程标准 (2022 年版)[S]. 北京: 北京师范大学出版社. 2022.

Appendix

Questionnaires: A survey of university students' application of elementary subjects (June 9, 2024)

Q1: Assuming that the prevalence of a disease in the population is 0.1%, and that the accuracy of hospitals in diagnosing the disease is 99.9%, and that when you go to the hospital to be tested for the disease you get a positive (diseased) result, what is the probability that you really have the disease?

(a) 50%

(b) 0.1%

(c) 1%

Q2: How do you think about and solve the above problems when faced with them?

(a) Honestly, I went with my gut.

(b) I used a simple math formula to get my answer.

Q3: Assuming that you are now going to fry three pancakes, each of which needs to be fried on two sides, taking 1 minute per side, and that you will be using a one-sided pan that can only hold down two pancakes at a time, what is the minimum amount of time it will take?

(a) 4 min.

(b) 3 min.

(c) 6 min.

(d) 5 min.

Q4: How do you think about and answer the previous question?

(a) I went with my gut.

(b) I have a feeling its an optimization issue, but haven't encountered it before.

(c) I found it to be an optimization problem, which I've seen in math textbooks.

(d) I picked the one that I thought was the easiest to operate.

Q5: Suppose you have data on how much time you've spent studying, gaming, and sleeping lately, and you want to see how much time you've spent in those places lately, what would you do?

(a) Take a broad look at the numbers and then visualize.

(b) Enter data into Excel and use it to draw pie charts, line graphs, and other views.

(c) Use software such as R language, MATLAB, Python, etc. for statistics, fitting and plotting.

(d) Throw the data straight to the AI to analyze it.

(e) I had no such plans or hadn't considered any of this.

Q6: How do you think about and answer the previous question?

(a) That's how I implemented it, as I was exposed to related learning and training.

(b) I'm not in the habit of doing this, but I've been exposed to related learning and training, and I envision that's how I'll apply it.

(c) I'm not in the habit of doing this, and despite my exposure to learning and training on the subject, I still feel that simplicity is most important.

(d) I'm not in the habit of doing this and have no idea how it works.

Q7: When you are confronted with an advertisement for a cosmetic product, do you check to see if the ingredients and effects of the cosmetic product are as advertised?

(a) I will.

(b) I won't.

Q8: When you come across food advertising campaigns, do you bother to find out about the substances that play a healthy role?

(a) I will.

(b) I won't.

Q9: Do you feel that accessing the knowledge would have helped you in purchasing this product?

(a) I will.

(b) I won't.

Q10: How often do you think a mask should be applied for best results?

(a) Keep your skin care frequency every other day.

(b) This is done occasionally about once a week.

(c) Apply it every day, more often if you can.

(d) No masks, masks are bad for your skin.

Q11: Most of your basis for choosing the answer to the previous question came from?

(a) Intuition or impression.

(b) Associated with skin as well as cosmetics, over hydration and other related concepts.

(c) Searched or consulted a friend.