AC 2010-1036: WORKSHOP ON DESIGNING ACTIVE LEARNING ACTIVITIES AND ASSOCIATED ASSESSMENT PLANS

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Results from the Designing Active Learning Activities and Associated Assessment Plans Workshop

Abstract

Although the pedagogical advantages of active learning are apparent from the literature, the use of these techniques is not yet pervasive in the engineering curricula. This is due, in part, to the lack of a smooth implementation path. A major roadblock to implementation of active learning techniques is the lack of "ready-to-use" active learning products (ALPs) and procedures. To remedy this, over 25 active learning products have been created for engineering mechanics. In addition, a general and repeatable approach for developing the active learning products, the PHLIpS Method (Producing Hands-on Learning to InsPire Students) and associated assessment instruments were created for application across STEM programs. The workshop overviewed many of the activities and focused on providing participants with the tools needed to implement and evaluate active learning in their classrooms. A post workshop survey provided participants evaluation of the workshop and the PHLIpS Method. Overall the workshop feedback was very positive and avenues for improvement to the PHLIpS Method also resulted.

Introduction

Many professor are aware that active learning is a more effective approach than traditional engineering lecture courses[1] but they often lack the tools and time necessary to implement active learning in their classrooms. As part of an NSF CCLI Phase II project, completed in 2008, the authors developed, tested, and validated active learning products in the specific domain of engineering mechanics [2]. Over 25 active learning products (ALPs) were created and disseminated as part of this collaborative effort. In addition, a general and repeatable approach to developing the active learning products and associated assessment instruments was created for application across STEM programs [3]. This approach uses novel ideation methods, systematic alignment techniques for educational objectives, and novel assessment strategies based on personal types and learning styles.

A workshop was presented on effective methods for using active learning products in the classroom and assessment techniques appropriate for courses that apply such methods. Additionally, participants learned how to generate new active learning products and assessment techniques for their classrooms. Activity generation included using the 6-3-5 method, and the Producing Hands-on Learning to Inspire Students (PHLIpS) method. Effectiveness of the workshop was measured with a survey.

Workshop Content

Contemporary STEM classrooms must focus on a variety of learning styles and personality types, while seeking to empower students with their ability to shape their own learning environment. Active learning products are a targeted approach for this purpose. This workshop presented effective approaches to using active learning products in the classroom and how to avoid potential pitfalls. The session modeled active learning in that all materials engaged the workshop participants using the active learning methods being discussed. The session also

covered assessment techniques appropriate for courses using active learning. Participants generated exemplar active learning products for their classrooms. Participants also designed assessment instruments for active learning products and methods for the classroom. As a tool for assisting in ALPs development and evaluation, the PHLiPS method was also presented.

PHLiPS Method

The PHLIpS Method[3] is a tool to guide professors in the efficient creation of ALPs. Figure 1 shows a summary of the method used to guide the development of ALPs. The method begins with understanding the educational goals, generating ideas, systematic selection of ideas, and finally implementation and evaluation of the newly-created ALPs (Figure 1). This method also seeks to relate student personality types and learning styles to active learning. This is done as part of the "evaluation" step. See Linsey, *et al.*,[3] for a more detailed explanation of the method. A "PHLiP" book (Figure 2) was also presented as a tool to guide professor in development of ALPs.

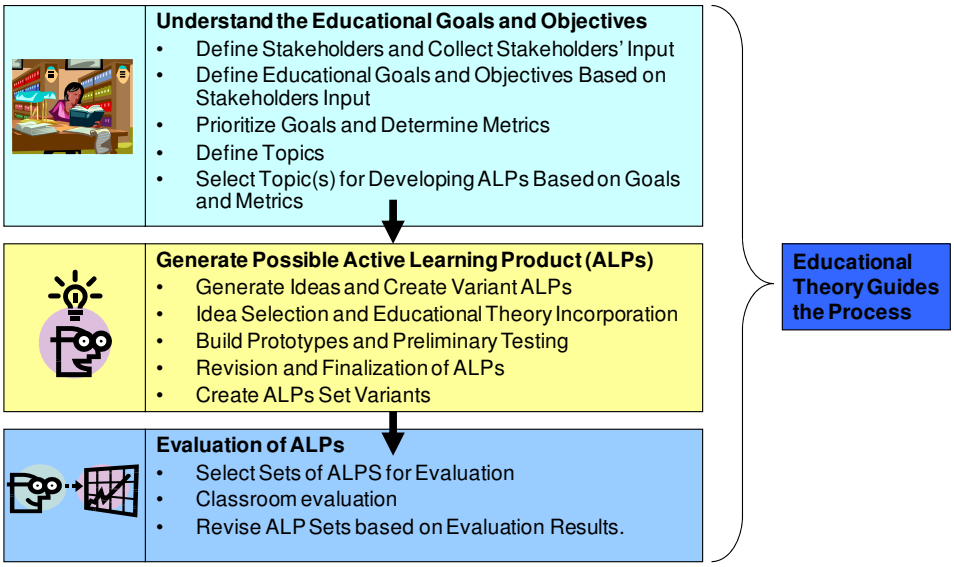

Figure 1: Overview of the PHLIpS Method for Developing Active Learning Activities

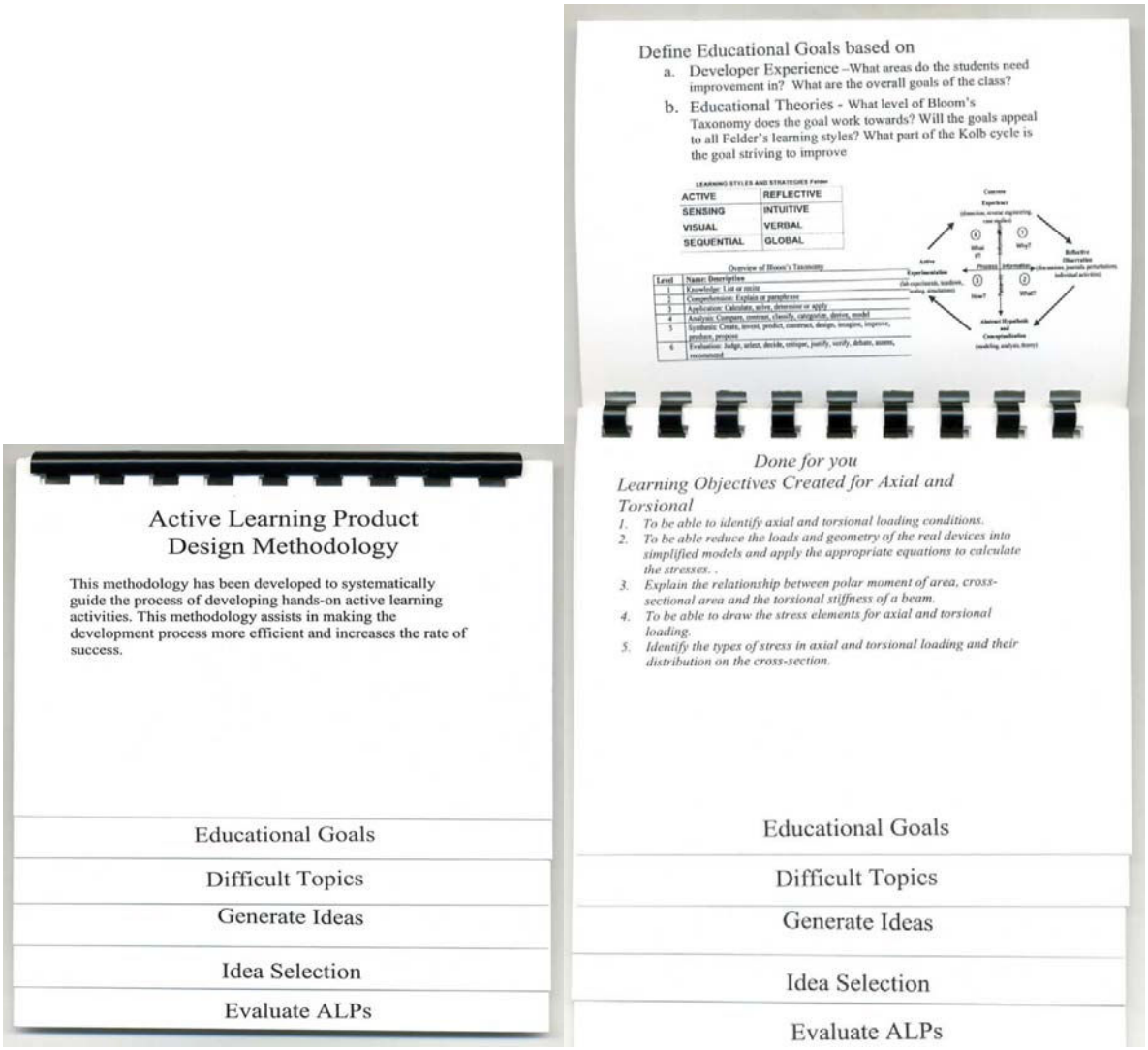

Figure 2: PHLIp Book for guiding professors through the PHLIpS Method

Survey Results

At the end of the workshop, 11 of the 15 registered participants completed a survey to evaluate the workshop's impact (Figures 3 and 4). Overall, feedback was very positive with all of the participants indicating that they found the workshop useful and would recommend it to a colleague (Table 1 and Figure 5). Participants also overwhelming thought that this workshop had provided them with tools to implement active learning in their classrooms (Figure 6).

Thanks for engaging in the activities and discussions about active learning and assessment for engineering education. Your feedback is important to us and will help inform the ways we think about active learning, associated assessments, and our future work. Please complete the following to provide us with feedback.

1. What areas do you teach?

2. Are you interested in applying hands-on / active learning techniques in the classroom?
   Yes _____ No _____ Maybe _____

3. Have you previously applied hands-on / active learning techniques in the classroom?
   Yes _____ No _____

4. Did you find the 6-3-5 method to be interesting?
   Yes _____ No _____ Maybe _____

5. Did you find the 6-3-5 method to be useful?
   Yes _____ No _____ Maybe _____

6. Do you anticipate integrating the 6-3-5 method in idea generation with your students?
   Yes _____ No _____ Maybe _____

7. Did you find the workshop to be interesting?
   Yes _____ No _____ Maybe _____

8. Did you find the workshop to be useful?
   Yes _____ No _____ Maybe _____

9. Did this workshop meet your expectations? If not, why?

10. Would you recommend this workshop to other people?
    Yes _____ No _____ Maybe _____

11. Has this workshop given you tools to assist in implementing active learning in your classroom?
    Yes _____ No _____ Maybe _____

12. Please rate the content of this workshop (check one):
    Vy Unsatisfactory ___ Unsatisfactory ___ Satisfactory ___ Good___ Vy Good ___

13. Please rate the facilitators of this workshop (check one):
    Vy Unsatisfactory ___ Unsatisfactory ___ Satisfactory ___ Good___ Vy Good ___

Figure 3: Survey Instrument, page 1.

Please rate the following responses for the PHLiPS Method:

	Not at all useful	Somewhat Useful	Useful	Very useful	Useful but N/A
1. The PHLiPS Method is:					
	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
2. The PHLiPS method helped me to generate more ideas.					
3. The PHLiPS method helped me to generate higher quality ideas.					
4. The PHLiPS method is a waste of time.					
5. The method PHLiP book was easy to use.					
6. I expect to use the PHLiPS method in the future.					
7. The PHLiPS method needs improvements.					
8. The PHLiPS method is useful.					

Do you have any suggestions for improving the PHLiPS method?

Additional Comments or Suggestions:

Figure 4: Survey Instrument, page 2 specific to the PHLiPS method.

Table 1. Summary of results for questions 2, 3, and 10 indicating the general interest in active learning techniques.

Survey Question	Yes	No	Maybe
2. Are you interested in applying hands-on/active learning techniques in the classroom?	11	0	0
3. Have you previously applied hands-on/active learning techniques in the classroom?	10	1	0
10. Would you recommend this workshop to other people?	10	0	1

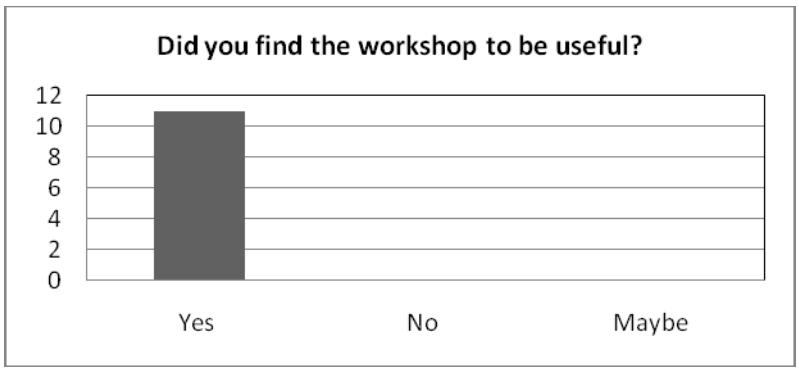

Figure 5. All workshop participants found the workshop to be useful. Result for question 8 indicating the value of the workshop content and techniques.

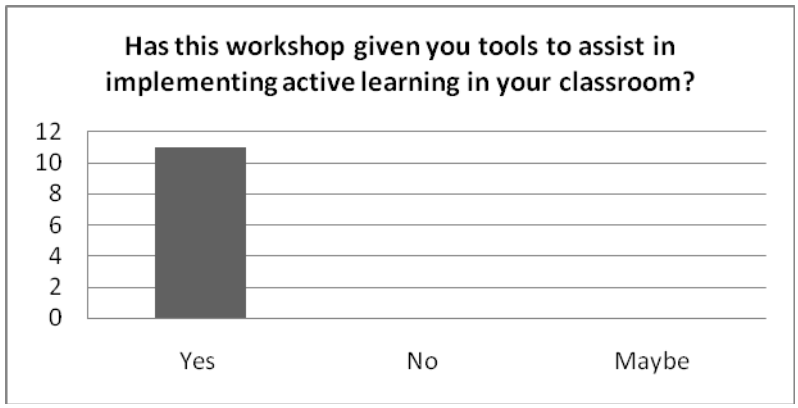

Figure 6. The workshop clearly provided the participants with tools for implementing active learning in their classrooms.

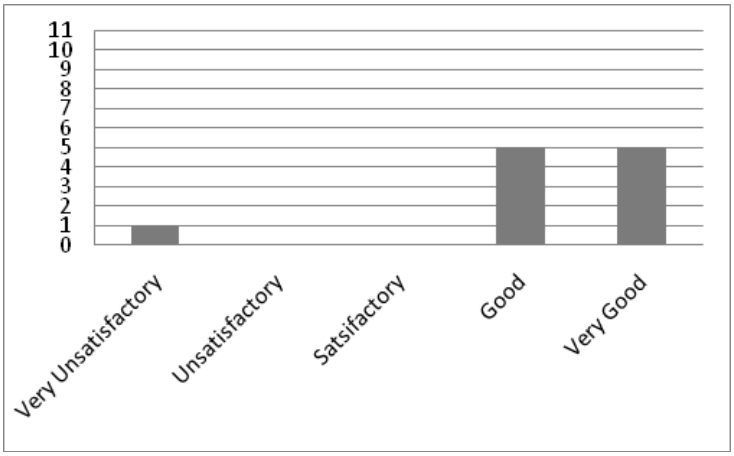

Figure 7: In general participants were satisitfied with the content of the workshop. One participant who taught electrical engineering was not satisfied with the workshop.

Evaluation of the PHLIpS Method

The second half of the survey focused on the PHLIpS method to provide guidance for improvement. Three participants did not answer any of the survey questions about PHLIpS and

likely missed the second page of the survey or felt they did not have enough information to make a judgment. A fourth participant only answered the first question.

Most participants found the PHLiPS method to be useful (Figure 8) and did not find it to be a waste of time (Figure 9). They generally felt it helped them generate more ideas (Figure 10) and higher quality ones (Figure 11). They also found the PHLiP Book easy to use (Figure 12) and expected to use the PHLiPS method in the future. The open ended questions did not provide any further insights into improving the method.

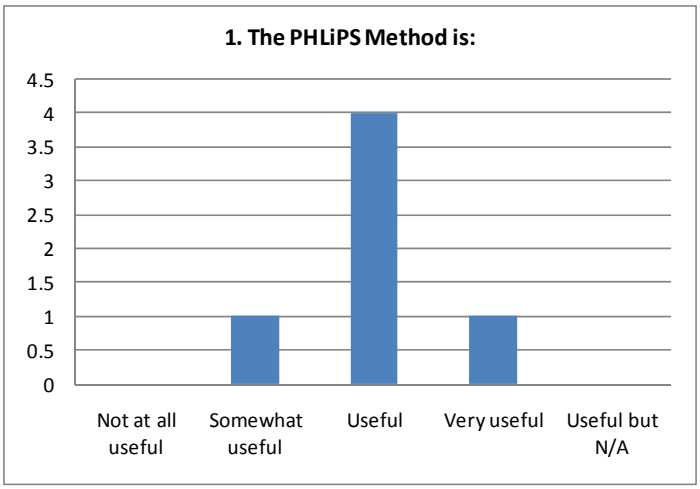

Figure 8. Result for question 14 indicating the usefulness of the PHLIpS method.

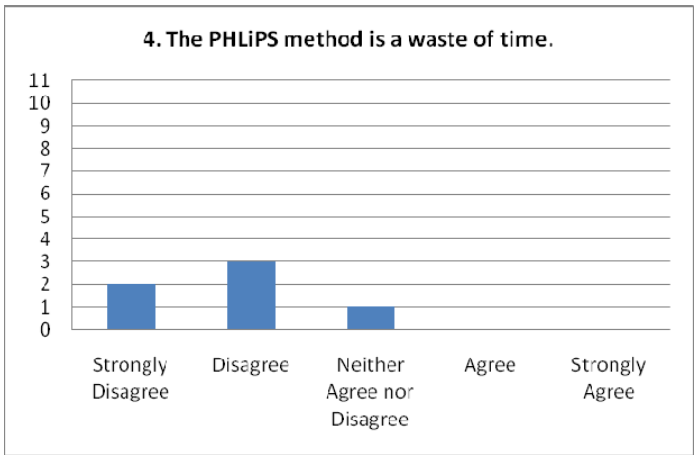

Figure 9. Participants did not think the PHLiPS method was a waste of time.

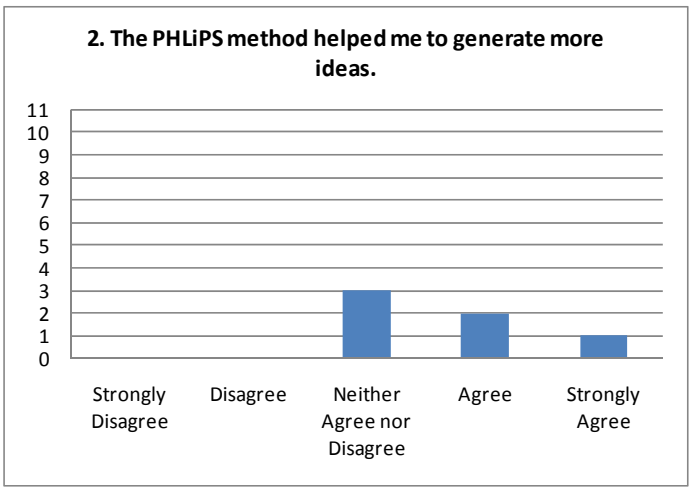

Figure 10: PHLiPS helps to generate more ideas.

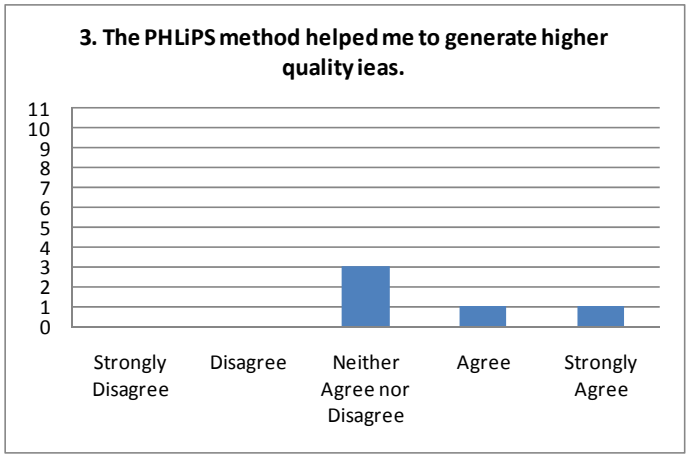

Figure 11: PHLiPS increases the quality of ideas.

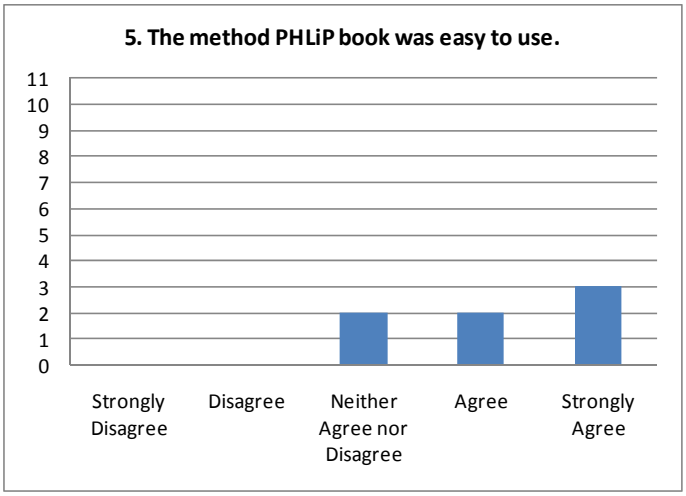

Figure 12: Participants found the PHLiP book easy to use.

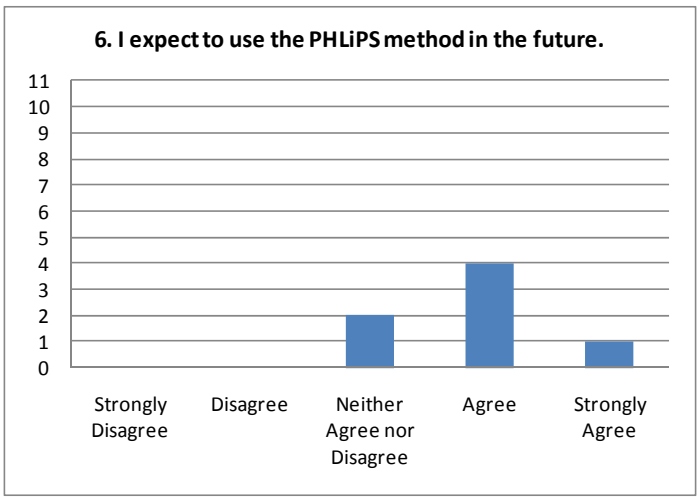

Figure 13: Most participants also expected to use the method in the future.

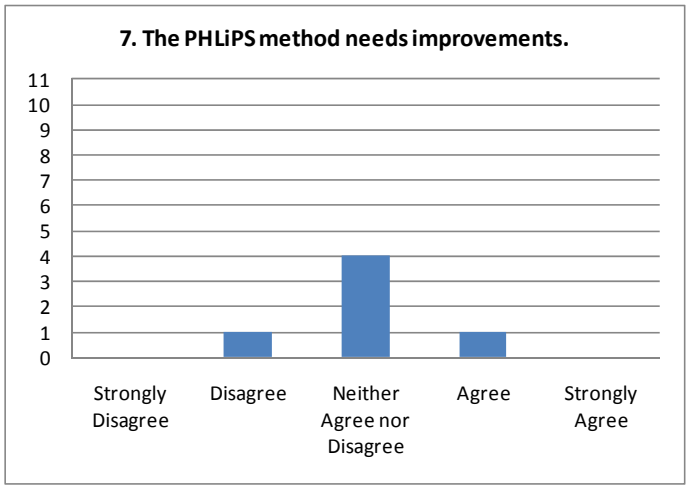

Figure 14: Participants were unsure if the method required improvements.

Conclusions

Overall, results indicate that the workshop was effective and participants were pleased with the content and presentation. Participants found the workshop to be useful and indicated that it provided them with the tools needed to apply active learning techniques in their classrooms. Results also indicate that participants had a high level of interest in active learning. This is to be expected given that they choose to participate. Future work will focus on improving the PHLIpS method. Results from the survey indicate that the PHLIpS method is useful but there is room for improvement.

Acknowledgments

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