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Learners' Satisfaction with Online Teaching and Learning Management in a Physics Course

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Abstract

The purpose of this research was to study learners' teaching and management satisfaction in a Physics course via three Applications--Line, Google Classroom and Google Meet. The subjects were 131 university students from four faculties: (1) Agricultural Innovation, (2) Engineering, (3) Optometry, and (4) Criminology and Justice Administration; they were registered in academic year 2020 and participated in the study on a voluntary basis. Online teaching and learning management consist of LINE groups for communication, Google Classroom for a virtual classroom, and Google Meet in real time. The research instrument was a questionnaire on a Likert type scale of 5 levels, with 18 items and an open-ended question on three issues: the application system, the course management system, and the online learning system. The index of Item Objective Congruence (IOC) between the items and the research purpose was not lower than 0.5. The researcher used Google Form to collect data from the participating subjects. The statistics used for data analysis were percentage, mean and standard deviation. The results showed the overall mean and standard deviation of students' satisfaction in each group at a high level: Agricultural Innovation (4.5 ± 0.7), Engineering (4.5 ± 0.8), Optometry (4.3 ± 0.8) and Criminology and Justice Administration (4.5 ± 0.7).

Keywords: Online teaching and learning management, Physics course, learners' satisfaction

1. Rationale and Background of the Study

In 2019, there was a situation that affected people worldwide, namely the pandemic of the new coronavirus "COVID-19" which started in Wuhan, the capital of Hubei Province, China. The World Health Organization declared the outbreak of COVID-19 as a pandemic that called for an international public health emergency. Thailand confirmed cases of coronavirus later in a month. Since then, Thailand has encountered four waves in 2020 and 2021: the first from the Lumpinee Boxing Stadium cluster, the second from fishery worker clusters in Samut Sakhon Province, the third from Tong Lor Entertainment Area, and the fourth from clusters of low-income communities construction workers' camp sites in Bangkok and its vicinity. The month of April in 2021 marked the beginning of the third wave, followed by the fourth which was expected to drag on until the end of the year, due to delay in vaccination and the government's delayed action in dealing with the outnumbered patients. The government's policy was simply to close all kinds of places with people gathering for regular activities, including schools and universities. In this regard, educational institutions have been affected for nearly two academic years and turned to teaching and learning online. The author as a professor at one large private university and fellow course instructors need to put teaching in a virtual mode by using cloud meeting applications.

Students also have to adjust themselves with online classes and rely more on guided selfstudy to complete their registered courses.

As generally known, online teaching takes into account the learning outcomes as specified in the curriculum by using one of the following options: (1) online teaching and learning management system (in the researcher's case called RSU-LMS) or Google Class Room, (2) Live online teaching via Google Meet, Webex Meeting, or Zoom, (3) assessment of online learning via Socrative, Quizizz, Kahoot!, followed by (4) plagiarism check using the Turnitin program (Wuthiyan & Srikramkan, 2017; Rangsit University, 2020a, 2020b, 2020c, 2021a, 2021b, 2021c)

Online teaching and learning management have a variety of programs for course instructors to select, such as Microsoft Teams, Google Hangouts Meet, Zoom Cloud Meeting, Line and Facebook Live. Each program has good features for interactive virtual communication. The author was interested in LINE application via smartphone voice conversation. As for group communication, Google Classroom application includes Google Apps for Education suitable for communication, discussion, exchange of opinions, and homework assignment Homework, scoring, grading on Google Meet applications are in Google Apps for Education—easy to conduct group discussions in a virtual class. These applications are available on Desktop, IOS and Android. In this study, the researcher used three applications: Line, Google Classroom and Google Meet, to manage online teaching and

learning in a Physics course, and studied learners' satisfaction to secure feedback information on their response to the used applications in teaching; this was also to identify areas of teaching and learning management that require improvement for efficiency in online teaching at the university level.

2. Research Objective

The research objective was to study learners' satisfaction with online teaching and learning management in a Physics course using LINE, Google Classroom and Google Meet.

3. Research Method

The research method was quantitative with the use of a questionnaire via Google Form to collect data from the participating subjects in the study.

3.1 Population and Sample

The population was from four faculties: Agricultural Innovation, Engineering, Optometry, and Criminology and Justice Administration. They were registered in Foundation Physics in the year 2020—all at 167 in total.

Of 167 students, 131 (78.33%) participated in the study on a voluntary basis.

3.2. Research Tools

3.2.1. Online Teaching Tools

The researcher used LINE and Google Meet for real-time online teaching, and Google Classroom for course learning management. The researcher's steps in using the tools were as follows:

(1) Studied the features and usage of LINE applications, Google Classroom and Google Meet.

(2) Used LINE for communicating, Google Meet for real time online teaching, and Google Classroom for course learning management.

(3) Designed an online classroom structure and prepared teaching materials after the course description according to the curriculum (TQF 3 Thailand Qualification Framework).

(4) Prepared teaching materials for online teaching, consisting of PowerPoint and video clips to enhance knowledge, and uploaded the material files on Google Classroom along with teaching videos for uploading after real-time online class.

5) Asked three education experts to check the teaching materials and Physics online classroom structure to obtain IOC of at least 0.5.

3.2.2. The Questionnaire

The researcher used a questionnaire of 18 items and one open-ended question to collect data on learners' satisfaction with online learning management in the physics course. The researcher had two steps in constructing the tool:

(1) Created a questionnaire on learners' satisfaction with Physics learning management using Line, Google Classroom and Google Meet. There were 18 items on online learning satisfaction on the Likert type scale of 5 levels from low to high. The researcher put one open-ended question at the end of the questionnaire on Google Form.

(2) Asked three education experts to check the items and the research objective to obtain IOC of at least 0.5.

4. Data Collection Procedure

The researcher used Google Form to collect data from the participating subjects in the procedure shown below:

(1) Clarified the objective of this research to students in the Physics course and invited them to volunteer as participants in the study. There were 131students showing their interest in helping with data provision.

(2) Managed online teaching and learning as specified in the course description and the curriculum by TQF 3 using LINE, Google Classroom and Google Meet.

(3) Collected data on learners' satisfaction with teaching and learning management in the Physics course using LINE, Google Classroom and Google Meet.

(4) Analyzed the obtained data by interpreting the satisfaction levels from the averages of all answers at 5 levels--highest, high, moderate, low and lowest. The average criteria for interpreting the levels of satisfaction are given in Table 1.

Range	Satisfaction Level
4.24 - 5.00	Highest
3.43 - 4.23	High
2.62 - 3.42	Moderate
1.81 - 2.61	Low
1.00 - 1.80	Lowest

Table 1: Mean Criteria for Interpretation of Satisfaction Levels

5. Data Analysis

The obtained quantitative data were analyzed by using frequency, percentage, mean and standard deviation. The participating subjects' responses to the open-ended question were analyzed by content analysis.

6. Results of the Study

The results of the study were as follows:

(1) The participating subjects were 131 of 167 (78.4%) students registered in the Foundation Physics course in Academic Year 2020: 42 of 42 (100.0%) in Optometry, and 27 of 29 (93.1%) in Criminology and Justice Administration, 22 of 37 (59.5%) in Agricultural Innovation, and 40 of 59 (67.8%) from Engineering. There were 59 males (45.0%), and 72 females (55.0%). Those who graduated from high school in the science stream were 78 of 131 (59.5%) as shown in Tables 2 and 3.

Faculty	Number of Students	Registered (Person)	Percent
Faculty of Agricultural Innovation	37	22	59.5
College of Engineering	59	40	67.8
Faculty of Optometry	42	42	100.0
Faculty of Criminology and Justice Administration	29	27	93.1
Total	167	131	78.4

Table 2: Number and Percentage of Participating Subjects

Faculty	Gender Number of Persons (Percent)		Graduation Number of persons (Percent)			
	Male	Female	Upper Secondary Level General (Science)	Upper Secondary Level General (Art)	Secondary School Teacher	
Faculty of Agricultural	15	7	7	5	10	
Innovation	(11.5)	(5.3)	(5.3)	(3.8)	(7.6)	
College of Engineering	27	13	20	8	12	
	(20.6)	(9.9)	(16.3)	(6.1)	(9.2)	
Faculty of Optometry	12	30	34	5	3	
	(9.2)	(22.9)	(26.0)	(3.8)	(2.3)	
Faculty of Criminology and	5	22	17	9	1	
Justice Administration	(3.8)	(16.8)	(13.0)	(6.9)	(0.8)	
Total	59	72	78	27	26	
	(45.0)	(55.0)	(59.5)	(20.6)	(19.8)	

Table 3: Classified Baseline Data of Participating Subjects

(2) For those students in Agricultural Innovation, their average satisfaction with the application system, the physics course management system, and the online learning system in the Physics course via three applications were high at 4.6 ± 0.7 , 4.5 ± 0.7 and 4.5 ± 0.7 , respectively. The students were a little less satisfied at 4.5 ± 0.7 , 4.5 ± 0.7 and 4.4 ± 1.1 , respectively. The mean of "announcing the scores in the online system" was at 4.7 ± 0.5 for those students in Agricultural Innovation and Engineering. It was noted that the item "reduce costs and reduce travel time to attend classes" for Engineering students was at 4.4 ± 1.1 . Overall, students in Agricultural Innovation appeared a little more positive than those in Engineering toward online teaching and learning management in the Physics course. Details are shown in Table 4.

Table 4: Satisfaction Results of Students in Agricultural Innovation and Engineering

Assessment Item		Faculty of Agricultural Innovation		College of Engineering	
	\overline{x}	SD.	\overline{x}	SD.	
Satisfaction with the application system	4.6	0.7	4.5	0.7	
1. Using group lines in communication.	4.5	0.9	4.6	0.6	
2. Using google classroom instead of normal classroom.	4.6	0.6	4.4	0.8	
3. Using google meet in real-time online learning.	4.6	0.6	4.4	0.7	
Satisfaction with the physics course management	4.5	0.7	4.5	0.7	
system					
1. Details appear in the online classroom structure.	4.5	0.7	4.5	0.6	

Assessment item		Faculty of Agricultural Innovation		ege of eering
	\overline{x}	SD.	\overline{x}	SD.
2. Real-time online learning.	4.4	0.7	4.3	0.7
3. Video recordings of real-time online teaching.	4.4	0.7	4.5	0.8
4. Documents for lectures.	4.3	0.9	4.5	0.8
5. Exercises for learning.	4.4	0.8	4.5	0.7
6. Supplementary media such as video clips answering	4.3	0.8	4.5	0.8
7. Submitting work in the online system.	4.6	0.5	4.5	0.7
8. Online Exam.	4.5	0.5	4.7	0.6
9. Announcing the scores in the online system.	4.7	0.5	4.7	0.5
10. Content sequencing is more convenient and easy to self-study.	4.5	0.7	4.6	0.6
Satisfaction with the online learning system	4.5	0.7	4.4	1.1
1. Help to understand the lesson just like studying in a	4.4	0.8	4.1	0.9
normal classroom.				
2. Give an opportunity to ask questions in the lesson.	4.6	0.5	4.4	0.8
3. Able to review teaching and learning as needed.	4.5	0.7	4.6	0.6
4. Help to have an increase in academic achievement.	4.3	0.8	4.3	0.8
5. Reduce costs and reduce travel time to attend classes.	4.6	0.7	4.4	1.1

(3) It was found that the average satisfaction with the application system, the physics course management system, and the online learning system in the Physics course via three applications were: Optometry at 4.3 ± 0.8 , 4.3 ± 0.8 and 4.2 ± 0.8 , respectively; and Criminology and Administration of Justice at 4.6 ± 0.7 , 4.6 ± 0.7 and 4.4 ± 0.7 , respectively. It was obvious that the students in Criminology and Administration of Justice were positive toward online teaching and learning management in the Physics course, as seen in their mean values ranging from 4.2-4.6 with the highest satisfaction with "Exercises for learning" at 4.7 ± 0.6 . Those students in Optometry were slightly lower in their satisfaction with the lowest mean value at 3.9 ± 1.0 for "Help to have an increase in academic achievement," and the highest mean value at 4.6 ± 0.6 for "Announcing the scores in the online system." Details are shown in Table 5.

Table 5: 3	Satisfaction Results of Students in Optometry and Engineering and Criminology and
	Justice Administration

Assessment Item		lty of metry	Faculty of Criminology and administration of justice	
	\overline{x}	SD.	\overline{x}	SD.
Satisfaction with the application system	4.3	0.8	4.6	0.7
1. Using group lines in communication.	4.2	0.8	4.6	0.6
2 Using google classroom instead of normal classroom.	4.4	0.7	4.6	0.7
3. Using google meet in real-time online learning.	4.3	0.8	4.5	0.7
Satisfaction with the physics course management system	4.3	0.8	4.6	0.7

Assessment Item		lty of	Faculty of	
	Opto	metry	Crimin	ology
			and administration	
			of jus	stice
	\overline{x}	SD.	\overline{x}	SD.
1. Details appear in the online classroom structure	4.2	0.8	4.5	0.7
2. Real-time online learning.	4.1	0.8	4.5	0.8
3. Video recordings of real-time online teaching.	4.4	0.9	4.6	0.6
4. Documents for lectures.	4.2	1.0	4.6	0.9
5. Exercises for learning.	4.1	0.9	4.7	0.6
6. Supplementary media such as video clips answering	4.3	0.9	4.4	0.7
exercises.				
7. Submitting work in the online system.	4.4	0.7	4.6	0.7
8. Online Exam.	4.5	0.8	4.6	0.6
9. Announcing the scores in the online system.	4.6	0.6	4.6	0.7
10. Content sequencing is more convenient and easy to	4.3	0.8	4.5	0.6
self-study.				
Satisfaction with the online learning system	4.2	0.8	4.4	0.7
1. Help to understand the lesson just like studying in a	4.0	0.9	4.2	0.7
normal classroom.				
2. Give an opportunity to ask questions in the lesson.	4.0	0.8	4.4	0.6
3. Able to review teaching and learning as needed.	4.3	0.9	4.6	0.8
4. Help to have an increase in academic achievement.	3.9	1.0	4.3	0.7
5. Reduce costs and reduce travel time to attend classes.	4.6	0.6	4.6	0.7

(4) The students' average satisfaction with three applications in the Physics course using LINE, Google Classroom and Google Meet revealed that those in Agricultural Innovation, Engineering, and Criminology and Justice Administration were satisfied with Application, Course Management and Online Learning at the total average of 4.5 ± 0.7 , 4.5 ± 0.8 and 4.5 ± 0.7 , respectively. Those students in Optometry were a little less satisfied at 4.3 ± 0.8 .

It should be noted that the students in Agricultural Innovation (4.6 ± 0.7) and Criminology and Justice Administration (4.6 ± 0.7) were more pleased with the *Applications* used in the Physics course than those in Engineering (4.5 ± 0.7) and Optometry (4.3 ± 0.8) . Those in Criminology and Justice Administration (4.6 ± 0.7) were the highest in satisfaction with *Course Management*, while Agricultural Innovation (4.5 ± 0.7) were the highest in satisfaction satisfaction with *Online Learning*. Among the four groups, the students in Optometry (4.3 ± 0.8) appeared a little less satisfied overall. Details are given in Table 6.

Assessment Item	Facu Agricu Innov	lty of ultural vation	Colle Engin	ege of eering	Facu Opto	lty of metry	Facu Crimi and J Admini	lty of nology lustice istration
	\overline{x}	S.D.	\overline{x}	S.D.	\overline{x}	S.D.	\overline{x}	S.D.
Satisfaction with the <i>application</i> system.	4.6	0.7	4.5	0.7	4.3	0.8	4.6	0.7
Satisfaction with the physics <i>course management</i> system.	4.5	0.7	4.5	0.7	4.3	0.8	4.6	0.7
Satisfaction with the <i>online learning</i> system.	4.5	0.7	4.4	1.1	4.2	0.8	4.4	0.7
Total	4.5	0.7	4.5	0.8	4.3	0.8	4.5	0.7

Table 6: Satisfaction Results of Students with Online Learning Management Using Three Applications

(4) Those students who gave opinions or suggestions were 61, representing 46.6%, of which 23 from the Faculty of Optometry, representing 54.8% as shown in Tables 7 and 8.

Table 7: Frequency and Percentage of Participating Students' Responses

Faculty	Number of Respondents	Number of Open-Ended Questions (Persons)	Percent
Agricultural Innovation	22	8	36.4
Engineering.	40	20	50.0
Optometry.	42	23	54.8
Criminology and Justice Administration.	27	10	37.0
Total	131	61	46.6

Table 8 reports comments and suggestions given by the participating students. The total number of responses from the participating students was 61 (one student could give more than one response). By response frequency, more than one-third of the students (F=27) were happy with the teacher's teaching method. Other responses dealt with comments or suggestions on the online course teaching: (1) convenience in learning time (F=8), (2) preference for a real classroom/ admitting affective effects on their mood (F=7), (3) request for slower teaching pace (F=4), (4) request for earlier teaching video clip uploading (F=2), and (5) teaching time keeping or punctuality (F=2). The rest of the responses with Frequency of 1 were on explanations, exercises, lab documents, problem-solving tasks and the like. Details are shown in Table 8.

Faculty	Comments and Suggestions
Agricultural	• Teacher is very good at teaching online. I can review the
Innovation (F=8)	content myself. I like it very much.
	• I want Covid to go away.
	• Good (f=2)
	• The teacher is kind.
	• I study for a long time and I feel sleepy.
	• Sometimes I can't catch up. Maybe it's a subject that I'm not
	good at. I have to apologize here.
	• Thank you teacher for inserting knowledge about agriculture
	for me. It's a lot of fun when the teacher tells stories about the
	teacher's garden. I like it.
Engineering (F=19)	• Very good teaching, easy to understand.
	• Want to study at university.
	• Add exercises that use more complex analysis and calculations
	• The teacher is very good. I want the teacher to slow down a bit.
	 I like studying
	 I don't understand like in my class
	 Llike to go to class more
	• Thank you $(f-2)$
	 It's assign to understand in my class
	• It is easier to understand in my class.
	• I want you to teach slowly.
	• The teacher recommends it. Yes, always remind students.
	There is always something to ten students in the group line, so
	students are always entrustastic.
	• The teacher is very good. If it's slower, it will be very good.
	• I want the teacher to teach me how to analyze the problems in each lesson a lot.
	• I want to study in the classroom more. because it makes you
	concentrate and understand more But with this situation, it's not
	good. must study online But I understand.
	• Even though online learning reduces travel expenses, learning
	is still less than studying in the classroom.
	• I want teachers to teach a little slower.
	• Thank you teacher for giving the kids the opportunity.
	• It might make me lazy to study.
Optometry (F=24)	• Study and have convenient videos. If you can't listen to it in
optometry (r 21)	time you can repeat it over and over
	 Good
	 About time sometimes there may be late, sometimes not
	released on time. Overall ok.
	• Sometimes the voice may not be very clear.
	• If you study in the classroom. You will understand more.
	• Teacher teaches very well.
	• Teacher teaches in detail and understand.
	• Online classes can review the content by themselves. This
	allows students to understand the lesson more.

Table 8: Comments and Suggestions from Participating Students

Faculty	Comments and Suggestions
	• Thank you teacher for giving knowledge and teaching very
	well throughout the 1 semester.
	• Thank you (f=2)
	• The homework briefs should be clear and accurate so that
	students can understand the lesson better. To understand the
	correct way of thinking more.
	• I want to study at the university more.
	• Thank you for your interest in people suffering from depression like me. Even though I didn't inform the teacher that I am, the teacher still gave me a way for people with depression to show themselves. Thank you very much.
	• I want the teacher to explain in detail. And I want the teacher to speak a little slower. Thank you.
	• The teaching recording is very good. It helps us understand many times. We can go back and watch it as many times as we
	 I want the teacher to upload the teaching clips one by one to YouTube. Yes, because I will see first and understand. And on YouTube, you can replay and speed clips.
	• Want to study in the classroom more. When online is not as intended as it should be.
	• Learning in the classroom is the best choice. But in this
	situation, online learning is probably the best solution.
	• Time to teach because it's free in some sessions, the teacher teaches late.
	• The internet system is not good. This should be improved a bit.
	• I would like the teacher to clearly divide the teaching video for each chapter. And video labs to specify more clearly for the
	 Even online learning is convenient. But I prefer to study in the room
	 The lab documents want the teacher to be able to do it in the app. without having to photocopy because of the waste of natural resources.
Criminology and	• Studying online and having videos to watch is very good.
Justice	Because you can always come back and review the lesson.
Administration	• The teacher gave me good advice on how to study.
(F=10)	• Very good.
	• The teacher teaches well but sometimes I can't keep up.
	• The teacher is cute.
	 There is a clip for each teaching. Looking back all the time is very good for this subject because I can come back and review the parts that I don't understand. Cond
	 The teacher is very nice and kind
	 There may be some difficulties when studying online, but still
	- There may be some uniformers when studying online, but still. It's all right. There is another video to review.
	 Teach well and be very kind, giving me the courage to ask.
	Thank you very much.

7. Discussion of Results

(1) The Questionnaire

The questionnaire results revealed the students in four faculties giving average satisfaction with online teaching and learning management of the Physics course via three applications--LINE, Google Classroom and Google Meet-at a high level: Faculty of Agricultural Innovation (4.5 ± 0.7) , College of Engineering (4.5 ± 0.8) , Faculty of Criminology and Justice Administration (4.5 ± 0.7), followed by Faculty of Optometry at (4.3 ± 0.8). This finding was rather consistent with the studies of other preceding researchers, particularly Chuha et al (2019) who reported students' satisfaction with online teaching via the Zoom Cloud Meeting application in the practice of midwifery courses. These researchers highlighted students' satisfaction with virtual teaching at the mean of 4.61±0.49, followed by 4.59±0.49 on being able to review teaching and learning as needed. Similarly, Wuttiyan & Srikramkran (2017) reported language learners' high satisfaction with format and content used in English online via Skype at ECC Language Institute. Sedrit (2020) also praised Google Classroom in teaching language for communication in Grade 5. It was found that the students were satisfied with the lesson series of activities to develop their English communication skills. The learners in the study liked content in the lesson enhancing the communicative English experience and enjoyed learning English through the Google Classroom application for its ease, speed and access to teaching. Students can save time in traveling to university. It is a great way to handle learning and communication with students as education management strategies required at the university level (Petchroj, 2021); the virtual mode helps reduce costs in teaching and learning management, and alleviate stress over economic hardship on the part of students and their families. Online learning does not limit the number of learners, and students can learn and review their lessons as many times as needed.

(2) The Open-Ended Responses

As seen in Table 8, 61 students gave their opinions/suggestions on the Physics course teaching and learning management via LINE, Google Classroom and Google Meet. Most respondents were positive about being able to review the lessons at their own learning pace to understand the teaching points. They praised the teacher for good attention to learners and effective online teaching techniques. The respondents liked the way the teacher reminded them in group LINE to keep students active in class time. Provision of teaching clips was for students to review them later, as expressed in one response "Sometimes I really can't keep up. Maybe it's a subject that I'm not good at. I'm sorry here." Some respondents asserted that they would prefer to study in a real classroom: "I would rather study in a classroom. When online, it's not as intended as it should be." From these comments or suggestions, the researcher as a Physics course instructor would certainly take their feedback as information for adjustments in the next round of online teaching and learning management

8. Recommendations

Based on the research findings, the following points could be recommended:

(1) Online teaching requires a slow pace in explaining, and time for students to absorb the new points by mainly listening in virtual communication. The course instructor needs to look at the curriculum TQF 2, the course description in TQF 3 in order to plan on how to deliver the course contents in full while keeping the students' interaction, interest and attention span in focus. The contents could be divided into smaller units for the students to digest with ease, followed by their self-paced review and self-study. Therefore, the course instructor may need to provide online supplementary instruction to explain with more examples outside of class time and upload video clips for students to study and review again as needed. Also, it is important to follow up with students via LINE or other social media as agreed in class,

(2) Study programs should facilitate students to submit their assignments online to help reduce the use of paper.

(3) The course instructor can create a YouTube channel to upload video clips obtained from online teaching on Google Meet for the students' viewing after each class without delay.

9. Suggestions for Future Research

Based on the major findings of the study, the researcher would like to suggest future research in three aspects:

(1) Study students in other faculties or fields of study to get a wider scope of feedback for efficiency in online teaching and learning management.

(2) Study teaching management in terms of teacher-student and student-student interactions via Google Meet, Google Classroom, Microsoft Teams, Zoom, VooV, Facebook Live, LINE, and WeChat to identify a combination of use that suits particular groups of students or teaching-learning contexts.

(3) Study satisfaction and reaction on the part of teachers who need to cope with online teaching-learning management for custom-made in-service training programs pertinent to their needs for digital skills.

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