Constructive Alignment: Investigating Student's Use of Mobile Technologies in University Classrooms

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Abstract— ***The purpose of the present study was to inspect the impact of information and communication technologies (ICTs), while attempting to learn from real-time university classroom lectures. The numerous adoptions of mobile phones are one aspect of ICT pleasant appearance. Mobile usage is banned in most classrooms globally. However, students still use them during their lectures and tutorials. It is anticipated that this usage is askew from the motivation of the lectures and classrooms. Synchronizing students' mobile usage in classrooms with the incentives of their academic activities remains a significant avenue of research. A sample of undergraduate nd graduate Computer Science (CS) students and another sample of undergraduate and graduate English literature students were surveyed to establish their frequency of mobile ICT use in the classrooms and the students' motivations and basis for undertaking those activities unrelated to classrooms culture, in UMT Lahore , Pakistan . In spite of mobile usage being banned in class rooms, it was determined that a large number of students use mobile phones during lectures and tutorials. This study helped to revamp classroom activities, to actively involve digital technologies to lend a hand in valuable coalition with the learning outcomes and widen the student learning awareness.***

Keywords— m learning , mobile learning , e learning , education

I. INTRODUCTION

Digital technologies with access to Wi-Fi have become a vital aspect of education. It has been consented on that contemporary technologies can expand the scope and influence of modern educational tools. Modern – day research has resulted in smaller, cheaper and handy digital devices for aiding academic activities. The convenience of digital technologies has made them readily accessible and they have become an integral part of all contexts of life including the classroom [1]. Extensive research has emphasized the capacity of digital technologies, to enhance student –teacher cooperation in distant and conventional academic scenarios [1].

.In lieu of incorporating technology in imparting education, mobile phones are broadly being accepted as imperative learning instruments[2].The popularity of " Bring Your Own Device" model which advocates the use of personal mobiles to expedite access in academic activities, supports the usefulness of mobile devices in education[3].

The use of mobile phones in educational contexts is referred to as Mobile Learning (m learning), which equips students to contribute instantly to academic activities with real implications [5]. The adoption of m learning has enhanced student commitment towards education[6],improved performance[7], increased enthusiasm[9], and groomed their academic attitude[9], and critical thinking[10].The capability to involve students in effective educational opportunities from anywhere is one of the most important features of m learning[10].The immediate access to Internet on the mobile is one of the most popular motives for incorporating mobile devices in learning[12]. This feature allows teachers and students to conduct efficient online academic research [13]. Teachers involve their students in attempting and accessing assignments online. Moreover, access to online tools like Dropbox, Web 2.0., and Poll Everywhere for effective incorporation in academics is another vital aspect of m learning[14].The feature of sending and receiving SMS has also been efficiently used for collaboration between students and teachers, hence supporting the viability of m learning[15]. Mobile support for developing audios and videos based on academic content is another constructive function. It has been attested that student developed audio and videos for academics, enhance their reading and writing abilities and attentiveness [16]. Mobile phones provide teachers the capability to create their customized instruction material [17], develop student – centered educational activities, and collaborate for development of instruction material [18]. The access to academic content on mobile phone has proven to enrich academic competence and learning caliber. The use of Personal Digital Devices in curriculum has also resulted in improved exam scores in students [19].

There are also contradictory conclusions about mobile effectiveness in academia. It has been implied that students who use mobiles in academic settings suffer from loss in concentration. Degradation of intellectual capability is also an adverse side effect of incorporating mobiles in academia [20]. Incorporating computing in education has proved to be disruptive for learning abilities and causes distraction. Making calls, sending and receiving SMS and checking

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emails during classes using mobiles has been proven to divert student attention from academic matters [21]. The effect of SMS slangs and abbreviations on students is also an issue of substantial concern for instructors. Too much texting has demonstrated adverse impacts on student literacy [22]. Mobile phone usage for cheating, sexting and bullying has been matters of severe concern in academic environments [23]. Cyber bullying i.e. bullying using digital technologies is a crucial concern. It has been revealed that a large number of bullies use their mobiles for harassing others [24]. In a study presented in[25]it was also found that if student were allowed to use mobiles phones in classes, their attention diverted from academic activities occurring in the class resulting in declined performance in academic assessment. Students spent two thirds of their time on irrelevant activities if laptops were allowed in class [26]. Prompt access to Internet is also one of the undesirable effects of permitting portable devices in lectures. It has been proved that this prompt access to Internet results in poor exam performance and reduced academic competence [27].

Constructive alignment is a prominent teaching strategy that is based on the synopsis that students ripen their knowledge from learning activities. It also infers that student learning is most fulfilling when academic instructors coordinate their teaching approaches and academic evaluations with expected learning results [29]. As the constructive result of integrating mobile phones in academia is significantly confirmed, aligning course outcomes to effectively use positive academic effects of mobile phones is an imperative feature of this research venture. In Lieu of this, it is essential to recognize student motivations for using mobiles for course related and unrelated activities in classrooms and during lectures and tutorials.

Introduction is the initial part of this research followed by related work. After related work methodology is elaborated and then results are explained. Discussion and conclusion section follows the results..

II. RELATED WORK

Globally, extensive research is conducted to determine the usability of mobile phones in facilitating student learning. A survey was conducted to determine the usability of mobile phone based response system in a post-secondary class room. It was concluded that the participants enjoyed the activity, felt their class was more interactive, and were more enthusiastically involved in their learning. The instructors also concluded the introduction of mobile based class activities enriched student eagerness in class [29].

Another study was conducted to investigate teachers 'insight about mobile phone usage of students in classrooms. Out of 245 respondents of the survey, 45% encouraged mobile phone usage in class for educational initiatives. This research inferred that Internet accessibility, availability of educational applications and the capability to use mobile as a book reader were the most popular educational features [30].

An investigation was executed to comprehend the effectiveness of Classroom Response System (CRS) that improved student involvement in their academics. This system allowed students to give immediate feedback via their mobiles. It was concluded that CRS had the benefits of improved student academic enthusiasm and excitement towards course, enhanced attentiveness, and better attendance. Student-teacher relation was also improved as students were allowed to provide instant feedback [28]. A mixed-method study about the popularity of mobile phones in medical students was conducted. Medical students and faculty were interviewed to investigate their perceptions about using mobile phones and mobile devices in medical academia. Over 85% participants confessed to use a mobile. The participants narrated that the ability to carry academic material on mobiles and the ease of use of mobile phones were significant benefits. It was also inferred from this survey that the simplicity of information management on mobiles and the ability to readily communicate with peers and teachers were other vital advantages of inculcating mobile usage in academia [31].

Another study supports the inculcation of mobile technology in academia and curriculum delivery. In that study, audio and visual tapes of chemistry laboratory lectures were made accessible to students on iPhones and iPods. Quantitative analysis was done on the degree to which students accessed the academic data on their devices, the frequency of interactions between students and instructors, and student performance in grading assessments. It was deduced that teams with academic material on their mobile devices interacted with the instructor fewer times and had better understanding of their academic material. The students with laboratory material on mobiles also scored better course average [32]. Another study on acceptance of mobiles in schools deduced that the frequency of students owning mobiles increased as the classes got higher. Maximizing the effectiveness of m-learning, and incorporating m-learning in the curriculum were vital aspects of this study. It was deduced that student motivation towards academic ventures enhanced and student learning improved [33].

III. MEHTODOLOGY

The participants of this study were students of four courses, from four different degree programs i.e. BS Computer Science, MS Computer Science, MA English and MPhil English Literature at University of Management and Technology, Lahore, Pakistan. Each course was conducted as a 75 minutes long lecture, held twice a week. Course content was delivered by a teacher with the help of Power Point presentations. Tutorials were held to repeat difficult course content, as 75 minutes lectures too, held once a week. The intention of this research was to develop an insight into student perspective for using their mobiles for course irrelevant activities during lectures and tutorials. This information was

One hundred and seventy eight students (99 males and 79 females) from the university took part in the survey. 54% of the participants were from Computer Science Department, while the remaining 46% were students of English Literature Department. Moreover, 57% of the survey participants were undergraduate students and 43% were graduates. The students were asked to anonymously fill an online survey. It had demographic questions. There were also Likert Scale Item questions (1 Never, 2 Seldom , 3 Sometimes, 4 Frequently and 5 Very Frequently) for analyzing student intentions for mobile usage during lectures. There were open ended questions for comprehensively analyzing students' opinions about mobile usage during lectures and classes. An

online survey was developed and its link was emailed to participants for filling.

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IV. RESULTS

It was depicted from results of the survey that 66.5 % participants possessed a Smartphone device, while 88.8% used some sort of Computer or Tablet during university hours. Only a minor 3.5% of students specified that they did not have any device with Internet. A fairly large percent of students stated that they used their Internet capable devices during their course lectures. 73.4 % students answered Yes to "Do you use your Internet capable devices during lectures?" 22% answered No and 4.6% claimed they did not have any Internet capable device at University. Crucial points of the survey are depicted in Table 1.

Table 1 : IMPORTANT POINTS OF SURVEY ON MOBILE USAGE IN CLASS LECTURES/TUTORIAL

	Explanation
P1	Internet Usage to Access Course Information
P2	Internet Usage to Access Email
P3	Internet Usage to Access Facebook
P4	Internet Usage to Access Online News
P5	Internet Usage to Access Online Sports Update
P6	Internet Usage to Chat
P7	Internet Usage to Access Youtube
P8	Internet Usage for other Activities
P9	Sending and Receiving SMS

Table 2 presents the results of various course activities, conducted on the Internet, by students during lectures. Encouragingly 24.3 % students quiet often, while 17.5% students often use Internet for acquiring course relevant material. More than half of the students never or seldom use Facebook in their class lectures. Moreover, greater than 50% of the students never or seldom use Internet for Online News, Sports, Chatting, or accessing YouTube. Surprisingly only 18.6% students acknowledged to frequently sending and receiving SMS, while 8% admitted to often sending and receiving SMS, during class lectures. An 18.6% of respondents confessed to quiet often accessing, while 21.5% often accessed email, during course lectures.

Table 2 : PERCENTAGE OF PARTICIPANTS EVALUATING THEIR USE OF MOBILES FOR DIFFERENT ACTIVITIES DURING CLASS LECTURES.

Essence of Questions	**% of Students Responses**				
	5	***4***	***3***	***2***	***1***
P1	24.3	17.5	23.7	12.4	22
P2	18.6	21.5	13	20.9	26
P3	19.2	10.2	8.5	16.9	45.2
P4	19.2	7.4	10.7	18.1	44.6
P5	17.5	10.7	11.3	15.8	44.6
P6	17.5	13.6	13.6	14.7	40.7
P7	19.8	8	6.7	20.3	45.2
P8	17.5	20.3	27.7	13	21.5
P9	18.6	8	14.7	19.2	39.5

It is depicted from **Table 3** that 24.3% participants quiet often accessed, while 26.6% students often accessed Internet for seeking course relevant material. It was very reassuring to determine that approximately half of the participants Never or Seldom opened the Internet for Facebook, online sports, news, chatting or YouTube even during course tutorials.

Table 3 : PERCENTAGE OF PARTICIPANTS EVALUATING THEIR USE OF MOBILES FOR DIFFERENT ACTIVITIES DURING TUTORIALS.

Essence of Questions	**% of Students Responses**				
	5	***4***	***3***	***2***	***1***
P1	24.3	26.6	12.4	16.4	20.3
P2	20.9	18.6	16.4	15.3	28.8
P3	18.6	13	12.4	19.2	36.7
P4	19.8	9	14.7	16.4	40.1
P5	18.1	8.5	12.4	18.6	42.4
P6	18.1	12.4	15.8	15.3	38.4
P7	19.2	9.6	10.8	16.9	43.5
P8	18.1	10.2	19.2	18.8	33.9
P9	19.2	17.5	23.2	15.3	24.9

Chi-square analysis was carried to evaluate variations in responses of categorical questions based on gender, graduate and undergraduate level and department (Computer Science and English). The responses to yes no questions like Do you use mobile during class lectures? Do you use mobile during class tutorials? Lastly, Do you think using mobile for course irrelevant activities in class lectures and tutorials diminishes concentration? The analysis inferred that there was no link between sub-demographic characteristics in context of the previously mentioned categorical questions.

Independent t tests were conducted on gender, graduate and under graduate level and department (Computer Science and

English). An α =0.05 was used as significance level. 4 depicts t- test results for Gender comparisons for Likert scale questions related to mobile usage activities during course lectures. It was inferred that male students used mobiles, more than females for using Internet for course material and accessing emails. The male students also depicted a higher use of mobiles for Facebook usage, online news, and online sports news chatting and using the Internet for other activities. Surprisingly female students demonstrated a higher usage of Internet on mobile phones for accessing YouTube. Female students also had a higher usage of using mobile to send and receive SMS as depicted in Table 4.

Table 4 : T TEST RESULTS FOR GENDER COMPARISONS FOR LIKERT SCALE QUESTIONS FOR MOBILE USAGE ACTIVITIES DURING COURSE LECTURES.

Questions	Male		Female		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.45	1.23	2.76	1.09	t(21)=2.87	0.04
P2	3.12	1.33	3.01	1.17	t(29)=3.01	0.06
P3	2.04	0.98	1.45	0.55	t(25)=1.41	<0.001
P4	1.75	0.25	0.46	0.02	t(19)=-2.66	0.09
P5	1.23	0.35	0.45	0.21	t(22)=2.04	0.07
P6	1.30	0.17	0.96	0.23	t(26) =-2.37	0.06
P7	1.11	0.45	1.23	0.60	t(25)=3.23	0.30
P8	1.56	0.36	1.78	0.87	t(20)=-3.01	0.42
P9	3.01	1.22	3.99	1.89	t(21)=2.34	0.06

It can be concluded from Table 5 that female students had a higher rate of accessing Internet on their mobiles during course tutorials for accessing course material, emails and Facebook. It is also deduced that female students chatted more using Internet on mobiles and had a higher frequency of accessing Youtube then male students in course tutorials. Male students depicted a slightly higher frequency of accessing online sports on their mobiles and using the Internet for other activities. Male students also showed a greater tendency to send and receive SMS during course tutorials.

Table 5 : T TEST RESULTS FOR GENDER COMPARISONS FOR LIKERT SCALE QUESTIONS FOR MOBILE USAGE ACTIVITIES DURING COURSE TUTORIALS

Questions	Male		Female		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.45	1.54	3.66	2.1	t(27)=-4.01	0.071
P2	3.78	1.25	3.87	2.01	t(25)=3.01	0.0522
P3	3.67	1.06	3.98	2.01	t(22)=3.21	0.064
P4	1.45	0.565	1.01	0.34	t(23)=-2.01	0.051
P5	2.55	0.32	1.34	0.11	t(19) = 3.02	0.034
P6	2.24	1.11	2.68	1.04	t(27)=-4.60	<0.001
P7	3.33	2.01	3.45	1.55	t(29)=3.33	0.045
P8	3.67	1.98	2.99	1.65	t(24)=2.89	0.056
P9	3.98	1.54	3.25	1.44	t(22)=2.97	0.035

Table 6 shows that graduate students engaged in more mobile usage for accessing course information, Facebook, and online news on the Internet than undergraduate students, and vice versa for Internet usage on mobiles for accessing emails, online sports, YouTube and other activities. Graduate students had a greater tendency to chat on the Internet on their mobiles, while undergraduate students showed a greater inclination towards sending and receiving SMS during course lectures.

Table 6 : T TEST RESULTS FOR GRADUATE AND UNDERGRADUATE GROUP COMPARISONS FOR LIKERT SCALE QUESTIONS FOR MOBILE USAGE ACTIVITIES DURING COURSE LECTURES

Questions	Graduate		Undergraduate		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.67	1.36	3.21	1.21	t(31)=2.51	0.039
P2	3.15	1.21	3.34	1.19	t(29)=3.33	0.035
P3	3.18	1.18	2.78	0.78	t(28)=2.61	0.031
P4	2.75	0.45	1.19	0.33	t(33)=-2.06	0.04
P5	2.99	1.12	3.12	1.22	t(37)=2.15	0.052
P6	3.55	2.11	2.98	1.90	t(34)=-2.84	<0.001
P7	3.67	1.43	3.98	1.81	t(32)=2.10	0.038
P8	3.33	1.11	3.66	1.78	t(38)=-2.51	0.025
P9	3.5	1.03	3.67	1.13	t(35)=-2.84	0.015

In Table 7, it is concluded from application of t test that graduate students have a larger inclination of mobile usage for accessing Internet for academic material, emails, Facebook, online news, online sports and other activities during course tutorials. Meanwhile undergraduates demonstrated a larger tendency to chat on the Internet and use YouTube on their mobiles in course tutorials.

Table 7 : T TEST RESULTS FOR GRADUATE AND UNDERGRADUATE GROUP COMPARISONS FOR LIKERT SCALE QUESTIONS FOR MOBILE USAGE ACTIVITIES DURING COURSE TUTORIALS

Questions	Graduate		Undergraduate		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.95	1.98	3.54	1.65	t(37)=2.26	0.029
P2	3.65	1.56	3.42	1.33	t(34)=-3.83	0.041
P3	3.53	1.34	3.33	1.12	t(29)=-2.51	0.04

P4	2.91	0.78	2.66	0.54	t(36)=-3.02	0.016
P5	3.99	1.21	3.45	1.33	t(31)=2.41	0.005
P6	3.42	1.22	3.69	1.32	t(33)=3.01	0.039
P7	3.22	1.11	3.65	1.22	t(34)=2.75	0.019
P8	3.86	1.53	2.76	1.33	t(38) = 3.61	0.018
P9	3.77	1.31	2.81	1.07	t(31)=3.45	0.032

Independent t test implementation for Computer Science and English students showed that Computer Science students had a higher rate of Internet usage on mobile during class lectures as depicted in Table 8.

Table 8 : T TEST RESULTS FOR COMPUTER SCIENCE VS ENGLISH STUDENTS FOR LIKERT SCALE QUESTIONS FOR ACTIVITIES DURING COURSE LECTURES

Questions	Comp Sci		Eng		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.4	1.11	2.34	1.22	t(21) = -3.55	0.035
P2	3.21	1.09	2.56	1.11	t(22) = 2.26	0.027
P3	3.11	1.10	2.01	1.08	t(21)=4.57	<0.001
P4	3	0.43	2.22	0.56	t(25) = 3.65	0.045
P5	3.12	0.22	1.99	0.55	t(27) = 3.23	0.006
P6	3.66	0.23	3.11	0.12	t(21)=3.61	0.017
P7	3.45	0.12	2.34	0.34	t(24) = 4.48	<0.001
P8	2.97	1.11	2.65	0.88	t(26)=4.51	0.016
P9	2.5	1.22	2.01	0.66	t(28)=3.65	0.001

t test results for Computer Science vs English students for mobile usage activities during course tutorials are shown in Table 9. Computer Science students had a higher use of mobile use for Internet access and for sending and receiving SMS. Interestingly English students have a higher use of mobiles in course tutorials than in course lectures.

Table 9 : T TEST RESULTS FOR COMPUTER SCIENCE VS ENGLISH STUDENTS FOR LIKERT SCALE QUESTIONS FOR ACTIVITIES DURING COURSE TUTORIALS

Questions	Comp Sci		Eng		T – Test	P value
	Mean	*SD*	*Mean*	*SD*		
P1	3.99	1.01	3.44	1.11	t(19)=3.81	0.025
P2	3.63	1.11	3.14	1.09	t(17)=3.01	0.037
P3	3.41	1.22	3.21	1.19	t(16)=4.44	0.018
P4	3.21	1.04	3.11	1.84	t(15)=3.76	0.029
P5	2.09	1.00	1.99	0.98	t(14)=3.22	0.018
P6	3.66	1.14	3.14	0.58	t(18)=3.66	0.046
P7	3.77	1.04	2.99	0.56	t(13)=3.11	0.047
P8	3.45	1.03	2.33	0.49	t(18)=3.89	0.046
P9	3.66	1.11	2.55	0.66	t(20)=4.44	0.027

There were open ended questions in the survey to gain student insight into their use of mobiles in course lectures and tutorials. Students were inquired on advantages and disadvantages of mobile usage in class lectures and tutorials. Leximancer was used to analyze student responses. Students regarded Internet access on mobile during lectures and tutorials, as a beneficial utility for readily retrieving course related academic material. Some prominent comments were "Difficult course concepts can be quickly studied on Internet on mobile and discussed in class", and "Quick access to contemporary and International course material". Though it was agreed that Internet access via mobiles in lectures was advantageous, students also regarded it as deterring concentration. They commented that "Mobile usage during class lectures causes loss of attention" and "Using mobiles in class lectures and tutorials diverts attention from teacher and discussion being held in class". Students were also asked if they use mobile phones in class lectures and tutorials despite mobile usage being distracting. Some of the student replies were" Sometimes class is boring so out of boredom I use mobile ", " When I don't feel interested in class I use mobile " and " Lack of attentiveness in class" . Table 10 depicts qualitative analysis for open ended questions.

Table 10 : QUALITATIVE ANALYSIS FOR OPEN ENDED QUESTIONS

Questions	Themes	Concepts	Frequency
Advantages of using mobiles in lectures and tutorials.	Academic Material Repository	Readily accessing more sources of course relevant information	55
		Access to other course related assignments and activities	
Disadvantages of using mobiles in lectures and tutorials.	Divert Concentration	Distract attention from class instructor, lecture and activities	67
Why do you use mobiles in class lectures and tutorials if they cause loss of attention?	Uninterested	Boredom in class	34
		Lack of engagement in class activities and material	

V. DISCUSSION

A vital intent of this research was to investigate how students used mobile phones in their class rooms during academic lectures and tutorials. The extent, to which students used mobiles for course irrelevant activities, during course lectures, was surprising. Sending and receiving SMS, which needs non-smart mobile phones, was one of the key course unrelated activities carried out by students. Other course unrelated uses for mobile phones during lectures and

tutorials comprised of sending and reading emails, and surfing the Internet for a range of motives.

The degree to which lectures and course tutorials sustain student attention and enthusiasm is an imperative aspect in student use of mobile phones for course unrelated activities. Students considerably use mobiles for course unrelated activities, if they feel a deficiency of curiosity in lectures and tutorials. If students feel their lectures are not inspiring enough, they decide that using mobile for course unrelated activities is a worthwhile use of their time. Hence, to effectively occupy students in course activities, academic incentives must be efficiently modified. It was also inferred that learning experience and environment should feel "meaningful "to the students to efficiently capture their concentration. Aligning student learning and mobile usage for course related activities can be a substantial challenge for education policy makers. If this challenge is effectively fulfilled, then integrating mobile usage in academia can enhance student learning and overall academic intellect. Academic curriculum, teaching methodologies and course assessments can be adapted to incorporate continually progressing mobile phone functions and capabilities that are supportive for students in their academia. One significant characteristic of an effective mobile oriented learning environment would be that students can be given incentives on using their mobiles for course associated purposes.

VI. CONCLUSION

It was deduced from this study, that students supported mobile usage for accessing course related material. However, mobile usage for course irrelevant activities was affirmed distracting during their lectures. The students declared that these distractions undermined their academic activities. Students were distracted from their academic activities if some student near them was using mobiles for course unrelated activities, in lectures. This distraction ultimately reduces student learning. Multitasking during academic activities is unfavorable for academic performance. As students substantially use mobiles for course unrelated activities during their lectures, teachers' role in planning valuable modes of lecture delivery, devising interesting course material and assessments has imperative significance. Students should be given some guidance on how to ingeniously manage mobile phone usage for enhancing academic potential. In this investigation, students declared their mobile phone obsession, incapability to control themselves and uninteresting lectures as the reasons for using mobile phones for course unrelated activities. Institutes have a vital role in implementing procedures for effective incorporation of mobiles in academia. Institutional support would encourage training procedures for teachers that would enable them to devise effective strategies for inculcating mobile use in academia that maximizes achievement of academic goals. This research was carried out to understand student inclinations towards mobile usage in university. It was also investigated how this usage aligns with the academic goals and motivations of their courses. Moreover, students realized that irrelevant mobile usage distracted them from academic goals. It is concluded from this research that by developing strategies that incorporate mobile usage in accordance with academic objectives can enhance learning , motivation and enthusiasm of students .

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