International Journal of Latest Research in Humanities and Social Science (IJLRHSS)
Volume 02 - Issue 09, 2019
www.ijlrhss.com || PP. 127-136

Effects of What'sApp m-Learning Tool on Nigerian Undergraduates' Achievement and Retention in an Education Course

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Abstract: This quasi-experimental study sought to determine the effects of WhatsApp m-learning tool on the academic achievement and retention of an Education course among undergraduates of Abia State University Uturu, Nigeria. The purposive sampling technique was employed in selecting from a population of 60 students registered for the Education course, 25 subjects of who were randomly assigned to experimental (E) group; and 35 to the control (C) group. While the E group was taught using the WhatsApp platform, the C group was taught using traditional didactic approach. Both groups were taught for 4 weeks after which a valid and reliable achievement test (reliability index of 0.89) was administered to the E and C groups. The retention test which was same as the achievement test except for the reordering of the special arrangement of the items, was administered to the E & C groups 4 weeks later. The obtained scores were the data used to answer the 3 research questions applying means and standard deviation; and ANCOVA for data on the 3 hypotheses that guided the study. The results proved the superiority of the WhatsApp m-learning tool over the traditional didactic approach both in the achievement and retention. The academic achievement was not influenced by gender. Recommendations were made for tertiary level teachers to utilize the WhatsApp more confidently as a supplement to the traditional didactic approach.

Keywords: WhatsApp m-learning Tool; Academic achievement, Retention.

1. Introduction:

The last decade was characterized by increased application of the digital tools of communication especially among key players in the education industry – student groups and their teachers. Such facilities as the Email, Facebook, Twitter, Sms, and WhatsApp are gaining substantial grounds in improving communication (Sayan 2016). It would appear that What'sApp appeals to a lot more people on account of its user-friendly nature and versatility. Most smart phones avail users the opportunity to utilize the What'sApp (Bouhnik and Deshen, 2014). The group-chat and location sharing opportunity of the What'sApp are some of its strengths as a result of which it is gaining popularity among users (Ghailan 2016) especially students and their teachers. Indeed the increasing emphasis on blended learning and application of technology in the online teaching – learning process have facilitated the popularity of WhatsApp as an m-learning instructional tool (Fr, Tschi & Wolf, 2012).

The Mobile – Learning (m-learning) is the strategy of the moment which emphasizes that learning can be taking place anywhere and everywhere an individual might find himself/herself using wireless devices (Pack 2011; Izyani and Moham 2016) and in various formats. The What'sApp is the technology of this age, and so children of today absorbed it as a way of life. It becomes imperative for teachers of these children to adapt their instructional practices to accommodate this new culture and transform it into a viable instructional culture that will be of benefit to both the learners and teachers. (Gon and Ravvekaouths , 2017). This is necessary because as the days progress, What'sApp usage continues to gain popularity with more youths keying into it. (Barhoumi,2015) The above fact challenges our instructional planners to seek ways of maximizing the utility of m-learning tools for more instructional delivery (in various subject areas covered by school curricula (Baran 2014). We are inspired to insist on this because there is evidence that students, especially, tertiary level ones, have shown a positive attitude towards the use of What'sApp as a learning tool (Aisha, 2014).

One interesting merit of What'sApp as a learning tool is its ability to facilitate the retention of any learned material. Retention implies the mental operation of transferring a learned information from the short term memory to long term memory (Andriotis,2017). As long as the information or chat is not deleted, then learner is able to access it as frequently as possible and wherever one stays, until the information is thoroughly learned and completely absorbed. (Salechi and Ashiyan 2016).

The What'sApp processes some update features which teachers and learners can both utilize to optimize teaching and learning. Of special interest are the facilities for the use of text, audio, emotions, images and videos. It is also possible to create groups and broadcast list that promote the sharing of messages. (Bouhnik and Deshen (2014).

What'sApp has been experimented on and found to be of immense advantage to both students and teachers towards facilitating learning through collaboration amongst students, effective instructional delivery on account of its affordability, and the facilitating of instructional design. (Said, 2015; Park, 2011, & Dempsey and Van Eric 2012).

The What'sApp may facilitate instruction when used in a number of ways including: application of the group – chat features in creating study groups and students' virtual classes; creating audio lessons and sending same to students; connecting with students outside the classroom and keying them into the ongoing lessons; carrying on with lessons via assignments even during vacation periods; the teacher creating lessons and circulating then via Youtube for the class member who can watch the lessons at their convenience; sending assignments in forms of graphics , pictures and chats to students to solve; using What'sApp web to facilitate communication by teachers on laptops, tablets or desktops; eliciting feedbacks from students. (Olukemi 2018). Some of the advantages of the What'sApp include: cost effectiveness as it free, user friendliness, lack of interruptions from adds; easy impartation from phones, sharing of location photos and status, ease of chatting and sharing with friends, etc. (Stephen Macane 2015). Other benefits of What'sApp as m- learning tool include:

- Availability of the faculty to all students who are enabled to make contributions on the platform and receive immediate feedback;
- Possibility of increased speed in uninterrupted communication among class members and teachers;
- Learning taking place anywhere, and anytime;
- Opportunity for students to access the internet with small amount of information and emerge with substantial information;
- the possibility of self assessment through quiz to review progress;
- Providing the opportunity for a medium for lecture packaging (Izyani & Mohammed,2016) Abaido & El-Messiry 2016);

Some challenges exist in the use of Whats'App as an m-learning tool. These include: Accessibility and technical issue, inadequate experience of some users; the restrictions in some schools of the use of mobile phones; unaffordability of smart phones by some high school students; teachers' intolerance of irrelevant messages; connectivity issues; informality of language used in communication, etc. (Marpadga, 2014, Baran , 2014, and Bouhnik & Deshen 2014).

A number of empirical studies have tried to investigate the efficacy of WhatsApp as an m-learning tool to facilitate learning and teaching. The study by Job, Abdulkarim and Onesmo (2016), explored the benefits and challenges of using the What'sApp in second language (L2) learning. They investigated whether What'sApp Social Networking Tool (WSNT) in English (L2) learning would make the class more interactive. WSNT was blended in grammar course for one semester. Thereafter evaluating forms and What'sApp discussion board were used to collect data. Result revealed the efficacy of the What'sApp in helping students learn English interactively and collaboratively. The WSNT in L2 was proved to be highly effective in achieving the objectives of the lessons as its facilitated student learning and development. The study made necessary recommendation for its adoption in Tanzanian schools.

The study that explored the effectiveness of What'sApp in the study of 4th semester MBBS students of Pathology of about 4 months compared the performances of the m-learning (Experimental) group with those of the didactic lecture (Control) group. The two groups were taught the same topics but with the different methods. The groups were assessed through pre and post test questionnaires of 20 marks for each topic. The post-test results showed that the group taught via What'sApp outperformed the didactic lecture group. The researchers concluded that What'sApp was a very effective tool for instruction in the course. (Gon and Rawekar 2017).

In the study by Tulika and Dhananjah (2014) 37 students of the Bachelor's in Education who had access to smart phones with mobile application of What'sApp were involved in the study. They participated in a What'sApp group chat in which they interacted for 40 days after which they were to complete a questionnaire on their experiences in using the What'sApp in learning as well as their disposition towards the use of

What'sApp in learning. The result showed very positive attitude towards the use of the m-learning tool. It was found to be educationally useful and promoted interactivity among their peers.

A study by Abiado and El-Messiry (2016) explored the usage of What'sApp among the students of Aldar University and indentified the impacts of What'sApp messenger on the education through improving the interaction of instructor-student communication and student-student communication via the e-learning environment. Results revealed strong positive indicators that there were distinct differences between the normal classroom teaching method and e-learning method applied via What'sApp. Indicators showed the learning environment being influenced by multiple variables. This led to the conclusion that there is a growing need for further studies, and more innovative teaching methods.

The study by Ashiyan and Salechi (2016). determined the effectiveness of WhatsApp on school work and out of school work in the study of English as a foreign language by Iranian students. The experimental group was taught using the What'sApp tool while the control group was taught using the conventional teacher centered method. Results showed that the experimental group was superior to the control group both in the achievement and retention tests. A similar superiority of the experimental group resulted from a study by Aicha (2014) which investigated the effectiveness of the What'sApp m-learning approach when compared with the normal traditional face-to-face instruction among university students of an educational media class. Results revealed that the achievement and attitudinal scores of the experimental group were satisfactorily higher and more significant than those of the control groups.

Barhoumi's (2015) study sought to find out the effectiveness of the application of the mobile technologies to support a blended learning course titled: "Scientific research methods in information science" in Saudi Arabia. The experimental group had its lesson of 2hours of in-class learning and 1hour of learning activities mediated by What'sApp instant messaging each week. The control group had its lessons completely in-class. Analysis of the results of the achievement test that followed the treatment revealed the superiority of the experimental group. Over the control.

From the foregoing, we can appreciate that What'sApp as an m-learning device/tool is getting more widely used by all categories of individuals including students and educators. It is also becoming popular as an instructional strategy for a variety of subject areas. Most studies on the effectiveness of What'sApp appear to favour its use as being more effective than the didactic approach especially at the tertiary level of education. Many students do not appear to have been conducted in the use of What'sApp in Nigerian tertiary level if education as much as have been done elsewhere outside Africa. This results largely from the newness of the What'sApp as a mobile learning tool in our part of the world.

Given the merits of the use of What'sApp as observed above and given that most of the studies were done outside Nigeria the question arises as to what could be the effectiveness of the tool in the Nigerian educational context. In other words, the present study sought to determine the extent to which What'sApp would facilitate the academic performance in terms of the achievement and retention scores, of undergraduates of an education course in Abia State University, Uturu, Nigeria.

More specifically, the study sought to:

i. If there would be a significant difference in the performances of students taught with the What'sApp platform (experimental group) as measured by their scores in the achievement test and those taught with the traditional expository method (Control group);
ii. If there would be a significant difference in the academic performances of male and female students as measured by their mean scores, in the experimental group taught with the What'sApp platform.
iii. If there would be a significant difference in retention of the content taught to the experimental group (using What'sApp) as measured by their scores in the retention test and those in the control group taught using the traditional approach.

1.2 Research Questions:

The following research questions guided the study:

i. What is the difference in the achievement of the group of students taught "Methods in Teaching" using What'sApp platform (E-group) and those taught using the traditional method (C-group).
ii. What are the differences in the achievements of male and female students taught "Methods in Teaching" using the What'sApp platform?
iii. What is the difference in the retention test scores of students taught "Methods in Teaching "using What'sApp platform and those taught using traditional approach?

1.3 Hypotheses

The following three hypotheses were formulated to guide the study:

i. There is no significant difference in the performance of the experimental group (taught using What'sApp) as measured by their scores in the achievement test, and those of the control group (taught using the traditional method).
ii. There is no significant difference in the performance of male and female students in the experimental group (taught using What'sApp) as measured by their scores in the achievement test.
iii. There is no significant difference in the retention of the content taught to the experimental group (using What'sApp) as measured by the retention test scores, and those of the control group (using the traditional method).

2. Methodology:

2.1 Design and subjects: This study is a quasi experimental research of the pretest – protest control non-equivalent group design. The experimental (E) group called group 1, was taught using What'sApp social m-learning platform, while the control group (C) tagged group 2, was taught using the traditional approach. The design is represented as:

$$\frac{EO_1 \; X \; O_2}{CO_1 \; X \; O_2}$$

Where E stands for experimental group; C means control group; X means treatment; O_1 means same pretest for the experimental and control groups, O_2 means same posttest for experimental and control groups.

The population for the study consisted of 60 students of the second year class of the Department of Curriculum and Teacher Education, Faculty of Education, of Abia State University, Uturu, Nigeria.

Purposive sampling technique was used to select 25 students for the experimental group. The bases for their selection were their accessibility to mobile phones with What'sApp compatibility and their positive attitude to learning in the course of the pilot study that preceded the investigation. Research literature had revealed that the smaller the number making up the study group, the better the chances of achieving the objectives of the instruction (Olukemi, 2018). The control group was made up of 35 students.

Data collection was effected through the course – EDU 223 (Methodology in Teaching Subjects). This course is compulsory to all 200 level students of the Faculty of Education of Education of the University and has 7 units. This study was conducted using Unit 4 in the course titled "Lesson Presentation Skills" which include set induction, stimulus variation, reinforcement, planned repetition, use of examples, non-verbal communication, closure and questioning skills.

The contents were divided into four lectures in two weeks while the third and fourth weeks were used for revision and written achievement test. After another four weeks, the same written achievement tests were administered to all the subjects as their retention test.

The researchers were personally and actively involved in the instructional exercise.

2.2 Development of the What'sApp platform and learning

The researchers opened the What'sApp for the experimental group captioned "Methodology in Teaching EDU 223" and personally added members selected for the experimental group. The group members were pre-informed about the expectations on them with respect to the scheduled time for lectures and the ground rules which included: punctuality, keying in matriculation numbers, active participation by all, prompt notification if suddenly disconnected, no irrelevant posts, brevity in contributions among others.

The instructions /ground rules were given via What'sApp platform prior to the commencement of the lectures and immediately after lectures with a signal as was directed by the online instructors. The objectives of the lessons were posted on the platform each time the lesson began, and particular students were occasionally called upon to respond to questions or make contributions so as to ensure maximum participation.

On the other hand, the control group members were taught the same lessons using the normal traditional method of teaching, twice a week. They (the control group) had the same hours and contents with those of the What'sApp group.

2.3 Description of Communication.

Texts, audio and emoji/images were used to teach the experimental group members in addition to the reading materials earlier given to the subjects. Audio was used to teach such information that required extra

verbal means and the teacher's voice, while emoji was used to portray non-verbal communication. The normal classroom activities were used to teach those in the control group.

2.4 Duration of the treatment / activities

The whole activities lasted for 8 weeks. The experimental and control groups were engaged twice a week in 4 hours lecture per week, and it ran for 2 weeks, making a total of 8 hours, while the third and forth weeks were used for revision and achievement tests. The retention tests were administered 4 weeks after the treatment and posttest.

2.5 Data collection instrument

The instrument for data collection was the achievement test which was constructed by the researchers. It consists of a 25 item multiple choice questions in which only one option was the correct one. The items judiciously covered the four topics that constituted Unit 4 of the course content. These included:

Lesson 1 – Set induction, stimulus, variation, and reinforcement.
Lesson 2 – Non-verbal communication, planned repetition and use of examples.
Lesson 3 – Closure and questioning techniques.
Lesson 4 – Questioning skills and principles.

The instrument was validated by 2 specialists in Curriculum Development and 2 others in Measurement and Evaluation in the Faculties of Education in Abia State University Uturu and University of Port-Harcourt.

The same test also served as the retention test, the only difference being that the serial ordering of the retention test items was rearranged.

The reliability of the achievement test was computed using the Person's Product Moment Correlation Coefficient after two separate administrations of the instrument to twenty subjects who were not part of the experiment. This yielded an index of 0.89 which was considered high enough for us to repose confidence in the instrument.

2.6 Data Analysis Method.

The obtained data were analyzed by the use of means and standard deviations for the research question, and Analysis of Covariance for the hypotheses.

3. Results

Research Question One

What is the difference in the achievement of the group of students taught "Methods in Teaching" course using What'sApp platform (E-group) and the group taught using the traditional method (C-group)?

Data for answering the research question were derived from the answers to the achievement test by the What'sApp group and traditional method group.

Table 1 shows the summary of the responses.

Table 1: Means (x) and Standard Deviation (SD) Analysis of the Difference Between Pre and Post Achievement Test Scores of the Experimental and Control groups

Group	N	Pre-test $\bar{X}$	SD	Protest $\bar{X}$	SD	Mean Gain	Mean Difference
WhatsApp Platform	25	33.28	14.409	65.12	9.347	31.84	9.55
Traditional Method	35	34.17	12.053	54.46	8.276	22.29	

Table 1 shows that the What'sApp platform (Experimental Group) pretest score of students gave a mean value of 33.28 and a standard deviation of 14.409, while their post test score gave a mean (X) value of 65.12 and standard deviation (SD) of 9.347. The pretest score of students taught with the traditional method (Control group) gave a mean (X) value of 34.17 and standard deviation of 12.053 while their posttest score gave a mean (X) value of 56.46 and standard deviation (SD) of 8.276. The mean gain scores for the two groups were 31.84 for the What'sApp platform and 22.29 for the traditional method respectively.

Research Question Two

What is the difference in the achievements of male and female students taught "Methods in Teaching" using the What'sApp platform?

Data for answering research question 2 were obtained from the responses to the achievement test by male and female students in the What'sApp group. Table 2 shows the summary of the responses.

Table 2. Mean (X) and Standard Deviation (SD) Analysis of the Difference Between the Pre and Post Achievement Test of Male and Female Students Taught Using WhatsApp platform

Group	N	Preset $\bar{X}$	SD	Pro-test $\bar{X}$	SD	Mean Gain	Mean Difference
Male	10	30.80	13.0 71	63.60	6.38	32.8	-0.4
Female	15	34.93	68.13	68.13	13.103	33.2	

Table 2 shows that What'sApp platform (E-group) pretest score of students gave a mean (X) value of 30.80 and standard deviation (SD) of 13.071 for the male and 34.93 mean (X) and standard deviation (SD) of 15.453 for the female students. For the post-test mean score, male students obtained 63.60 and standard deviation of 6.381. The female students obtained a mean performance score of 63.13 and standard deviation of 15.103.

The mean gain scores for the two groups where 32.8 for males and 33.2 for the females respectively. The difference in the mean gain scores of both groups is -o.4.

Research question 3

What is the difference in the retention test scores of students taught "Methods in Teaching" using What'sApp platform and those taught using the traditional approach?

Data for answering this research question were derived from responses to the retention test by those in the What'sApp and traditional method groups respectively.

Table 3 Mean (x) and Standard Deviation
(SD) Analysis of the Difference Between Students Taught Using WhatsApp Platform and Traditional Method in their Retention Level as Measured by their Retention Test Scores.

Group	N	Post-test (retention) $\bar{X}$	SD	Mean Difference
WhatsApp platform	25	65.76	9.803	
				10.62
Traditional method	35	55.14	7.117	

Table 3 shows that What'sApp platform method (Experimental group) had a post-test (retention test) mean score of 65.76 and standard deviation of 9.803 while the students exposed to the traditional method (Control group) had a post-test (retention test score) of 55.14 and a standard deviation of 7.117. The difference in the mean scores of both groups is 10.62 in favour of the What'sApp group.

Testing of Hypotheses

Ho_1: **There will be no significant difference in the performance of the experimental group (taught by WhatsApp) as measured by their scores in the achievement test, and those of the control group (taught by the traditional approach).**

Data for analyzing the data related to this hypothesis were derived from table 1.
Table 4 shows the summary of the analysis of data related to the hypothesis.

Table 4: Summary of ANCOVA on Achievement Test Scores of the Experimental and Control Groups

Source of variation	Type 111 sum of squares	DF	Mean Square	F	Sign.
Corrected model	1921.288[a]	2	960.644	15.217	.000
Intercept	18659.964	1	18659.964	295.577	.000
Pretest	826.880	1	826.880	13.098	.001
Group	565.637	1	565.637	8.960	.004
Error	3598.446	57	63.131		
Total	222000.000	60			
Corrected Total	5519.733	59			

Table 4 indicates that the treatment with What'sApp platform produced a statistically significant difference F(1,57) = 8.960 < 0.05 in the post-test scores. Based on this, the null hypothesis is rejected.

Ho_2: There will be no significant difference in the performance of male and female students in the experimental group (taught by What'sApp) as measured by their scores in the achievement test.

Data for analyzing data related to this hypothesis were derived from table 2.

Table 5: Summary of ANCOVA on Performance of Male and Female Students Taught with the What'sApp Platform

Source of variation	Type 111 sum of squares	DF	Mean square	F	Sign.
Corrected Model	340.1499	2	170.075	2.130	.0143
Intercept	12222.168	1	12222.168	153.082	.000
Pretest	301.643	1	301.643	3.778	.065
Sex	13.324	1	13.324	.167	.687
Error	1756.491	22	79.840		
Total	108112.000	25			
Corrected Total	2096.640	24			

Table 5 reveals that the calculated F (0.167) is less that the critical F-value (2.95) in the protest scores. The indication shows no significant difference. We therefore fail to reject the null hypothesis. And so, conclude that the males did not differ from the families in their performances.

Hypothesis 3: there will be no significant difference in retention of the content taught to the experimental group (with What'sApp) as measured by the retention test scores, and those of the control group (taught with the traditional method).

Data for analyzing data related to the hypothesis were derived from table 3.

Table 6: Summary of ANCOVA on the Retention Level of Students Taught with What'sApp Platform and The Traditional Method.

Source of variation	Type 111 sum of squares	DF	Mean square	F	Sign.
Corrected model	1668.355[a]	2	834.178	11.874	.000
Intercept	15757.748	1	15757.748	224.302	.000
Sex	24.468	1	24.468	.348	.557
Group	1516.099	1	1516.099	21.588	.275
Error	4004.378	57	70.252		
Corrected total	5672.733	59			

Table 6 reveals that the treatment with What'sApp platform produced a statistically significant difference F (1, 57) = 21.582 < 0.05 in the posttest (retention test) scores. Based on this, hypothesis 3 is rejected and so we conclude that there is a significant difference in retention of the content taught the experimental group (What'sApp) as measured by the scores in the retention test and those of the control (taught by the traditional method)

4. Discussion of findings

The results of the analysis of data for the first research question and hypothesis reveal the superiority of the experimental group taught through the What'sApp platform over their counterparts in the control group taught using the traditional, teacher-centered, didactic approach as measured by their scores in the achievement test. Although the study was conducted in Abia State University, Uturu, Nigeria, we are confident in the generalizability of the findings to all other Nigerian Universities given that the Nigerian youths that are found in the tertiary institutions share similar characteristics. They are products of the digital age. Their socio-economic backgrounds are largely similar and they belong to similar social environments. They utilize the smart phones as their topmost priorities and those who do not have the phones strive to acquire them for various purposes.

The superiority of the What'sApp group agrees with the findings from the studies by Achia (2014). Tulika and Dhananjay (2014), Barhoumi (2015) and Sayan (2016) that students taught using the WhatsApp performed, significantly better in achievement scores than those taught through the traditional teacher centered approach of the normal classroom features. The above findings were corroborated by Said (2003), and Baran (2014) who concluded that the What'sApp use really produced positive results.

There is no doubt that the digital natives would want everything or at least most things digitalized to accord with their social learning styles. (Olukemi 2018). They would therefore like to maximize the utilization of the m-learning tool of What'sApp which affords them the opportunity to move along to places with their lecture notes in their phones. This afford, then the opportunity to study at all times, everywhere and under any condition as long as they have their smart phones on them. This is the advantage which the control group in our study could not enjoy and this could have contributed in producing the observed result. Yeboah and Ewur(2014) add that since students prefer to spend more time on What'sApp than their academic work, their academic work can be inserted in their mobile phones on What'sApp platform.

Our findings with respect to research question 2 and hypothesis 2 lead us to the conclusion that male and female students did not differ in their achievement scores resulting from their use of the m-learning tool. Both boys and girls appear to use the phones fairly equally and therefore learn from the phones equally well. We conclude that gender has no influence on students' performances in the use of What'sApp as an instructional tool. The findings show that digital natives have the same spirit of technology as both genders embrace the use of technology in teaching and the passion is without bias. We therefore encourage teachers, parents and other stakeholders to support both male and female student as they show interest in the use of digital tools to promote teaching and learning.

The result of the analysis of data on the third hypothesis shows that a statistically significant difference existed in the retention scores of the Experimental group as against the Control. Simply put, the group taught using What'sApp, retained the learned content for a longer time than the group taught using via the conventional method. This implies that the What'sApp approach has the capacity to enhance retention of learned content over and above the traditional method. This conclusion is in agreement with the study conducted by Ashiyan and Salechi (2016) on the impact of What'sApp on learning and retention. They discovered that the use of What'sApp facilitated retention of the learned information.

Given that all the chats and information contained in the What'sApp platform are retained in the smart phones, it is reasonable to expect that students in the experimental group would frequently refer to the chats and refresh their minds on the learned subject matter. This practice is very likely to promote the retention of learned information. The control group students do not have such an opportunity and so may not retain the learned information as much as the experimental group members.

5. Conclusion

In the light of the findings, it becomes reasonable to suggest a more robust adoption and utilization of the What'sApp tool as a formalized pedagogical strategy in the Nigerian school system especially at the tertiary level. Instructional designers should be challenged by the applications on mobile devices which provide opportunities for learning activities thereby finding ways of working hand in hand with the apps investors in designing more learning tools that would accommodate curriculum activities.

University teachers in all subject areas and disciplines need to utilize the rich benefits of the m-learning tool of Whatsapp and explore ways of enhancing its use as a digital alternative and/or supplement to the didactic approach.

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