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Development of MOOCs-Assisted Digital Teaching Materials to Increase Student Learning Motivation in the Material of Work and Energy at Bengkulu City High School

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Abstract: *The aim of this research is to produce a product in the form of digital teaching materials assisted by MOOCs to increase students' motivation in learning about effort and energy. Research is also useful for looking at the increase in student motivation between before and after using MOOCs-assisted digital teaching materials on effort and energy as well as seeing the link between motivation and learning outcomes. The research method used is the R&D research method using the 4D model. The instruments used in this study were questionnaires, observations, interviews. This research uses the methodpra eksperimental one grup pretes posttes design. This research was tested on a limited basis in one of class X at SMAN 9 Bengkulu City. The results obtained are that students feel more motivated when learning to use digital teaching materials assisted by MOOCs. This is in accordance with the results of the perception questionnaire which obtained 84.87% containing suggestions and stating that MOOCs-assisted digital teaching materials were very interesting. The results of the pre-test and post-test conducted also prove that there is a link between learning motivation and learning outcomes where the average student can increase from 55 to 93.8.*
Keywords: *Digital teaching materials; MOOCs; Motivation to learn.*

INTRODUCTION

There has been an increase in popularity of such electronic and spoken communication methods resulting in an impactful evolution of textbooks and other educational resources. All competencies that students will master through learning activities are displayed in a clear and organized format in teaching materials (Farhana et al., 2021; Hernawan et al., 2012). The use of teaching materials can improve student performance by assisting students in capturing the concepts being taught. A variety of audiovisual formats are available for use as teaching resources. Audiovisual media, sometimes known as "video", is a type of educational media that combines visual and audio components. Student curiosity and drive for knowledge can both be increased through this medium (Suprianto, 2020) ("172 Utilization," 2010). Audiovisual media is very important for physics education because it provides visual representations of real world

events, natural phenomena, and presentations of physics experiments. It's a fantastic way to encourage curiosity. Students' natural interest must be disturbed, nurtured, and maintained (Risdianto, 2008) (Sriadhi, 2015).

One way to foster motivation is to create a new form of course or learning. Courses that are held online are the newest educational method that are widely open. There is no limit to the number of participants in the MOOC (Massive Available Online Course), an online course that is free and open to anyone. The content presented in MOOCs is usually presented in video form and is accompanied by document files that can be downloaded and contains material appropriate to the material taken (Oksatianti et al., 2020)(Suyetno, 2020). Users can access MOOCs online at any time, and students can choose content that interests them. As an innovative alternative to conventional university courses, massively open online courses (MOOCs) have gained popularity in recent years (Risdianto et al., 2021)("List of Topics," 2016). MOOCs, which stands for "Massive Open Online Courses", are basically just online classes that anyone, anywhere can take. As an added bonus, anyone from any location or demographic can sign up for massively open online courses (MOOCs).

To sign up for a MOOC, all you need is a MOOC-capable device and a connection to the internet. And most MOOCs are either completely free or very cheap. Because of the unique qualities of MOOCs, they are increasingly being considered as a viable alternative to the traditional model of higher education by a variety of schools, from vocational schools to universities. Because the demand for university education is growing rapidly around the world, especially in developing countries (Chen, 2018). If you want a higher education from a top college but can't afford to go there every day, large open online courses (MOOCs) may be the answer. Therefore, integrating MOOCs into*setting* Established academics are the main challenge at the moment (Maiz Olazabalaga, 2020). MOOCs have many benefits, such as providing open material that can be accessed at any time and from any location (*flexibility*), offers a wide variety of materials that can be selected based on the desired interests, talents, and skills, presenting material in a systematic manner. Finally, it offers many free versions (although some are paid), and provides certificates (Risdianto, 2021).

Student interest and engagement can be influenced by the use of video-based teaching materials. That is the reason video media is useful and used as an educational medium (Ribawati, 2015). Students are more motivated to learn thanks to the use of video media by teachers in science classes because they are faced with new teaching methods (Pebriani, 2017). As shown by surveys and interviews conducted at Bengkulu City Public High School, textbooks and supplementary materials such as PowerPoint are widely used in the classroom.

The Internet has become an increasingly common source for students seeking additional reading material. Many classrooms still rely on tried and true teaching methods; others make use of ICT, but only to access YouTube videos. As a result, students lack motivation and interest throughout the class. As a result of teaching materials that are less interesting, students are less enthusiastic about learning. Therefore we need a teaching material that is interesting and not boring so that students can become enthusiastic about learning, and students are able to increase their grades and achievements at school.

Making MOOCs-assisted digital teaching materials on work and energy is one approach to addressing this problem and increasing student learning motivation. With their ability to streamline, organize, and conserve resources, MOOCs and digital resources are perfect for effort and energy content. The benefits of developing teaching materials using MOOCs include making interesting visuals and learning videos, which will help increase students' knowledge of the subject matter being taught. It's not difficult to understand the mechanics or use the software.

RESEARCH METHODS

The research process uses a development method known as R&D (Research and Development). To create and evaluate the efficacy of a product, researchers use a research procedure known as "Research and Development" (R&D) (Sugiyono, 2013)(Ramadani et al., 2020). This research makes MOOCs-assisted teaching materials on work and energy materials using the 4D material development approach (define, design, develop, and dissemination). The research was carried out by starting to observe at the define stage, then designing, and developing with several trials at the developmet stage, and ending at the desiminate stage where the resulting product will be disseminated online. The stages of the research can be seen in Figure 1 below.

Figure 1. Research Design

SMAN 9 Bengkulu City became the main research location. Previously, for needs analysis, research was conducted at SMAN 4 Bengkulu City, SMAN 9 Bengkulu City, and SMAN 10 Bengkulu City. After that, for a limited trial, it will be focused on SMAN 9 Bengkulu City. The study was conducted in November for analysis, until March for limited trials. Class X IPA students at SMAN 9 Bengkulu City became the study population in a limited trial. Defining this group is helpful for limiting the generalization area (Krismony et al., 2020) and

informs decisions about how many samples to use. The reason: the sample only represents a small part of the whole (D. I. Ihya, Ulumuddin, 2021).*Purposive sampling* used to select 20 students of class X IPA for this study.

Data collection methods used are questionnaires, interviews, perception questionnaires, and pretest, post-test. Students' need for MOOCs-enhanced digital course materials was analyzed using observation, interviews, and questionnaires. To see the level of student motivation, perception questionnaires and needs analysis questionnaires were used. In addition, to see the relationship between learning motivation and learning outcomes, a pre-test and post-test test was carried out, and then the results were subjected to a different test through a T-test. This had to be done the old-fashioned way, with printouts. Quantitative methods are used to analyze the data. This is due to the Likert scale used to test data from the research needs questionnaire. Attitudes, views, and perceptions of a person or more about social phenomena can be measured using a Likert scale. The Likert scale provides a means to transform the target variable into a more universal characteristic (Bahrun et al., 2017). Table 1 displays the layout of the Liker scale answer sheet.

Table 1. Likert Scale Score Value (Arifin et al., 2019)

Criteria	Score
Strongly agree	4
Agree	3
Don't agree	2
Strongly disagree	1

A total of 4 levels are available on this particular Likert scale. This application is intended to decide between choices that make respondents feel unsure about their answers because they refer to neutral choices. One of the goals of this scale is to encourage students to think critically about the answers they give and the justification they provide for these responses.

Student responses to the research questionnaire will be entered into the data management system. This is achieved by using a graphical representation of the findings obtained through the use of a data interval approach. Percentage responses for each question were derived using Eq. (1), namely as follows,

$$P_{skor} = \frac{skor\ yang\ didapatkan}{jumlah\ skor\ maksimum} \times 100\% \quad (1)$$

In order to make it easier to read the data from the percentage validation results of the questionnaire for the need for the development of digital teaching materials assisted by MOOCs, the resulting percentage values are analyzed and

used as a reference to determine the scale interpretation criteria, as shown in table 2 below,

Table 2. Table of Likert Scale Interpretation (Melianti et al., 2020)

Interpretation	Percentage
Strongly disagree	0% - 25%
Don't agree	26% - 50%
Agree	51% - 75%
Strongly agree	76% - 100%

Based on established research decision procedures (Risdianto et al., 2021), we made calls on each survey item included in this investigation. If rcount is greater than rtable, it can be safely assumed that the calculation is accurate. Unreliable if ($r_{count} < r_{table}$): rcount value is smaller than rtable value. When determining the validity and reliability of the questionnaire, SPSS was used to analyze each statement and answer option to ensure it was applicable without sacrificing quality. SPSS is a computer tool that facilitates precise and accurate management of statistical data (Bulu et al., 2021). This aims to check the validity and reliability of the instruments used. In addition, as already explained, a T-test will be carried out, where the T-test has provisions, namely if the value of sig. (2-tailed) <0.05, so there is a significant difference between learning outcomes in*pre test* and*post test*. If the value of sig. (2-tailed) > 0.05, so there is no significant difference between learning outcomes in*pre test* and*post test*. The T-test is useful for seeing the significant differences between two unpaired samples, such as the average pre-test and post-test results.

RESULTS AND DISCUSSION

This development research using the R&D method aims to produce products in the form of digital teaching materials assisted by MOOCs to increase student motivation in the material of effort and energy. This research was carried out using the R&D research method with the 4D model, namely 1)*Define*, in the form of needs analysis; 2)*Design*, in the form of selecting media and learning materials, selecting video formats, and initial designs; 3)*Develop*, in the form of validation, revision and perception. The final result of this research is MOOCs-assisted digital teaching materials to increase student learning motivation on business and energy materials at Public High Schools in Bengkulu City which are distributed online.

The first step taken in this research is the stage*define*. At this stage the researcher analyzed the results of the observations using observation sheets, interviews, and needs analysis through a needs analysis questionnaire. The needs

analysis was carried out in three schools, namely SMAN 9 Bengkulu City, SMAN 4 Bengkulu City and SMAN 10 Bengkulu City. Respondents for the needs analysis were 84 students and 3 teachers from the three schools. At this stage the researcher knows several things, including the three schools already using the 2013 curriculum and in teaching and learning activities the teacher uses worksheets, printed books, and other supporting teaching materials such as*powerpoint* and videos from youtube. The teaching materials and media provided still make students less interested in understanding the subject matter. It can be seen from students who are not so enthusiastic when learning in class. Therefore, few students respond to the teacher during the physics learning process during the learning process.

The results of the observations were supported by conducting a needs analysis which was given to teachers and students who were distributed to 3 schools, namely SMAN 4 Bengkulu City, SMAN 9 Bengkulu City and SMAN 10 Bengkulu City. The distribution of this questionnaire was carried out using an offline questionnaire. Based on the results of the analysis of student needs, a percentage of 91.81% of students was interested in MOOCs-assisted digital teaching materials to increase student motivation in the material for effort and energy being developed and the results of the analysis of teacher needs obtained a percentage of 97.33% of teachers interested in using teaching materials digital-assisted MOOCs to increase student learning motivation in the material of effort and energy as additional media in the learning process.

The next step after doing the stage*define* is doing level*design*. This stage is the first step to develop MOOCs-assisted digital teaching materials. This development is in the form of designing products in the form of digital teaching materials assisted by MOOCs to increase students' learning motivation in the material of effort and energy. The stages are choosing learning media, choosing applications that are suitable for use for learning media to be made, then choosing a format in developing learning media in the form of videos that aim to design or design video content starting from learning materials. The selection of the form of presentation of learning is adjusted to the media used. Where in this case the selected format must meet the criteria of being attractive, easy, and helping to optimize all the intelligence you have. The purpose of choosing this format is so that the videos developed are in accordance with good and correct criteria so that they are suitable for use.

The characteristics of the media created are presenting digital teaching materials in the form of learning videos that can be accessed at*1001tutorial.com*. Thus, the teaching materials developed will be presented as attractively as possible and clear. This of course can make it easier for students to learn physics, especially work and energy material. Wherever and whenever students

can access the material either using*smartphone* as well as computers. In this digital teaching material, learning videos are made in sub-sections. Furthermore, the existence of a video can help clarify material that cannot be conveyed through writing. So, through video, the material can be visualized clearly. Thus, it raises students' interest in physics, which so far most people think that physics is a difficult subject. Because of this teaching material that thought can be eliminated. Furthermore, the media that has been created is facilitated with discussion rooms, both in the form of chat and*zoom meeting*, so that between teachers and students can discuss directly through face-to-face online.

The next activity is to make a grid for feasibility assessment based on experts. Where this study uses 5 aspects of assessment in the form of content aspects, presentation aspects, language aspects, media aspects, and learning motivation aspects. As for assessing students' perceptions of the legibility of the media using 3 aspects, namely the display aspect, the presentation aspect of the material, and the benefit aspect. And to measure learning motivation using 4 aspects, namely aspects*attention* (attention), aspect*relevance* (relevance), aspect*confidence* (self-confidence) and aspects*satisfaction* (satisfaction). After doing the stage*design* to MOOCs-assisted digital teaching materials to increase student learning motivation in the developed effort and energy material, the next stage is the *develop*.

At the level of*develop* This validation was carried out on teaching materials developed by three expert validators. Furthermore, revisions were made based on the results of expert validation. After the results of the expert validation and review were carried out, a product was obtained in the form of MOOCs-assisted digital teaching materials to increase student learning motivation on effort and energy material that was feasible to be tested on a small scale to determine students' perceptions of MOOCs-assisted digital teaching materials that had been developed . In addition to the perception test, then a student learning motivation questionnaire, then a limited trial was carried out using*pre eksperimental one class pre test post test design* which was carried out in one of the classes at SMA N 9 Bengkulu City.

Based on the results of the validity test by 2 expert validators and 1 practitioner, it was found that the feasibility of digital teaching materials assisted by MOOCs to increase student learning motivation on effort and energy material with 5 assessment aspects, namely content aspects, presentation aspects, language aspects, media aspects and learning motivation aspects. The results obtained from the validity test can be seen in the table below,

Table 3. **Table of Average Validity Test Results**

Aspect	Average value	Criteria
Head	85,42 %	Very good
Presentation	80,56 %	Very good
Language	80,56 %	Very good
Media	83,33 %	Very good
Motivation to learn	76,39 %	Very good
Average	**81,25%**	**Very good**

From the table above, the average result is that digital teaching materials assisted by MOOCs to increase student learning motivation in the material for effort and energy developed are in the "very good" criteria which refers to the interpretation of the Likert scale with a percentage of 81.25% of the maximum score of 100 %. This means that the MOOCs-assisted digital teaching materials developed have fulfilled the content aspects, presentation aspects, language aspects, media aspects and learning motivation aspects, so that it can be concluded that the learning media developed are feasible to use. To be more clearly seen in the following graph,

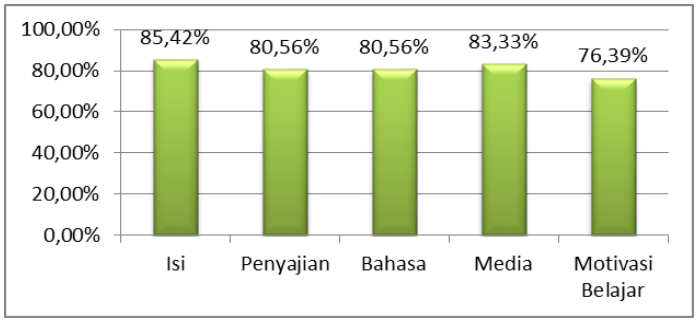

Figure 4. Graph of average validation test

The MOOCs-assisted digital teaching materials developed are said to be feasible if the score intervals on all averages are in the "good" or "very good" criteria. This is in accordance with the statement of Sriwahyuni et al., (2019) which states that research can be said to be successful and valid or very valid if the processing of questionnaire data produces a score between 51% to 100% or is in the criteria of "good" and "very good".

Based on this statement, it can be concluded that MOOCs-assisted digital teaching materials to increase student learning motivation in the material of effort and energy that has been developed are feasible to use. Thus, this MOOCs-assisted digital teaching material can be used for testing because it meets the five assessment aspects, namely content aspect, presentation aspect, language aspect, media aspect, and learning motivation aspect. This research is

relevant to research conducted by (Risdianto et al., 2021) where this research is based on an analysis conducted on the results of the teacher's response to the model*blended learning* based on assisted MOOCs*augmented reality*. So it can be concluded that the quality of the questionnaire responds to the needs of the model*blended learning* based on assisted MOOCs*augmented reality* this is very good.

Furthermore, the results of this study are also in line with Suyetno's opinion (Suyetno, 2020) regarding Development*Massive Open Online Courses* (MOOCs) on the welding material. The development developed is proven to be able to support practicum activities, this can be seen from the questionnaires distributed to students and the results obtained are that the MOOC developed has a high level of feasibility with a percentage of 83.22%. Furthermore, the aspect readability test was carried out on the MOOCs and the following results were obtained,

Figure 5. The readability test table is based on students' perceptions

Aspect	Average value	Criteria
Appearance	84,53 %	Very good
Material Presentation	84,72 %	Very good
Benefit	85,34 %	Very good
Average	**84,87 %**	**Very good**

Based on the average percentage of students' perceptions on the display aspect, the presentation aspect of the material, and the benefit aspect carried out in three classes at SMAN 9 Bengkulu City, with a total of 87 students in class X IPA, it can be concluded that digital teaching materials are assisted by MOOCs to increase students' learning motivation in the material developed for effort and energy, it is classified as very good with a percentage of 84.87% of 100%. This means that MOOCs-assisted digital teaching materials to increase student learning motivation on effort and energy materials have fulfilled the appearance, material presentation, and benefits aspects.

After obtaining the feasibility of MOOCs-assisted digital teaching materials on work and energy materials, to find out the characteristics of MOOCs digital teaching materials to increase student motivation on work-assisted materials, an analysis sheet of the characteristics of MOOCs-assisted digital materials is used. Where this teaching material has a learning target that must be achieved at the end of the lesson and the material provided is further divided into several sub-chapters which will be studied within a predetermined period of time. So, it can be seen how far each student's progress has been.

Furthermore, this media is carried out online through the website, so it does not require physical face-to-face meetings. However, students can also see the teacher in the learning video because in the learning video the teacher is in the video as if delivering material directly to students.

To increase learning motivation, MOOCs-assisted digital teaching materials related to learning videos contain real events and humor. This is embedded in the presentation of learning as well as examples that clarify the concepts conveyed, as well as examples that are directly related to the conditions of students, as well as asking techniques that involve students. It is also able to build the knowledge of students.

Based on the characteristics of the MOOCs-assisted digital teaching materials developed, the results contain the relationship between MOOCs-assisted digital teaching materials containing learning videos and learning motivation. This is in accordance with the opinion (Johar et al., 2014)on the criteria of learning media. He argues that if aspects of suitability or relevance are not considered, this will make learning in class boring, so that the learning process will not be effective. Conversely, if the relevance exists and is well related to the learning criteria, then learning will be more effective (Sari et al., 2018). This is in accordance with the opinion which states that student learning motivation will increase if students can know the benefits of the knowledge being studied.

Further statements regarding this matter were stated by (Syaparuddin & Elihami, 2020) regarding learning media which can be classified into four, namely audio media, visual media, audio visual media, and multimedia. The learning media that is currently felt to be attractive to students is using audio-visual media in the form of video, so that interactions carried out by students with this learning media will motivate students to be more interested in the learning being delivered. This is because events related to the material can be presented directly into the classroom. Where this statement is also related to the opinion (Johar et al., 2014) which states that one of the criteria for learning media is the aspect of attractiveness. Where students' interest in MOOCs-based learning media can influence students' attitudes towards learning process activities in class. One of them is the attractiveness of students to learning media to foster motivation and enthusiasm of students. The next statement according to (Risabethe & Astuti, 2017) about one way to make learning good is to use audio-visual media. This is because the audio-visual media contains sound, images, graphics and shapes as well as animation, which is one way to attract students to learn.

After all the things needed in the design have been done, and the product has been said to be feasible, the product is tested to find out the perceptions of students towards the MOOCs-assisted digital teaching materials that have been developed. Based on the results of students' perceptions of MOOCs-assisted digital teaching materials carried out in three schools it is known that MOOCs-based learning media to increase student learning motivation on effort and energy materials that have been made get student perceptions with very good criteria which include aspects of appearance, presentation of material, and benefits. From these three aspects it can be concluded that overall the students' perception of digital teaching materials assisted by MOOCs is very good with an average of 84.87%. These results were obtained from comments and suggestions from several students who stated that digital teaching materials assisted by MOOCs were very interesting, so they did not cause boredom. With digital teaching materials assisted by MOOCs, the material presented is easier to understand because it uses language that is easy to understand and common and relates to everyday life.

After the perception test and distribution of student learning motivation questionnaires, do it*pre test* and *post test* to find out the learning level of each student before using MOOCs-assisted digital teaching materials and after using MOOCs-assisted digital teaching materials. These results are then used to perform a different test using the test*independent sample test* to see whether there is a significant difference from the average value obtained. Based on this test, it was found that there were significant differences in learning outcomes in*pre test* and*post test* it can be concluded that student learning outcomes have increased. This proves that increased learning motivation also determines a good increase in student learning outcomes. For more details, the differences in the results of the pretest and posttest can be seen in the following table,

Figure 6. Result Summary *Pre Test* and *Post Test*

They do not answer	**Pretest**	**Post test**
1.	36	94
2.	68	94
3.	68	94
4.	28	90
5.	76	94
6.	20	86
7.	68	94
8.	60	98
9.	72	90

They do not answer	**Pretest**	**Post test**
10.	56	94
11.	44	94
12.	48	94
13.	64	94
14.	64	94
15.	44	94
16.	72	94
17.	52	94
18.	80	98
19.	48	94
20.	32	98
Amount	1100	1876
Average	55	93,8
Maximum Value	80	98
Minimum Value	20	86

Based on the table above it can be seen several things including, the highest value experienced a significant increase approaching the maximum value, namely at*pre tes* is 80 while the highest score is on*post test* was 98. The lowest score also experienced an increase from 20 to 86. Likewise, the average obtained which was originally only 55 rose to 93.8. This proves that with increased learning motivation, the value of students' knowledge can also increase. This can be seen from the results*pre test* and*post test* which is obtained. Thus, it can be concluded that student learning motivation is very closely related to the learning outcomes obtained by students.

With all of the trials above, digital teaching materials assisted by MOOCs are expected to be an alternative to independent learning so that students understand the subject matter better. This is in line with research (Johar et al., 2014) regarding the criteria for learning media in the aspects of usefulness and convenience. This positive response from students was most likely caused by the situation at the previous school. Previously, the school had never implemented learning using digital teaching materials assisted by MOOCs. Thus, students feel they are getting new experiences in learning activities. This MOOCs-assisted digital teaching material is also useful and in accordance with the learning process that is carried out online or the system for dividing student groups into class.

In the development of digital teaching materials assisted by MOOCs, there are several obstacles. The obstacles faced when developing MOOCs-assisted digital teaching materials to increase student learning motivation in this material of effort and energy are the process of *take* videos that must be in a soundproof room or in a quiet state so that outside sounds do not enter into the video, requires really bright lighting and so that the results of the recorded video are clear. The next obstacle at the stage*design*. In designing several supporting drawings to be included in the material there are several difficulties. Then, video editing must be in accordance with the slides shown, as well as managing MOOCs-based websites so that they look attractive and can be accessed without any obstacles. These things became common obstacles experienced during the research. The advantages of this product are in accordance with the advantages of MOOCs according to (Husna, 2019) namely online-based, so the learning process does not have to be face-to-face and the number of participants is not limited, in accordance with the advantages stated by (Aji, 2016) namely unlimited MOOCs in space and time, because of its open nature.

After the development stage or*develop,* The last step is stage*desiminate*. At this stage the dissemination of products that have been made is carried out. In this case, MOOCs-assisted digital teaching material products on business and energy materials are disseminated online. Students can access it on the 1001 tutorial web. Where can this website be searched on Google Chrome and the like. Thus, this MOOCs digital teaching material can be accessed by all high school students in grade X and is able to help students learn and understand business and energy material much better.

CONCLUSION

Digital teaching materials assisted by MOOCs are urgently needed to make physics learning, especially work and energy materials, more interesting. Thus, student learning motivation can increase and can improve student learning outcomes according to the limited trials that have been carried out. The teaching materials that have been made have gone through a series of tests and are suitable for use and are currently distributed online on web 101 tutorial.com. The researcher would like to thank the Physics Education Study Program, Faculty of Teacher Training and Education, University of Bengkulu, for giving permission to the researcher to participate in the research as part of the thesis and produced output in the form of this thesis and article. The researcher also thanked all the schools of Bengkulu City 4 Public High School, Bengkulu City 9 State Senior High School, and Bengkulu City 10 Public High School who had agreed and gave permission to conduct research in the school environment.

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