Using Group/Cooperative Learning Method to Enhance Students' Conceptual Understanding toward Magnetism

Tujyinama Valens, Yamikani Kalolo

Article Info

Article History

Received:
24 April 2025
Accepted:
1 September 2025

Keywords

Magnetism
Group learning
Cooperative learning
Conceptual understanding
Lower secondary

Abstract

The current study looked into the use of cooperative learning/group discussion methods to improve students' conceptual understanding of magnetism. This study was conducted in seniors one and two, 86 participants, 79 students, 5 physics teachers, and 2 DOSs. Purposive sampling was used to select the participants of the research. SPSS version 21 was used to analyse the data, qualitative data was analysed empirically, and frequency and percentages were used. The finding was group formation can have an impact on the attitudes of students and how well they work together. It also highlights that there was no real change in students' achievement, but the longer the group worked together the better they were motivated to learn and understand the concepts of magnetism effectively. Furthermore, it discovered that there is not only one best method for teaching magnetism but also a combination of different teaching methods that help learners participate in teaching and learning magnetism in lower secondary schools. It recommends that all stakeholders in education should upgrade teachers' ability and capacity building by using active teaching methods related to science subjects, teachers should use low-cost materials that can be easily found and available around them as well as in the schools.

Introduction

Cooperative Learning is a proven technique for engaging students, promoting deep learning and developing the soft skills that are demanded by twenty-first-century employers (Clark, 2015). Cooperative learning is a methodical, structured and teacher-led small group instruction style in which students collaborate in small learning groups to maximize their learning goals and achieve their shared learning objectives. Collaborative learning is an unstructured form of small-group learning that incorporates a wide range of formal and informal instructional methods in which students work together in small groups and interact together to achieve a common goal (Anonymous, 2023). In cooperative learning, a small group of participants works together to achieve a common goal. Cooperative learning operators are based on the premise that participants achieve more when they work together. The goals of cooperative learning are positive interdependence, and face-to-face interaction among participants, and individuals (Haripamyu, 2019). To be successful, however, teachers must plan carefully, construct tasks effectively and actively monitor the process.

Magnetism is the force exerted by magnets as they attract or repel one another. Moving electric charges create a

natural force known as a magnet. These motions can be microscopic and occur within magnets. Magnetism is caused by the movement of electrical charges. Every substance is composed of tiny units called atoms (Jim, 2022). It is one of the physics units that should be studied in lower secondary schools in Rwanda. It requires efforts from the teachers to explain it and on the side of the learners.

Conceptual understanding is a vast and practical understanding of mathematical, scientific, or other concepts. Understanding concepts allows students to advance beyond single facts and approaches, and they fully understand why a mathematical problem is significant and how it may be applied in a variety of settings. Conceptual understanding is essentially about learning more than isolated facts; it is about understanding the relationships between those facts and having them arranged properly (Marketing, 2022).

How is a Conceptual Understanding Developed?

To develop conceptual knowledge, learners must actively participate. When conceptual understanding is not used, teachers typically describe and illustrate the approaches, focusing on facts and procedures. Throughout the process, the student must pay close attention and carefully practice the methods, while seeking explanations where appropriate. When the emphasis is on conceptual comprehension, however, the responsibilities of the teacher and pupils shift dramatically. In this scenario, the teacher should provide pupils with questions and activities that will challenge them to understand the concept's significance. As a result, the learner is encouraged to go through the difficulty of discovering the concept and applying it to many solutions.

Simply put, engaging and encouraging learners to figure out the significance of a concept and apply it to other solutions is one method for developing conceptual understanding. Active participation is essential for developing conceptual understanding. It is beneficial because it allows young people to improve their ability to think for themselves so that they become critical thinkers. In the study conducted by (Schiller, 2024), learning defined as learning is a phenomenon that is influenced by a complex interplay of factors such as physiological, environmental, cognitive, emotional, motivational, and social factors. Simply, learning is defined as a process that occurs within nebulous environments of shifting core elements not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves and it is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing (Melamed, 2023).

According to Macpherson (2007), Cooperative Learning is part of a group of teaching/learning techniques where students interact with each other to acquire and practice the elements of a subject matter and to meet common learning goals. It is much more than just putting students into groups and hoping for the best. Cooperative Learning is a very formal way of structuring activities in a learning environment that includes specific elements intended to increase the potential for rich and deep learning by the participants. Combined, they argued that, "working together to achieve a common goal produces higher achievement and greater productivity than working alone." Cooperative/group learning. Cooperative instruction means "the instructional use of small groups so that students work together to maximize their own and each other's learning". Students

perform well in group or cooperative situations, not just for themselves but also for the other members of their group. Working cooperatively is also an important life skill that students may utilize outside of the classroom to help them work effectively with others to solve any challenging challenge.

For many years, researchers in both education and psychology have focused on the understanding of concepts. This focus may reflect an increasingly common assumption among classroom teachers that student conceptual knowledge is the most significant determinant of overall educational performance. If we motivate children to learn and enable them to learn well, we will have a high-performing education system in a variety of fields. As the late educator Jack Frymier often said “If the kids want to learn, we couldn’t stop them. If they don’t, we can’t make them” (Frymier, 1974). This will increase the conceptual understanding of learners in magnetism.

Significance of the Study

The poor conceptual understanding of teaching and learning magnetism concepts can affect the performance and achievement of learners in different disciplines of education. This is the reason why it will help both teachers and learners to use cooperative and group discussion which will help develop their critical thinking and their understanding of magnetism concepts effectively.

Problem Statement

Through the analysis made by the researcher, the learners from senior two are quiet, working alone, and lack of using group discussion or cooperative learning toward physics subject. As it has been identified these issues affect their motivation. These problems that have been listed above should be solved by creating groups which will help them to enhance cooperativeness, and participation in classroom activity as well as boost students’ conceptual understanding. It is important to find a way to motivate learners to learn. If learners feel motivated, they are more likely to take an active role in their learning and there would be high expectations for students to be able to work cooperatively and support one another as they work together.

Cooperative learning is a powerful tool for learning and the interaction within cooperative groups helps students to feel confident in their abilities. A person who can work with others cooperatively and willingly can be a productive member of today’s society. Research shows that students learn and understand more when they discuss and collaborate in magnetism.

In this study, the researcher is being guided by the following questions:

1. Why learners are poorly motivated to understand concepts of magnetism?
2. Is it significant to use cooperative/group learning to enhance learner’s conceptual understanding of magnetism lessons?

Literature Review

Aluko (2004), that an adapted version of cooperative learning strategy requires students to solve mathematical

problems together in small groups and the teacher acts as a facilitator. Also, learners will be more involved than their teacher. Johnson (2007), defines cooperative learning as students working together to accomplish shared goals. Students seek outcomes that are beneficial to all, Students discuss material with each other, help one another to understand it, and encourage each other to work hard. This shows that cooperative learning has more benefits for all those who use it. Cooperative learning is defined as the instructional use of small groups so that students work together to maximize their own and each other's learning" (Jill Clark, 2015).

Cooperative learning, as opposed to competitive individual learning, makes use of all members' resources and skills by asking each other for information and assistance, evaluating each other's ideas, and monitoring each other's contributions. Ross (1995), describes successful cooperative learning tasks as intellectually demanding, creative open-ended, and involving higher-order thinking tasks. Students must work in groups to complete tasks collectively and accurately toward academic goals. Everyone succeeds when the group succeeds and the objective of the lesson will be highly achieved. Successful cooperative learning tasks are intellectually demanding, creative and open-ended. They involve higher-order thinking skills and lead to lively discussion and active "deep learning". "Deep learning", as opposed to surface learning, examines new facts and ideas critically, encourages students to relate ideas to one another, to previous knowledge and to their individual experience, and leads to greater retention of learning. Group work is a powerful way to promote deep learning as students constantly need to express, justify and sometimes change their assumptions and their knowledge as they interact with others (Haripamyu, 2019).

Building blocks of effective cooperative learning is more than just working in groups. Five building blocks, identified by David and Roger Johnson (2009), are fundamental to successful cooperative learning:

- ***Promotive Interaction***, preferably face-to-face promotive (positive) interaction means that groups meet regularly to discuss ideas and to establish group relationships. This prevents the development of "pseudo groups" where group members work as individuals and combine their efforts only at the end of the task (Visgosky, 1987). There is an established correlation between interaction and learning (Webb, 1989), so a well-designed cooperative learning activity must provide many opportunities for your students to discuss, question, and support one another and therefore learn.
- ***Positive Interdependence***: In successful cooperative learning, your students must feel that they need each other to complete the group's tasks. This empowers students who might be overwhelmed in a traditional learning situation where the teacher and the high-achieving or more vocal students tend to dominate. It also introduces students to the idea that they need to rely on.
- ***Individual Accountability:*** Group members must always feel that they are individually accountable for helping to complete a task and for mastering material. They must understand that a "free-riding" situation (depending on others to do most of the work) will not lead to group success.
- ***Interpersonal and Collaborative:*** Before beginning group work your students must practise skills for working together effectively as well as for ensuring that group maintenance is carried out efficiently. Your students need to be taught leadership, decision-making, trust-building, communication, intercultural and conflict-management skills. They need to learn and practice ways of giving constructive feedback and use probing questions as students do not automatically know how to do this.

- ***Group Processing:*** Groups need specific times and processes to reflect on how well they are achieving their goals and whether they are maintaining effective working relationships among their members. This needs to be carried out throughout the life of the group, not just at the end and needs to be practised by your students to ensure that they develop the skill to do it effectively.

A group discussion is a group of individuals with similar interests who gather either formally or informally to share or bring up ideas, solve problems or give comments about the topic given (Guneev, 2024). Shortly or simply, a group discussion is a detailed conversation about something important. It helps the learners to increase their knowledge, and critical thinking and benefit more outcomes from their colleagues (Janelle, 2024). It also helps them to participate actively when they share ideas about the lesson and the teacher helps get more information referring to the ideas and understanding of the learners in their respective group. It shows the strengths and weaknesses of the learners where low learners improve their participation in groups and ask questions which they don't understand well. It helps the teacher to know where learners are weak and focus more on strengthening them to achieve goals.

A study done by Chambers (1995), quoted that "When kids listen to each other they understand better than when they hear directly from me teacher". It makes more sense to them. Through discussion and listening to others, students also find that there may be more than one way to solve a problem. If a student was unable to understand a concept or apply it in the way it was explained, his team members would explain or show it differently. Many times, this was successful in helping the student get back on track (Bernero, 2000).

Learners' Motivation

It is not difficult to combine academic learning, assessment, and soft skills. What needs to be taught that hasn't been emphasized in previous decades is the common thread that runs through all concepts, the underlying structure of information, and how ideas relate (Tatum, 2016). To accomplish this, we must guide our students through real-world examples of professions and embed the learning within. Just as an effective learning game incorporates learning into the game's core mechanics, effective teaching activities must incorporate real strategies that students will use in the real world. Instead of simply teaching memorization, we must prepare students to use abstract ideas to form thoughtful opinions and decisions, as they would in a future profession. One method for getting people to fully understand something is to take what they're interested in and have them explore it as if they were in that field. Project-based learning and exploratory units are great approaches to conceptual knowledge, especially in school districts that may lack the resources to pursue personalized learning (Sutrisno, 2023).

Learners differ from one another, the reason why learners' conceptual understanding will also be varied as well as their behaviours. Intrinsic conceptual understanding is the desire to seek out new things and new challenges, to analyze one's capacity, to observe and to gain knowledge (Richard, 2001). Therefore, intrinsic motivation has great importance in promoting learners' learning due to its long-lasting and self-sustaining. On the other hand, the extrinsic conceptual understanding refers to the performance of an activity to attain a desired outcome and it

comes from influences outside of the individual. Common extrinsic motivations are rewards for showing the desired behaviour, meaning that learners who are extrinsically motivated want to achieve good grades or money. Competition is an extrinsic motivation because it encourages the learners to win, not simply to enjoy the intrinsic rewards of the activity.

Factors Contributing to Poor Learners' Conceptual Understanding Of Magnetism

In this research, it was found that the poor conceptual understanding of learners in learning magnetism was caused by some factors like lack of enough equipment, lack of collaboration among the learners, and lack of teaching and learning materials. After observing those factors of poor conceptual understanding in magnetism. Researchers observed that poor conceptual understanding of the learners affects their performance and great achievement in magnetism. The best way of solving that issue is to use cooperative learning methods.

Strategies to be used by the Teacher to Enhance Student's Conceptual Understanding of Magnetism

Being successful in magnetism involves the ability to understand one's current state of knowledge, build on it, improve it, and make changes where necessary. There are strategies that students need to develop and apply to reach great achievement in magnetism such as: Using classroom presentations and group discussions in the teaching and learning process. Asih (2022), said that verbal presentation by individual students constituted an opportunity to increase, improve and provide methods of learning in the classroom. Those have a great impact in increasing the conceptual understanding of learners because most of the students understand better what her/his colleagues said than what their teachers said, using oral and visual presentations for students to the entire class versus submitting assignments only to the instructor or only to one peer is to demonstrate and evaluate the benefit of such presentations (Thirumalai, 2011).

Mixing students with strong and weak learners and allocating tasks to be done in groups, so that the students will share ideas among themselves about the task given in their respective groups. Weak students often work better in smaller groups. There is a need to cater for the students' different learning styles and preferences by using a variety of activity types in each lesson (Jonasson, 2007). Shortly for this strategy; group work has to be carefully planned to ensure progress and enhance the sense of creativity; students enjoy the activity because they work together.

Method

Research design

Research design is a master plan specifying the methods and procedures for collecting and analyzing the required information; it is also defined as a framework of the research plan of action. According to Smith (1997), research design is defined as the scientific part or action of planning procedures for conducting a project study to get the most valid findings. In this study, qualitative and quantitative techniques were used to collect data from learners, teachers and school administration using interviews, observation and questionnaires.

Population of the Study

A "population" in research refers to the large group of individuals or items that a researcher wants to generalize their findings from a sample to, essentially representing the entire group of interest that the study aims to understand and make inferences about (Oribhabor, 2019). This study is targeted at 490 students of senior two as well as those from senior one, 9 lower secondary physics teachers and 2 DOSs from 5 schools located in the Rwamagana district.

Sample Size

Purposive sampling was used to select the participants in this research. A researcher selects students and physics teachers in lower secondary schools where Physics is taken as a core subject. Students from seniors one and two were also selected purposively as they study magnetism topic as the one unit they should cover in the physics subjects. Lower secondary Physics teachers are the ones delivering the contents, and DOSs are in charge of checking whether magnetism is taught in an accurate way as it was supposed to be taught. This study is targeted at 76 students of senior two as well as those from senior one, 5 lower secondary physics teachers and 2 DOSs.

Instruments used for Data Collection

In this study, a triangulation method was employed for gathering information. Questionnaires, interviews and observation were used.

Questionnaires: defined as a research instrument consisting of a series of questions to gather information from respondents (Abawi, 2017). The respondents received a questionnaire and each one answered independently. The questionnaire included open-ended questions where the respondent formulated his/her answer and closed-ended questions where the respondent picked a correct answer depending on her/his choice. Those questionnaires were served to selected students in senior two to know what the teacher can do to enhance their conceptual understanding of learning Magnetism through cooperative learning.

Interview: The interview is a conversation between the researcher and the respondents (Taherdoost, 2022). The researcher sets the questions to be answered by the respondents exactly without writing anything and to obtain organized information, based on the feedback provided by the respondents.

Observation: Observation is an active instrument that helps researchers to get more information by observing the behaviour of somebody in a given condition (Kawulich, 2012). In this study, observation helped me to know how Magnetism is learnt how the students react in terms of active participation in learning Magnetism, and how they are involved in group discussion to enhance their conceptual understanding and achieve the lesson objective. A researcher has used participant observation, joined groups and observed their activities and how they share ideas in their respective groups.

Results

Table 1 shows the demographic data of the participants of this research, in total, they were 76. Participants were divided into three main categories 69 senior one or two students, 5 lower secondary physics teachers, and 2 directors in charge of the study (DOS). This study was not regarding gender, age, and race. Only the participants were supposed to be actively participating in the activity of teaching and learning magnetism concepts, learners were from senior one or two in time a researcher went to collect data from the field. Students from senior one and two were chosen because they study magnetism as unit 11 and in senior two as unit 11. The researcher chose them as they have basic skills and knowledge as they encounter magnetism at an early age in time they begin secondary school. Physics teachers and DOS were the instructors at the classroom level as well as at the school level respectively, Teachers are responsible for managing what the students should learn and controlling what, how, and what is not learned in the classroom.

Table 1. Demographic Data of Participants

Participants	**Number of participants**
Senior one or two Students	79.00
Lower secondary Physics Teachers	5.00
Director in charge of the study (DOS)	2.00
Total	86.00

In Table 2, 27.85% indicates that teachers fail to motivate learners to engage and use critical thinking and analysis in magnetic classes (teaching and learning activity). It indicates that 24. 05% of teachers did not give clear and good explanations related to magnetism concepts. It indicates that 22.78% of teachers are fairly to use teaching materials like physical magnets, video, and simulations where necessary. It indicates that 20.25% of teachers aren't conducting laboratory experiments related to magnetism concepts. It also indicates that 5.06% of teachers aren't using group discussion and cooperative learning methods in magnetics class.

Table 2. Students' View on the Factors that Hinder Failure in Magnetism Lesson

Items	**No**	**%**
Lack of magnetics concept from teachers to enhance learners' engagement and use critical thinking in magnetism class	22.00	27.85
Lack of explanation related to the concepts of magnetism	19.00	24.05
Lack of magnetism physical teaching aids like magnets, video, and PhET simulations	18.00	22.78
Lack of laboratory experiments related to magnetism	16.00	20.25
Lack of using group discussion/ cooperative learning in magnetism class	4.00	5.06
Total number of students	79.00	100.00

Represent the Frequency of Participants and **%** represents Percentages.

Table 3 indicates that 100.00% of DOSs and teachers and 93.67% of learners agreed that group discussion and cooperative learning are used effectively and frequently in teaching and learning magnetism classes. It indicates

that 94.94% of learners don't know if a group discussion is used in magnetic class and 71.43% of teachers highlight that group discussion is frequently used in magnetism class. It indicates that 87.34% of the learners don't know if cooperative learning is used frequently and effectively in the magnetism class and 85.71% of teachers highlight that cooperative learning is not used frequently in magnetic class.

Table 3. DOSs, Teachers, and Learners' Perception of How Group/Cooperative Learning was used to Enhance Conceptual Understanding of Magnetism

Items	Students view			Teachers and DOSs view		
	Ans	No	%	Ans	No	%
Are group/cooperative learning used effectively and frequently in magnetism class?	Yes	74.00	93.67	Yes	7.00	100.00
	No	3.00	3.80	No	0.00	0.00
	IDK	2.00	2.53	IDK	0.00	0.00
Is group learning used effectively in magnetism class only?	Yes	1.00	1.27	Yes	3.00	71.43
	No	3.00	3.80	No	3.00	28.57
	IDK	75.00	94.94	IDK	0.00	0.00
Is cooperative learning used effectively in magnetism class?	Yes	3.00	3.80	Yes	1.00	14.29
	No	7.00	8.86	No	6.00	85.71
	IDK	69.00	87.34	IDK	0.00	0.00

IDK-I don't know, No-Frequency, %-Percentages, and Ans-Answer

Discussion

They help them to be engaged, to learn, and to assess what they are learning. They select teaching methodology relevant to the subject, to the environment as well as to the school location. Therefore, teachers are the centre of Education with the help of the Director of the study. The director of the study is the link between teachers and the other stakeholders in education, they manage what to be taught, how, and when. They also report to the sector and district level if the teaching and learning were done effectively. He/ she organizes and controls if the teaching and learning are done effectively. The study shows that teachers enforce discipline for a smooth and orderly teaching and learning process. Compassion absolutely must be possessed by a teacher. If the teacher does not have authority, he will have difficulty guiding his students to comply with the rules for the sake of orderliness in school to support the success of the teaching and learning process (Zainal, 2020).

From the above finding, Teachers aren't motivating learners to learn magnetism. It shows that they don't use a classroom motivation strategy and this led the learners to be less engaged in magnetism class. This led to poor performance and created a negative conceptual understanding of the magnetism subject. It shows that several numbers of teachers do not give effective explanations related to the magnetism subject, which can lead to the creation of negative misconceptions and conceptual understanding toward magnetism. It also, shows that some teachers were not conducting magnetism laboratory experiments and were not using group discussion/cooperative learning in their classes. This led negative behaviour toward magnetism and can cause negative misconceptions and conceptual understanding toward the content they are learning. Nartey (2021),

highlights that the same topics which were identified by teachers as difficult to teach were negatively perceived and poorly understood by the majority of their students. This suggests that if better teaching strategies or approaches are made available and are used by the teachers, these topics may become easier to teach, and in turn easier for the learners to understand if they are better taught (Dean, 2024).

On the other side, some teachers arrange them elf and use some teaching materials to boost the students' minds and help their students to learn magnetism effectively, the teaching materials mentioned are physical magnets, video, and PhET simulations toward magnetism subjects. This method leads to the creation of positive attitudes toward the magnetism concepts which can upper their conceptual understanding as well as their performance toward the magnetism concepts. According to Abida (2019), a teacher as a manager has four functions, namely: planning learning objectives; organizing as a source of learning to realize learning goals; leading, including motivation, encouraging, and stimulating students; and supervising everything whether it is functioning as it should or not, in the context of achieving goals. It was found that whatever roles played by the teachers were subject to be revised and modified over the years, and the involvement and cooperation of all kinds of stakeholders could truly empower the teachers to bring about the changes needed beyond and within the context (Sharmin, 2020).

Magnetism will be enhanced through group discussion and using cooperative learning accurately. This requires specific strategies for making the lesson well understandable. Teachers must give many examples which will help the learners to understand the lesson content and encourage students to share their ideas and comments, even if they give wrong ideas; Maintain eye contact and move toward your students as you interact with them and return assignments and tests to students as soon as reasonably possible, this implies that teachers should provide constructive feedback and being consistent and fair in assessing students. Group discussion, doing many exercises and homework would help learners to be more practical than theoretical so that they can improve their critical thinking and participate actively during the teaching and learning process. According to Ekwueme (2019), The major cause of poor academic retention could be attributed to among other things, such as the use of inappropriate/less effective teaching methods. This finding also supports the assertion that passive learning creates undue stress for the learner because humans are not simple receptacles who easily process and transfer information passively (Maha, 2018).

Teachers’ practices help students to be motivated and the strategies to keep students who are interested in learning Magnetism are the following: Know my students’ characteristics and rely on them during the teaching and learning process and encourage interaction among students. Pay attention to the strengths and limitations of each student, reward their strengths through conceptual understanding and correct the weaknesses by giving additional help. Also use different methods of teaching like lecturing, demonstrations, class discussions, case studies, group work and cooperative learning; Review the learning objectives with the students. Be sure that the students know what they are expected to learn. According to Johnson (2017), Teachers motivate their students to learn by providing them with positive feedback, to develop competence. Providing feedback enables students to gain control over their learning and a sense of belief about their abilities. Teachers’ encouragement can motivate students for better performance. If some weaknesses are found the teacher may guide students in

correct directions for improvement (Sufiana, 2011).

The use of active learning has a good influence on learning: students in collaboration or group discussions learn from each other. Students have access to knowledge and skills easily when they are participating actively and regularly, they get a common understanding of what they learn. They have the chance to ask his /her facilitator as a group. Also working together will facilitate them to not forget easily what they learn. Student-centred active learning classrooms are designed primarily to promote active and deep learning, which requires a higher level of student engagement. Improving the environmental design and experiential perception of the learning space can effectively promote students' learning involvement (Peng, 2022). The study therefore established a positive relationship between parents' education, the child's academic ambition, the child's effort and academic performance (Ampofo, 2015). The active learning activities provided the chance for students to be leaders. Also, active learning activities let students think and share their ideas and make them think creatively (Teerapat, 2022).

Conclusion

The use of group/cooperative learning had a positive impact during the teaching and learning process; this led to enhancing student's motivation. Learners were motivated and the course was understandable, almost all students participated in the lesson, and learners found interest in that course. Group work helped the learners to participate in different ways where the learners were interactive, exchanging ideas, practised more exercises in learning and used teamwork and collaboration among them in the classroom. These activities help the learners learn with interest; otherwise, more students don't like to go to schools where the teachers don't prepare activities which will encourage them while they are learning. The teachers' practices had a great positive effect on the students' conceptual understanding of learning magnetism through working cooperatively or working in a group, which helped students to participate actively, improve their speaking skills, and increase critical thinking skills, and team working skills.

Recommendations

- Students are responsible for doing their self-study, exercises and homework. They should stay disciplined and take care of all bits of advice from their teachers, authorities or parents.
- Similar research should be conducted by attributing other factors that hinder the students' conceptual understanding of magnetism.
- Based on the findings, similar research should be conducted in the other districts in Rwanda to check whether the findings have a significant difference.

Acknowledgements

This research is dedicated to all students, teachers, and other stakeholders participating directly and indirectly.
No funding was provided to support this research.

References

Abawi, k. (2017). *Training in Sexual and Reproductive Health Research.* Geneva: Geneva Foundation for Medical Education and Research. Retrieved from https://www.gfmer.ch/SRH-Course-2017/Geneva-Workshop/pdf

Abida, F. H. (2019). Teacher Function in Class: A Literature Review. *5th International Conference on Education and Technology (ICET 2019)* (p. 4). Malang, Indonesia: Atlantis Press.

Aluko, K. O. (2004). Effects of Cooperative and Individualistic Instructional Strategies on Students Problem Solving Abilities Secondary School Chemistry in Llessa Nigeria. Unpublished PhD. Thesis, University of Ilorin Nigeria. *Scientific Research*. Retrieved 11 23, 2024, from https://www.scirp.org/reference/referencespapers?referenceid=2368845

Ampofo, E. T. (2015). Students' academic performance as mediated by students' academic ambition and effort in the public senior high schools in Ashanti Mampong municipality of Ghana. *International Journal of Academic Research and Reflection*, 5.

Anonymous. (2023). *Small-Group and Cooperative Learning. Effective Teaching in the Secondary Classroom.* Retrieved 11 16, 2024, from https://edtechbooks.org/

Asih, A. a. (2022). The use of oral presentation in teaching English to improve students speaking skills. *Professional Journal of English Education*, 300-305.

Bernero. (2000). *Discourse and cooperative learning in Math class.* Nabraska: University of Nabraska.

Chambers. (1995). *Using cooperative learning to promote problem-solving in the classroom.* Grand Island: University of Nebraska-Lincolin.

Clark, J. A. (2015). *Cooperative learning made easy: A practical guide to working with tertiary student groups.* Ako Aotearoa: WelTec. Retrieved from http://www.akoaotearoa.ac.nz/

Dean, M. (2024, 4 18). *9 Effective teaching strategies for every classroom*. Retrieved from HMH: https://www.hmhco.com/blog/effective-teaching-strategies-best-practices-in-the-classroom

Ekwueme, A. (2019). Efficacies Of Cooperative Learning Instructional Approach, Learning Activity. *Science Educational International*, 7.

Frymier, J. (1974). A study of oppressive practices in schools. *Education Resources Information Center*. Retrieved from https://files.eric.ed.gov/fulltext/ED094478.pdf

Guneev, P. (2024, 5 5). *What is A Group Discussion- Definition, Types, and Process*. Retrieved from naukri blog: https://www.naukri.com/blog/what-is-group-discussion/

Haripamyu, J. S. (2019). *The Implementation of Small Group Discussion and Cooperative Learning in Real Analysis 2.* Science and Technology Publications, Lda. SCITEPRESS. doi:DOI: 10.5220/0008680601010104

Janelle, M. J. (2024). Discussion Group Effectiveness is Related to Critical Thinking through Interest and Engagement. *ResearchGate*. doi:http://dx.doi.org/10.2304/plat.2014.13.1.12

Jill Clark, T. B. (2015). *Cooperative learning made an easy: A practical guide to working with tertiary students groups.* New Zeland: Ako Aotearoa – The National Centre for Tertiary Teaching Excellence. Retrieved 11 17, 2024, from https://ako.ac.nz/

Jim, L. P. (2022, 2 2). *What is magnetism? Facts about magnetic fields and magnetic force*. Retrieved 11 2024,

16, from LiveScience: https://www.livescience.com/38059-magnetism.html

Johnson, D. (2017). The Role of Teachers in Motivating Students To Learn. *BU Journal of Graduate Studies in Education*, 2.

Johnson, D. A. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*. doi:DOI: 10.3102/0013189X0933905

Jonasson, P. a. (2007). *The challenge of mixed-ability classes: How should upper secondary English teachers work to help the weaker students?* Retrieved 11 23, 2024, from http://www.diva-portal.org/smash/get/diva2:4422/fulltext01.p

Kawulich, B. (2012). Collecting data through observation. *ResearchGate*. Retrieved 2 14, 2025, from https://www.researchgate.net/publication/25794478

Macpherson, A. (2007). *Cooperative learning group activities for college courses a guide for instructors.* Retrieved 11 17, 2024, from https://uca.edu/core/files/2019/07/Collaborative-guide.pdf

Maha, A. A. (2018). The Learning Experience of International Students in Canada: Progressive Educational Theory and Passive Learning Styles. *Canadian Center of Science and Education*. doi:doi: 10.5539/elt.v11n7p76

Marketing, U. (2022, 9 28). *University of the Potomac*. Retrieved 11 16, 2024, from What Is Conceptual Understanding?: https://potomac.edu/

Melamed, C. (2023). *10 Definitions of Learning*. Retrieved from The E-learning Coach: https://theelearningcoach.com/learning/10-definitions-learning/

Nartey, E. a. (2021). The Perceptions of Senior High School Students and Teachers about Organic Chemistry: A Ghanaian Perspective. *Science Education International*, 7. doi:https://doi.org/10.33828/sei.v32.i4.8

Oribhabor, C. B. (2019). *Research Sampling and Sample Size Determination: A Practical Application Practical Application.* ResearchGate. Retrieved 2 14, 2025, from https://www.researchgate.net/publication/336723498_

Peng, L. ,. (2022). Students' perceptions of active learning classrooms from an informal learning perspective: building a full-time sustainable learning environment in higher education. *Sustainability*, 18. doi:https://doi.org/10.3390/su14148578

Richard, M. R. (2001). *Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being.* Retrieved 11 23, 2024, from https://selfdeterminationtheory.org/SDT/documents/2000_RyanDeci_SDT.pdf

Ross, S. A. (1995). *Definitions of cooperative learning.*

Schiller, F. (2024, 5 31). What Is Learning? *Scientific Research Publishing*. doi:https://doi.org/10.4236/psych.2024.155047

Sharmin, S. A. (2020). Teachers' Roles Beyond and Within the Context: An Ever-Changing Concept. *Arab World English Journal (AWEJ)*, 13. doi:https://dx.doi.org/10.24093/awej/vol11no1.21

Smith, V. K. (1997). *Welfare Measurement and Representative Consumer Theory.* My Ideas. Retrieved 11 23, 2024, from https://ideas.repec.org/p/ags/rffdps/10646.html

Sufiana, K. M. (2011). An Investigation into Students' Perceived Views about Effectiveness of Oral Presentation at University Level. *ResaerchGate*, 3.

Sutrisno, S. E. (2023). Exploring the Benefits and Challenges of Project-Based Learning in Higher Education.

International Journal of Education. doi:http://dx.doi.org/10.59175/pijed.v2i2.148

Taherdoost, H. (2022). How to Conduct an Effective Interview; A Guide to Interview Design in Research Study. *International Journal of Academic Research in Management*. Retrieved 2 14, 2024, from https://hal.science/hal-03741838/document

Tatum, M. A. (2016). *What is Conceptual Understanding?* Retrieved from Getting SMART: https://www.gettingsmart.com/2016/08/29/what-is-conceptual-understanding/

Teerapat, J. (2022). *A survey of teachers' perceptions of active learning activities at public schools in Bangkok.* Bangok: Tammsat University.

Thirumalai, M. S. (2011). An Investigation into Students' Perceived Views about Effectiveness of Oral Presentation at University Level. *Research Gate*.

Visgosky, L. (1987). *interaction between learning and Development.* Harvard University: Cambridge, MA.

Webb, N. M. (1989). Peer interaction and learning in small groups. *International Journal of Educational Research*.

Zainal, A. (2020). The role of the teachers in school and community. *Jurnal pemikiran dan pendidikan Islam*, 7.

Author Information

Tujyinama Valens
https://orcid.org/0000-0003-2650-2802
University of Rwanda-College of Education
Eastern-Kayonza, Rukara
Rwanda
Contact e-mail: *valenstujyinama@gmail.com*

Yamikani Kalolo
https://orcid.org/0000-0001-6289-6576
University of Malawi
Zomba
Malawi