

The factors of students' involvement on student-centered learning method

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ABSTRACT

Student-centered learning (SCL) is one of the teaching methods commonly used nowadays as it encourages the active participation and engagement of students in the classroom, especially for the engineering theoretical subject. This study is aimed to examine the factors of students' involvement and participation towards the SCL Teaching Method in terms of the activities, benefits, problems, and limitations of student involvement. The quantitative data are obtained from the responses of students that enroll in an engineering theoretical subject in the Universiti Teknologi MARA (UiTM) Pahang Civil Engineering Diploma Program. These questionnaires were being classified into five major factors that are the formation of group studies for SCL activities, activities conducted for SCL teaching method, benefits that they gain from SCL method, problems that they encounter during SCL, and suggestions for student improvement towards the activity SCL session. The collected data were analyzed quantitatively by using the percentage and mean method in SPSS computer software. The Relative Importance Index (RII) system was used to quantify the relative importance of involvement factors. This study revealed three main factors affecting the participation and engagement of students in the classroom. This study has an important contribution to help academicians to improve and enhance their teaching method to achieve the objective of the SCL method in the future.

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1. INTRODUCTION

Nowadays, passive learning in traditional classroom teaching is no longer relevant and students need to change their paradigm to a more dynamic and involved experience. Therefore, the development of Student-centred learning (SCL), usually known as learner-centered education, basically used an approach of teaching strategies that rely on teacher-to-student instruction. Student-centered learning seeks to enhance student freedom and independence by engaging responsibility for the learning path in the hands of students by providing them with expertise and a basis on how to learn a specific problem [1]. In addition, SCL method encourages students to become more interested in collaborating in groups, connecting ideas, and using scaffolding activities for mathematical learning [2].

However, in order to ensure the growth of active SCL, it requires effective technology to support the needs. The shift to the implementation of SCL extends the role of educational technology. Educational technology is an important part of the innovative development of professional education [3]–[7]. A student-centered classroom is a place where teachers understand the needs of the students and allow them to engage all the time in the learning process. The position of teachers is more that of facilitators than instructors. Students engage actively in the learning process and teachers help guide students, coordinate their activities, and direct their learning process in order to achieve the learning outcomes of respective subjects [8]. Conversely, lack of engagement and involvement from the students will result in an unsuccessful SCL as well as lack of guidance and motivation from the teacher as the facilitator in a SCL environment. The engineering students are normally exposed to calculation and design course, therefore the students find that the theoretical subject is not interesting [9]. Studies by Wong [10], Zeer and Streltsov [11] indicates that students gain excellent score of cognitive domains in engineering course as compared to other theoretical course. To achieve this aim, it is important to identify the factors that affect the student's involvement and their behavior especially in engineering theoretical subjects. Hence, this will provide solutions to the addressing factors in order to encourage students to actively involve in the SCL activities as well as to give inspiration to lecturers to create more interesting and interactive SCL activities.

Therefore, the objectives of this paper are to identify the factors affecting student's involvement and their behavior. To quantify the relative importance of the student's involvement and to demonstrate the ranking of the factors and groups according to their importance and to identify the approaches for solving the problems regarding the student's involvement.

2. LITERATURE REVIEW

One learning strategy right to be able to support the quality of the students is student learning model-centered learning. The term SCL is a learning model in education and teaching in which students have multiple activities such as planning, learning, interactions between teachers and students, research, and evaluation of the learning that has been done. The learning process conventionally takes place where the teacher is a source of learning that teaches the knowledge and skills to students. The key to change this is the thought that students must actively involve in the form of their knowledge that is known as constructivism thinking. The constructivism approach is a deep implementation that gives birth to an approach of SCL [12].

The use of a teaching method in the teaching and learning process can affect the level of effectiveness in teaching. It is because, the teaching strategies used by the lecturer will have an impact on student acceptance, which in turn can lead to success for students. The selection and implementation of a teaching strategy are very important to ensure that every planned teaching and learning activity can be implemented [13]. Among the main factors of teachers always turned to traditional teaching practices while teaching is due to the class environment factors and less stimulating learning space. Traditional teaching practices cause the processes of teaching and learning to seem to be less attractive and boring, thus causing fewer students interested in attending teaching and learning sessions. Therefore, the approach of SCL is one of the methods that can be implemented by the lecturer in the process of teaching and learning [11].

Teaching and learning processes at the tertiary level that use ordinary conventional teaching techniques, thus cause uninteresting and unexciting feelings among students, especially if the class takes place in the afternoon or after lunch. According to previous studies [12], [13], if the lecturing method is well delivered it can be efficient, effective, and dynamic to introduce new titles or concepts. Through the lecture method, lecturers can also organize complex ideas, promoting critical thinking, and can also stimulate students' interest in the content or topics being studied. Lecturing is a very popular teaching method especially in institutions of higher education because it has many advantages. Among the advantages include being able to deliver a lot of information in a short time, allows information that is difficult to obtain delivered live by the lecturers, allowing the lecturer to fully control the content, speed, organization, and direction of information that's delivered and able to complete other learning activities [14]–[16].

However, lecture methods were also found to have many disadvantages. Among the weaknesses of lecturing, the method can cause students to become passive in the classroom [17]. This is due to, as the lecturer delivers the lecture, students are usually found to be only listeners, do not engage in the teaching and learning process resulting in the absence of two-way communication between lecturers and students. Lecture methods as well can cause students to become overly dependent on lecturers and difficult to express opinions or their ideas. Accordingly, the approach of SCL seems like an approach or alternative teaching method that can be used by lecturers to overcome weaknesses [18], [19].

Implementation of learning in schools, which uses more conventional methods, results in less active student involvement in learning activities. Students tend to just hear and receive explanations from the teacher without being given the opportunity to speak up his opinion broadly and openly. It can be said that it

does not empower students to be able to enhance learning (learning to do) by increasing interaction with the environment. Thus, it will not build students' understanding and knowledge of the world around the students (learning to know). Previous studies suggest various characteristics of student-centered interactive learning where teachers act as facilitators and guides [20]. In addition to that, the involvement of students' roles must become more energetic and active, autonomous, inquiry-based, self-motivated, self-reflective, problem-solving, and relevant to their condition and interests [21]. Most of the learning style is based on group activity collaborative, cooperative, and participatory [22]. As to ensure the development of SCL methods are successful, each party needs to take part and understand their role [23]. The teacher takes part in consulting the students, managing the class, organizing the discussion, moderating, encouraging, exhibiting, planning, directing, innovating, leader, maintain justice, acting as a role model and observer. Whereas the role of the student is active participation, competent, creative, idealistic, inquisitive, good listener, punctual, pragmatic, positive, persistent, responsible, raises questions, self-motivated, self-conscientious, self-reflective, thoughtful, and tolerant.

Furthermore, by using the conventional teaching method, students do not have either opportunity to build knowledge and self-confidence (learning to be), as well as the ability to interact with various diverse individuals or groups (learning to live together) in society. Learning will be more meaningful (meaningful learning) if the students experience what learned, not knowing it. Target-oriented learning proved successful in the competence of remembering teaching materials in the short term, but fail in equipping children to solve problems in long-term learning.

Therefore, educators are required to be able to choose a model of uplifting learning which allows every student to be actively involved in their learning experience. One alternative learning model that allows the development of the activeness of each student is SCL. The paradigm shift in the process of learning was from teacher-centered to student-centered that intended to inspire students to actively participate in gaining knowledge, attitudes, and behavior. Go through a process of learning with this student engagement means, the teacher does not take away the student's rights to learn in a real sense. In the SCL process, the students get the chance and facilitation to develop their knowledge and understanding thus they will acquire a deep understanding, and in the end, can improve the quality of learners.

Implementing the SCL model means teachers need to help students to set goals to achieve, encouraging students to be able to assess their learning outcomes, help them to work together in groups, make sure they find out knowing how to take advantage of all available learning resources. SCL emphasizes students as learners and what students do to succeed in learning compared to what is done by the educators [24]. From these various definitions can be understood that SCL is a learning model placing students at the center of the learning process. This learning model is different from the Instructors Centred Learning model which emphasizes the transfer of knowledge from the teacher to the student that relatively passive. With the implementation of SCL, students are expected to be involved and act actively as participants in the learning process. They are accountable and take the initiative to recognize their learning needs, find sources of information that can address their needs, create and present knowledge based on needs and sources identified. Students are able to select the materials they need to learn under certain limits.

Along with the times, hence the teacher-centered learning process is considered no longer adequate, so there must be a change in learning methods more focused on students (student-centered learning) with the expectations of students that may have the motivation to determine the direction of learning objectives. SCL is a participant-centered learning model for students, where students can become active and independent learners in the process of learning and having the responsibility and initiative to recognize their learning needs, and are able to find sources of information without depending on others or their teacher. Another term introduced by Sagitova and Fahrudinov [25], participant-centered learning teaching is a teaching and learning process based on the needs and interests of students. Participant-centered learning model students are designed to provide the system with flexible learning according to life and student learning styles. Educational institutions and teachers do not play a central role but only as support.

Most of the method and techniques apply in SCL are brainstorming, case study, demonstration, group assignment, group discussion, guided study, flipped class, field visit, interactive learning, individual assignment, learning by doing, peer-led team learning, peer learning, pair learning, pair discussion, project, panel discussion, oral presentation, poster presentation, lecture, role play, site visit, study tour, simulation game, problem-solving, question-answer method, and STAD/student teams-achievement division [26]. All three processes of learning include cognitive, affective, and psychomotor domains [27]. Besides these three domain processes, all phases of learning are involved in interactive learning such as analyzing, applying, creating, evaluating, remembering, and understanding [28]–[30].

In a SCL environment, the student or the individual takes the responsibility for deciding their own learning goals, examining progress towards meeting those goals by either adjusting or adapting as necessary, and determines that these goals have been addressed satisfactorily [31]. For effective SCL and personal productivity enhancement, information technologies promote student learning and higher-order thinking. By

these, learners can use a selection of technologies to explore ideas, ask questions, gather and distribute information, and support each other in learning. This promotes adaptability and fosters individual growth and development of the learner. To promote SCL within the technological environment, educators actively seek information from a variety of sources (e.g., online databases, the Internet, colleagues, journals) to encourage and improve personalize the student learning process. By encouraging innovation, teamwork, and critical thinking, the careful incorporation of technology into the classroom offers educational resources that may transform learning in an effective and efficient process.

Educators also use technology for their professional growth, enhance their productivity, and facilitate communication. They learn in a self-directed manner, formulate and test a probable solution by reflecting on what they have learned and the effectiveness of their solution. Students sometimes spend extensive time working on computers, conducting research, and examining and evaluating with one another. Technology allows the advancement of SCL to gain access to almost unlimited amounts of data and information. They can be active learners by gaining access to the internet and research software. Technology is taught as a support tool or the creation of the student project and helps the problem-based lesson as the computer becomes a powerful tool in solving realistic problems. Technology serves an important role in project-based learning by enabling to access information, collaborating with others, and sharing and presenting the outcomes of the project [22]–[24]. According to Rollakanti *et al.* [32], there is important to incorporate the significant role of media and technology to support the SCL method. According to Dinesh [33] referred SCL is an experiential program, and by concerning the equilibrium of teacher and student participation in SCL method, one may trace the evolution of facilitation and reflection from student-centered to teacher-centered, and back to student-centered models. While teacher-centered experiential education has learning value, it is not almost as helpful as learner-centered experiential education. It is time for the profession to raise awareness, boost dialogue, and take action to resolve this imbalance.

3. RESEARCH METHOD

To rank the factors of students' involvement towards SCL teaching method, this study has selected a basic civil engineering theoretical course that is Water and Wastewater Engineering Course. This course consists of basic concepts of water and wastewater engineering principles, the technology used, and problems that arise regarding the topics. The session comprises students from the final year students of Diploma of Civil Engineering, Universiti Teknologi MARA Pahang whom attending this class on a full-time basis. This course was delivered in 14 weeks (one semester) by the same lecturer. Professional basic knowledge is important for civil engineering students; however, they must develop other critical and analytical skills such as innovative understanding, critical thinking skills about innovations and trends in the field of civil engineering. Therefore, to develop the understanding and learning capabilities of a student, it is important to introduce effective teaching and learning methods by instructors [32]. Consequently, the selected course was taught along with free online interactive programming applications and tools through a flipped teaching technique. This method involves many types of pre-existing approaches, in-class and post-class operations. To gain adequate knowledge outside the classroom, lecture materials was made well available to students in advance. Students were assigned to try quizzes related to lecture tools that helped the instructor test the comprehension of the course material by students for the respective class.

The students were formed into groups of four that were chosen by themselves. They were given one case study regarding the recent scenario in water and wastewater engineering by incorporating the problems and solutions for each problem respectively. They were given one week to discuss the topic and need to present for the next class session. By the end of the class session, the questionnaire was distributed that comprises five sections: i) Formation of a discussion group; ii) Activities carried out; iii) Benefits of the activities; iv) Problems encountered and suggestions for student improvement towards the SCL session.

The relative importance of the quality factors involved is calculated using the Relative Importance Index (RII). The points of the Likert scale used are equal to the W value, a weighting given by the respondent to each factor. Using (1), the RII was determined. The higher value of the RII obtained from (1) was the basis for evaluating the importance of each factor. Different variables had a different RII. Hence, the variables were ranked.

$$RII = \frac{\sum W}{A * N} \quad (1)$$

Where:

W=The weighting given by the respondent to each factor; A=The highest weight in the research; N=Total number of respondents

4. RESULTS AND DISCUSSION

The survey questions were divided into two sections: i) The respondent background; and ii) The agreement on SCL method implementation. The designed questionnaires on the agreement of the SCL implementation were evaluated based on a 5-point Likert Scale, which indicates a scale of 1 for strongly disagree and a scale of 5 for strongly agree as shown in Table 1. The analysis of the responses was done using the Statistical Package for Social Science (SPSS).

Table 1. Level of agreement

Level of agreement	Score
Strongly disagree	1.0–1.99
Disagree	2.0–2.99
Not sure	3.0–3.99
Agree	4.0–4.99
Strongly agree	5.0

The respondent's background is shown in Table 2. It is shown that the student respondents are divided into male and female genders and ages were ranged from 19 to 20 years old. The factors, mean score, and the rank of the responses in the survey are shown in Tables 3 to 7. It shows that the respondent agreed well with the implementation of the SCL method in the teaching and learning process. It is also indicated that this method gives more benefit to both students and lecturers.

Table 2. Summary of the respondent background

Respondents' background	(%)
Gender	
Male	56.3
Female	43.8
Semester	
5	2.1
6	89.6
7	2.1
8	6.3
CGPA	
2.01-2.5	27.1
2.51-3	66.7
3.01-3.5	6.3

4.1. Formation of a discussion group

The analysis in this section encompasses the level of a student's satisfaction towards the formation of a discussion group for the SCL session. Table 3 shows that students are free to choose their group members who held the first ranking. This method is self-organized grouping method as student free to choose their members without considering any factors as result, skills, knowledge. This might occur because the students are free to discuss at anytime and anywhere at their comfort and preference. Thus, those that are new in the group can also exchange their ideas. According to previous researchers [34], [35], group formation is one of the crucial steps of collaborative learning and it was found that student with different skill levels obtained better scores in the given activity when compared to the groups formed randomly and self-organized group. It is to be noted that factors one and two have the same scored, that are equivalent importance which justifies that the students are feeling comfortable to complete the task assigned when they know each of their group's mates' ability. The factor of group member limit of four people showed the lowest rank as this need to be set to ensure the fair in work delegations to complete the task within the time allocated.

Table 3. Mean score and rank of the survey

Factors	Mean scores	RII	Rank
1. Lecturers give student autonomy to determine their group members to facilitate students to complete assigned tasks.	4.25	0.85	2
2. Students are free to choose group members to encourage cooperation with less-known members.	4.56	0.913	1
3. Group member limits are set to be fair in assigning tasks.	4.17	0.833	3
4. All members of the selected group give excellent cooperation.	4.25	0.85	2

4.2. Activity SCL session

The analysis in this section encompasses the level of a student's satisfaction towards the activity SCL session. There are eight factors that contribute to the student's involvement in the activity of the SCL session. The activity exposes students to the concept of exam questions that they will face is the highest in the ranking as shown in Table 4. This factor might influence the students because they need to struggle to ensure they fully understand the topic as it will be representing the exam question. The SCL sessions help them to understand deeply the respective topic as it will save their self-learning time before the examination term. The second rank activity can stimulate students who have never spoken to speak their ideas and suggestions, especially during the presentation session. This finding consistent with Wichmann *et al.* [36] that indicates the productivity in homogeneous groups, the students who were less active contributed more when being grouped together. The third factor indicates that it is good as students will be exposed to a wide range of information on the topics provided. This is due to the student will be exploring more to answer correctly the questions that may be asked during the question-and-answer session. Furthermore, this SCL activity allows students to voice their opinions on the topic being discussed ranked in fourth place. As a result, the fifth rank shows this SCL activity helps students understand more about the topics being discussed. Thus, for the sixth factor, this SCL activity is very interesting as students will try their best to solve the problem. The students who engage in founding the SCL activity are fun as it is one of the best and most effective research and development activities in a student-centered session ranked in the seventh and eighth place since they can do their searching on the internet or any other sources.

Table 4. Mean score and rank of the survey

Factors	Mean score	RII	Rank
1. This SCL activity allows students to voice their opinions on the topic being discussed.	4.13	0.825	4
2. This SCL activity is fun.	3.81	0.763	7
3. This SCL activity is one of the best and most effective R&D activities in conducting student-centered R&D sessions.	3.79	0.758	8
4. This SCL activity is very interesting as students will try their best to solve the problem.	3.92	0.783	6
5. This SCL activity can stimulate students who have never spoken to speak.	4.27	0.854	2
6. This SCL activity is well as students will be exposed to a wide range of information on the topics provided.	4.23	0.846	3
7. This SCL activity helps students understand more about the topics being discussed.	4.02	0.804	5
8. This SCL activity exposes students to the concept of examination questions that they will face.	4.31	0.863	1

4.3. Benefits of a discussion group

The analysis in this section encompasses the level of a student's satisfaction towards the benefits of a discussion group for SCL sessions. Table 5 displays the benefits of factors that show the students can increase self-confidence and argumentative skills on top of the ranking. This is relevant because each of them will be assessed on their communication skill during the presentation session. The second factors indicate that students can increase motivation and increase their knowledge in more detail about a given topic to successfully present their works to the other groups. The third benefit is the students can come up with their ideas as they have allocated time to research on that particular topic. Students get a lot of information because they try to understand the topic in more detail by doing their research on the respective topics shows the fourth benefit of the SCL. Therefore, it indicates that students can improve their creative and critical thinking skills to solve a given topic as the fifth benefit. It follows that students find it easier to understand the information presented by a group of presenters than it is presented by the lecturer as the sixth benefit. This finding is in agreement with previous researches [37], [38] stated that teachers must encourage students to discover and intermingle in the SCL but always be ready to interfere once misperception arises

Table 5. Mean scores and rank of the survey

Factors	Mean score	RII	Rank
1. Students can increase motivation and increase their knowledge in more detail about a given topic.	4.23	0.846	2
2. Students can come up with their ideas.	4.17	0.833	3
3. Students get a lot of information because they try to understand the topic in more detail.	4.15	0.829	4
4. Students can increase self-confidence and argumentative skills.	4.29	0.858	1
5. Students can improve their creative and critical thinking skills to solve a given topic.	4.04	0.808	5
6. Students find it easier to understand the information presented by a group of presenters than it is presented by the lecturer.	3.67	0.733	6

4.4. Problems encountered in the activity SCL session

The analysis in this section encompasses the problems encountered during the activity of SCL session. Table 6 indicates the factor of students faces time constraints due to too many other tasks on top of the ranking. This is important because students in the final year are struggling with their projects that need their lecturers' approval. Besides, they must finish all the works at one time. As for the above reason, as compared to their juniors, the number of tasks or jobs for final year students may be higher. Therefore, they appear to do certain assignments later and concentrate first on completing the preferred ones. The second rank shows that the factor of 'students is less prepared to present' and 'the first group of students did not know the presentation procedure'. This may due to, respondents may feel that the weight of each job may not be worth the efforts they have made, as it may not add much to the overall marks of their course work. This causes them not able to do their best in the presentation and did not convey the information efficiently. The third factor indicates that students find this SCL activity a bit stressful as they have to prepare early for class. This might be due to too many commitments and tasks given at one time. The students may have engaged in different curriculum events during the final year at university, thereby influencing them to procrastinate because they have too much work to do.

Table 6. Mean scores and rank of the survey

Factors	Mean score	RII	Rank
1. Students face time constraints due to too many other tasks.	4.08	0.817	1
2. Students find this SCL activity a bit stressful as they have to prepare early for class.	3.10	0.621	3
3. Students are less prepared to present.	3.23	0.646	2
4. Students find it difficult to gather group members for a discussion session.	3.08	0.617	4
5. The first group of students did not know the presentation procedure.	3.23	0.646	2

4.5. Suggestions for student improvement towards the activity

The analysis in this section encompasses the suggestions for student improvement towards the activity SCL session. Table 7 indicates the suggestions of factors for student improvement towards the activities of the SCL session. The lecturer needs to reward individual students or the best group on top of the ranking. This is relevant as it will motivate students to actively participate and commit to the learning process. However, students are also expecting the lecturer to provide previous examples to ensure the student is well guided to complete the task given. This is similar to findings by Benlahcene *et al.* [39] proof the crucial role of teachers in SCL to motivate the students to involve interactions and engagement in their learning process. The extra marks also need to be given as this will motivate the students to be more prepared. The time length is important to ensure the students can complete the task within the provided time. Although the SCL is performed in a group discussion, individual marks are also necessary as this will represent individual students' effort. The lecturer needs to address some stringent rules and requirements to prevent individual students from overlooked at their tasks.

Table 7. Mean scores and rank of the survey

Factors	Mean scores	RII	Rank
1. The duration of the assignment should be longer for the assignment to be completed.	3.83	0.767	4
2. More stringent requirements are needed to prevent individuals from overlooked at their tasks.	3.33	0.667	6
3. Assessments and scores need to be given to motivate students to be well prepared.	3.94	0.788	3
4. Ratings and scores need to be given on an individual basis to match the student's efforts.	3.71	0.742	5
5. Lecturer needs to provide previous examples for the student to be well guided.	4.17	0.833	2
6. Lecturers need to reward individual students or the best group.	4.25	0.85	1

5. CONCLUSION

Student-centered learning is not a mechanism, it is more of a mentality, a framework for looking at education. Student-centered simply means that not only do students become more involved in learning practices, such as speaking, measuring, exploring, writing, and producing videos and web-based content, but also in thinking and shaping their learning style. By making them accountable for learning and reducing their dependency on other students, teachers, and administrators, the SCL approach focuses on the needs of students. SCL identifies learning and teaching methods of thought that emphasize the responsibility of students in activities such as organizing learning, communicating with teachers and other students, investigating, and reviewing learning. SCL encourages students to be independent. Research showed that by

doing stuff and getting input as soon as possible, students learn even more. If classes are vibrant and fun, participation in the learning process increases and dramatic changes can be dealt with in terms of knowledge quality. Besides, adjusting the difficulty of the task to the skill and ability of the students' results in more positive learning. The three main factors affecting the participation and engagement of students in the classroom were the selection of the team member, the activities that expose them clearly in the form of examination questions, besides can also increase the students' self-confidence and argumentative skills. However, the findings indicated that students face time constraints due to too many other tasks and they expect reward bonus marks as motivation for them to participate actively in the SCL session. This study has an important contribution to help academicians to improve and enhance their teaching method to achieve the objective of the SCL method in the future.

For future studies, it is recommended to distribute the questionnaire to other courses and also faculty in order to gain findings from various discipline areas as this will reflect the significance of the SCL method among students. The data obtained in this way might further confirm the rank established and the involvement of students towards SCL method. Some other factors that may affect engineering students' attitudes towards SCL activities at the tertiary level could be revealed as well.




REFERENCES

- [1] M. M. Aung, "How to Teach Myanmar Language more effectively as a Foreign Language," in *International Conference on Language Policy, Multicultural and Multilingual Settings at Mandalay University*, 2020, no. April, pp. 2–12, doi: 10.13140/RG.2.2.18518.80960.
- [2] C. Vale, A. Davies, M. Weaven, and N. Hooley, "Student Centred Approaches: Teachers' Learning and Practice," *Mathematics Education Research Group of Australasia*, pp. 571–578, 2010.
- [3] R. G. Gabdrakhmanova, G. I. Kalimullina, and V. G. Ignatovich, "Professional pedagogical education quality management," *Mathematics Education*, vol. 11, no. 1, pp. 103–112, 2016, doi: 10.12973/iser.2016.21010a.
- [4] A. R. Shaidullina, A. R. Masalimova, V. K. Vlasova, T. B. Lisitzina, A. A. Korzhanova, and O. M. Tzekhanovich, "Education, science and manufacture integration models features in continuous professional education system," *Life Science Journal*, vol. 11, no. 8, pp. 478–485, 2014.
- [5] I. Emaliana, "Teacher-centered or Student-centered Learning Approach to Promote Learning?" *Jurnal Sosial Humaniora*, vol. 10, pp. 59–70, 2017.
- [6] H. Şenay Şen, "The attitudes of university students towards learning," *Procedia - Social and Behavioral Sciences*, vol. 83, pp. 947–953, 2013, doi: 10.1016/j.sbspro.2013.06.177.
- [7] R. Taraban, E. E. Anderson, A. DeFinis, A. G. Brown, A. Weigold, and M. P. Sharma, "First steps in understanding engineering students growth of conceptual and procedural knowledge in an interactive learning context," *Journal of Engineering Education*, vol. 96, no. 1, pp. 57–68, 2007, doi: 10.1002/j.2168-9830.2007.tb00915.x.
- [8] B. Balakrishnan and F. Tarlochan, "Engineering students' attitude towards engineering ethics education," *IEEE Global Engineering Education Conference, EDUCON*, vol. 2015, no. June, pp. 16–22, 2015, doi: 10.1109/EDUCON.2015.7095944.
- [9] O. Bulvinska and L. Chervona, "Transformation of the Roles of Ukrainian Universities Teachers in Student-Centred Learning and Teaching," *Continuing Professional Education: Theory and Practice*, vol. 60, no. 3, pp. 38–44, 2019, doi: 10.28925/1609-8595.2019.3.3844.
- [10] K. M. Wong, "'A design framework for enhancing engagement in student-centered learning: own it, learn it, and share it' by Lee and Hannafin (2016): an international perspective," *Educational Technology Research and Development*, vol. 69, no. 1, pp. 93–96, 2021, doi: 10.1007/s11423-020-09842-w.
- [11] E. F. Zeer and A. V. Streltsov, "Technological platform for realization of students' individual educational trajectories in a vocational school," *Mathematics Education*, vol. 11, no. 7, pp. 2639–2650, 2016.
- [12] Y. Steinert and L. S. Snell, "Interactive lecturing: Strategies for increasing participation in large group presentations," *Medical Teacher*, vol. 21, no. 1, pp. 37–42, 1999, doi: 10.1080/01421599980011.
- [13] K. N. Huggett and W. B. Jeffries, *An introduction to medical teaching*. Springer, 2014.
- [14] T. Warinda, "Accounting Students' Evaluation of Internship Experiences From a Skills Perspective," *International Journal of Asian Social Science*, vol. 3, no. 3, pp. 783–799, 2013.
- [15] R. Yatsenko, "Personal Learning Systems As a Means of Student-Centered Learning," *Педагогічні Науки: Теорія, Історія, Інноваційні Технології*, vol. 9, no. 83, pp. 359–368, 2018, doi: 10.24139/2312-5993/2018.09/359-368.
- [16] B. Marx, A. Mohammadali-Haji, and P. A. Lansdell, "University accounting programmes and the development of Industry 4.0 soft skills," *Journal of Economic and Financial Sciences*, vol. 13, no. 1, pp. 1–17, 2020, doi: 10.4102/jef.v13i1.470.
- [17] S. M. Tsegay, "Students' Experience in Student-Centered Learning at Higher Education Institutions in China: A Case Study," *International Journal for Educational Studies*, vol. 7, no. 2, pp. 135–146, 2015.
- [18] M. Mariana, "Comparison of Teacher Center Learning and Student Center Learning Approach to Better Understanding in Mining Regulation Study," *Jurnal Ilmiah PPSDM GEOMINERBA*, vol. 5, no. 1, pp. 1–8, 2020, doi: 10.13140/RG.2.2.29424.48643.
- [19] B. Cimatti, "Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises," *International Journal for Quality Research*, vol. 10, no. 1, pp. 97–130, 2016, doi: 10.18421/IJQR10.01-05.
- [20] A. McCabe and U. O'Connor, "Student-centred learning: The role and responsibility of the lecturer," *Teaching in Higher Education*, vol. 19, no. 4, pp. 350–359, 2014, doi: 10.1080/13562517.2013.860111.
- [21] M. Jakir and A. Faruki, "Student-Centered Learning and Current Practice in Bangladeshi College Education," *Journal of Education and Practice*, vol. 10, no. 13, pp. 95–107, 2019, doi: 10.7176/jep/10-13-11.
- [22] R. M. Felder and R. Brent, "Navigating the Bumpy Road to SCI," *College Teaching*, vol. 44, pp. 43–47, 1996.
- [23] E. Sundaram and G. Subbiah, "Perception of Internship Training Program To Promote Entrepreneurship on Engineering Graduates," *CLIO An Annual Interdisciplinary Journal of History*, vol. 6, no. 7, pp. 37–52, 2020.




- [24] G. O'Neill and T. McMahon, "Student-centred learning: What does it mean for students and lecturers?" *Emerging Issues in the Practice of University Learning and Teaching*, 2005.
- [25] R. R. Sagitova and B. I. Fahrutdinov, "The model of formation of self-directed language learning of university students in a unified higher education area," *Humanities and Social Sciences Reviews*, vol. 7, no. 6, pp. 85–88, 2019, doi: 10.18510/hssr.2019.7618.
- [26] A. E. Tyabae, S. F. Sedelnikova, and A. V. Voytovich, "Student-Centered Learning: The Experience of Teaching International Students in Russian Universities," *Procedia - Social and Behavioral Sciences*, vol. 215, no. June, pp. 84–89, 2015, doi: 10.1016/j.sbspro.2015.11.578.
- [27] J. M. Tulung, M. W. K. Waney, and Y. Sumakul, "Learning Interest on Student Centered Learning Approach in Disruptive Era," *Advances in Social Science, Education and Humanities Research*, vol. 438, pp. 6–9, 2019, doi: 10.2991/assehr.k.200513.002.
- [28] J. K. Mahasneh and W. Thabet, "Rethinking construction curriculum: A descriptive cause analysis for soft skills Gap among construction graduates," *51st ASC Annual International Conference Proceedings*, 2015.
- [29] A. T. St. Louis, P. Thompson, T. N. Sulak, M. L. Harvill, and M. E. Moore, "Infusing 21st Century Skill Development into the Undergraduate Curriculum: The Formation of the iBEARS Network," *Journal of Microbiology & Biology Education*, vol. 22, no. 2, 2021, doi: 10.1128/jmbe.00180-21.
- [30] H. M. Judi and N. Sahari, "Student Centered Learning in Statistics: Analysis of Systematic Review," *Procedia - Social and Behavioral Sciences*, vol. 103, no. 1996, pp. 844–851, 2013, doi: 10.1016/j.sbspro.2013.10.406.
- [31] A. V. Fakhrutdinova, R. R. Khayrutdinov, and E. V. Gutman, "Social-Pedagogical Support Technology for University Students: Individual Safety Context," *International E-Journal of Advances in Education*, vol. 3, no. 8, pp. 284–288, 2017, doi: 10.18768/ijaedu.336255.
- [32] C. R. Rollakanti, V. R. Naidu, R. K. Manchiryal, and K. K. Polaju, "Technology-Assisted Student-Centered Learning for Civil Engineering Students," *Sustainable Development and Social Responsibility*, vol. 1, no. January, pp. 179–185, 2020, doi: 10.1007/978-3-030-32922-8.
- [33] A. Dinesh, "Promoting Student-Centered Learning in Experiential Education," *TechnoLearn An International Journal of Educational Technology*, vol. 9, no. 2, pp. 83–86, 2019, doi: 10.30954/2231-4105.02.2019.4.
- [34] P. B. C. Miranda, R. F. Mello, and A. C. A. Nascimento, "A multi-objective optimization approach for the group formation problem," *Expert Systems with Applications*, vol. 162, no. March, pp. 1–12, 2020, doi: 10.1016/j.eswa.2020.113828.
- [35] D. Lambić, B. Lazović, A. Djenčić, and M. Marić, "A novel metaheuristic approach for collaborative learning group formation," *Journal of Computer Assisted Learning*, vol. 34, no. 6, pp. 907–916, 2018, doi: 10.1111/jcal.12299.
- [36] A. Wichmann, T. Hecking, M. Elson, N. Christmann, T. Herrmann, and H. U. Hoppe, "Group formation for small-group learning: Are heterogeneous groups more productive?" *Proceedings of the 12th International Symposium on Open Collaboration, OpenSym 2016*, 2016, pp. 1–4, doi: 10.1145/2957792.2965662.
- [37] K. P. S. Kumar and D. Joaquin, "Perception of Students on Student-Centered Learning Activities as Implemented in Class Sessions," *International Journal of Computing Algorithm*, vol. 6, no. 1, pp. 45–47, 2017, doi: 10.20894/ijcoa.101.006.001.011.
- [38] G. M. Jacobs and W. A. Renandya, *Student Centered Cooperative Learning: An Introduction*. Springer Singapore, 2019.
- [39] A. Benlahcene, S. A. Lashari, T. A. Lashari, M. W. Shehzad, and W. Deli, "Exploring the perception of students using student-centered learning approach in a Malaysian public university," *International Journal of Higher Education*, vol. 9, no. 1, pp. 204–217, 2020, doi: 10.5430/ijhe.v9n1p204.

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