Assessing the Impact of ChatGPT on Learner Classroom Engagement: *Welcomed Guest or Unwanted Pest?*

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Abstract

This research article delves into the multifaceted nature of learner engagement within classroom settings, categorizing it into five key dimensions: *Behavioral, Emotional, Cognitive, Social,* and *Agentic* Engagement. Behavioral Engagement encompasses the observable actions learners take to remain on-task, while Emotional Engagement pertains to the enjoyment and positive feelings associated with learning activities. Cognitive Engagement is characterized by the mental effort exerted in understanding and critically analyzing class material. Social Engagement refers to the interactive and collaborative efforts among learners, and Agentic Engagement highlights the proactive steps learners take to enrich their learning experience. This is followed by an examination of the potential impacts of integrating ChatGPT, an AI tool, on these dimensions of engagement. Through a review of recent studies, it discusses how ChatGPT can enhance or hinder engagement by providing real-time feedback, fostering curiosity, facilitating discussions, and encouraging self-directed learning. However, it also addresses the challenges posed by AI,

such as potential over-reliance, diminished depth in cognitive engagement, and reduced quality of human interactions. Finally, to aid educators in assessing the effectiveness of ChatGPT in their classrooms, a comprehensive 25-question checklist is proposed, targeting each dimension of engagement. This approach aims to provide a balanced perspective, enabling instructors to make informed decisions about incorporating AI technologies to support and enhance learner engagement.

1. Understanding Learner Classroom Engagement

Within the discussion of this article, learner engagement within classwork will be broken down into five different dimensions. The first of these is *Behavioral Engagement* (Fredericks, Blumenfeld & Paris, 2004) which related to the observable actions learners take within class to stay on-task and complete work. This may be in the form of taking speaking turns within discussions or writing out ideas that arise. These are things that can be seen and represent concrete actions as signs of engagement. Such participation within classwork is clearly important for learning to take place and learning outcomes to be improved.

However, more non-visible data is required to understand how learners are reacting below the surface about the actions that they are being asked to take. *Emotional Engagement* (Fredericks et al., 2004) refers to the positive feelings and overall enjoyment that learners have towards their work. This can be seen within self-reported survey and/or interview responses from learners. Asking them about their emotional experience within classwork can help us better understand their motivation, anxiety levels and

willingness to communicate which are connected to their learning process and outcomes. For instance, learners who report enjoying undertaking a group project are more engaged in the work than those who report not enjoying it.

To take an examination of engagement in classwork further, we also need to consider how much learners are applying themselves mentally to complete work given to them. *Cognitive Engagement* (Fredericks et al., 2004) is defined as the mental effort learners invest to think deeply and critically about their work and outcomes. Observing and asking learners directly about what they are thinking at certain points of a class are the common way to collect such data, as well as asking them to write down their thinking processes at certain times throughout class. Learners who work hard to come up with several counter-arguments during a debate for example are said to be more cognitively engaged than those who do not.

These first three dimensions above have often been used in combination to assess the overall engagement of learners in their classwork (Stroud, 2015). In addition to these, we need to consider how learners are engaging with others around them during class. *Social Engagement* (Philp & Duchesne, 2016) refers to the ways in which learners communicate and collaborate with classmates to complete work and achieve their common goals. Although this dimension may not be considered as important as the first three for some courses (perhaps lectures that only require quiet note-taking and no group work for example), it does contribute to a higher resultant level of classroom engagement. Social engagement can be witnessed by an instructor in such forms as direct communication between learners and the instructor, questions and answers between group

members and brainstorming sessions within groups.

One further way to assess classroom engagement is by looking at the proactive efforts made by learners to enhance their own learning. *Agentic Engagement* (Reeve, 2012: Reeve & Tseng, 2011) describes how learners autonomously seek to personalize and enrich their own learning experience and outcomes through their own actions. Put simply, this is when learners take control of their own learning without the need for encouragement or direction from their instructor. These actions can be observed in the form of things such as asking for help from the instructor and undertaking work not given to them in class to help achieve outcomes. when learners take these additional steps by themselves, they increase their mental efforts and thinking about their work, which is a clear sign of higher classroom engagement.

Careful consideration, combination and measurement of the above-mentioned five dimensions can paint a clearer picture of the overall effort learners make to undertake classwork and achieve their learning goals. (Stroud, 2014). This approach will now be discussed as a way of assessing both the positive and negative impacts that ChatGPT may have on classroom engagement and resultant learning.

2. The Impact of ChatGPT on Classroom Engagement

Nurturing engagement is crucial for the learning process, and modern technology has become a significant focus in this regard (Carroll et al., 2021; Stroud, 2019, 2020, 2022; Ullah & Anwar, 2020). The recent explosive introduction of Artificial Intelligence into classrooms has

intensified this focus. With the rapid development of new AI applications and software, the impact of such technology on learning remains unclear. Instructors and institutions are left with many questions about the positive and negative effects of tools like ChatGPT on classroom learning (see a recent overview by Mai, Da & Hanh, 2024). This article discusses recent research on the potential effects on learner engagement to help instructors assess whether using ChatGPT truly benefits their teaching context.

The following five sections will assess the potential impact of ChatGPT on the five dimensions of learner classroom engagement outlined above by addressing recent research associated with them. Although these five dimensions are separated below, there is of course some overlap in the discussion about them due to their intertwined nature within learner engagement.

2.1. Impact on Behavioral Engagement (On-Task Participation)

Several recent research projects have found ChatGPT to have a positive impact on classroom behavioral engagement. Many of them report that using ChatGPT to initiate and support activities, such as classroom discussions, can result in more participation from learners because of its ability to quickly generate feedback in real-time (De la Vall & Araya, 2023). By responding to questions from learners, without the need to wait for the assistance of the instructor, ChatGPT can help speed up the learning process and help reduce frustration or boredom that some learners may feel (Acosta-Enriquez et al., 2024; Qu & Wu, 2024), resulting in more questions being asked by learners (Guo & Lee, 2023). Because the responses to prompts and questions are tailored specifically towards the needs and interests of the learners, ChatGPT can help engage those who would

otherwise remain passive and chose not to participate in class (Chan & Hu, 2023; Liu, 2024). Also, learners feel more comfortable to keep participating in classes where ChatGPT acts as a respondent to their questions, as they are less pressured about making errors or being judged by others (Muñoz et al., 2023). By helping all learners participate more in work in this way, we can create much more momentum and focus within the learning. This can often result in what is called 'flow' (Csikszentmihalyi, 1997), where learners participate so continuously and with such high focus on their classwork that they are completely undistracted from reaching their goals and even lose all sense of time.

However, one potential drawback for ChatGPT with regards to behavioral engagement is the impact on shared group participation (Rezaei, 2023). While AI can enhance collaborative efforts, it might also lead to unequal participation within groups. If some group members significantly increase their participation within activities (with more speaking, decision making, etc) than some other members, then ChatGPT may prevent some 'quieter' group members from participating due to domination issues (Stroud, 2014, 2017). It is essential that the instructor carefully monitors and consider the individual participation of learners in class if ChatGPT is being used to facilitate contributions made by all group members within the work.

2.2. Impact on Emotional Engagement (Interest and Enjoyment)

Beyond the effects on visible learner participation in classwork, we need to consider findings related to the emotional impact that ChatGPT may have. As discussed above for behavioral engagement, ChatGPT can generate very fast responses for learners. This has been found to be very effective at increasing and sustaining learner interest and enjoyment in classes who

would otherwise become detached from the class content (Rong et al., 2024). Furthermore, the use of ChatGPT to ask learners follow-up questions can help them enjoy classes more by deepening their understanding and maintaining their interest in the work undertaken (Tang et al., 2024).

The personalized nature of responses discussed above can also be connected to improvements in emotional engagement among learners. Learners have reported feeling more confidence and comfort in their learning (Cislowska & Acuna, 2024) with a more non-judgmental personalized approach with questions and answers and feel more intrinsically motivated by the personalization of content (Moybeka et al., 2023). If learners can adapt their learning focus more towards specific topics of interest, rather than be limited to what is on a set syllabus, they are more likely to enjoy the class and engage more with it (Umar, 2024). The resultant increase in learner curiosity is a key driving force for higher emotional engagement while using ChatGPT. Learners are expected to engage more with classwork when given easier and quicker access to a wide range of information and multiple perspectives on topics which grab their interest (Abbas, Jam & Khan, 2024; Hmoud et al., 2024).

Despite these emotionally engaging factors reported for ChatGPT, there have also been some potentially disengaging elements found within research. While AI can provide quick feedback, it may not always be as nuanced or context-sensitive as feedback from human instructors (Escalante, Pack & Barrett, 2023). This can lead to misunderstandings and perhaps disinterest in the work. This impersonal nature of AI feedback can sometimes leave learners feeling disconnected from their learning process,

as they miss out on the encouragement and empathy that human instructors provide.

In addition, the rapid shift between topics and viewpoints facilitated by AI can overwhelm learners and disrupt the continuity of learning (Kartal, 2023). Such overloading of learners with quick and varied information from ChatGPT can cause fatigue and what is known as ‘technostress' (Kohnke, Zou & Moorhouse, 2024). Instructors need to consider these possible negative effects of AI on their classes across time before they cause stress and harm to learners.

2.3. Impact on Cognitive Engagement (Investment in Deeper Thinking)

In addition to considering the effects of ChatGPT on visible actions and emotions of learners, we now need to consider the positive and negative impacts on deeper thinking that take place during class. One positive impact reported for ChatGPT is its ability to challenge learners to think more critically. The availability of information at a very fast pace allows learners to reflect on things more and undergo deeper analysis of the topics they are focused upon (Darwin et al., 2024; De la Vall & Araya, 2023). As discussed above, the speed with which ChatGPT can response to questions and prompts can have a clear benefit for learning in terms of cognitive engagement also.

Moreover, the ability of ChatGPT to generate many different perspectives and viewpoints on topics (also mentioned above as a benefit) can help push learners to consider discussions and debates from many different cultural backgrounds and perspectives (Karataş et al., 2024). This can help them not only think more deeply about those topics, but develop their own well-

supported arguments.

Despite these potential benefits, using ChatGPT may have a negative impact on cognitive engagement. Information provided by ChatGPT can often lack depth and make it difficult for learners to get more complex or nuanced information that an instructor might be able to provide (Chan & Tsi, 2023). Learners can often get quite generic-type responses when trying to fully understand something with their own questions, leaving them feeling unfulfilled and discouraged. Without such depth and clarity in responses (which a human instructor may understand better and deliver), learners may be less likely to cognitively engage in the classwork. They may form habits of skimming over work rather than taking adequate time to think critically about it because of the vast amount of undetailed data provided to them (Mohamed, 2024). In addition, ChatGPT might not always capture the broader context or the interconnectedness of real-world problems. Learners might struggle to relate AI-generated scenarios to their personal experiences and prior knowledge, affecting their ability to engage deeply with the material.

Furthermore, in the longer-term, the availability of ChatGPT-generated materials might limit learners' ability to independently identify and evaluate sources (Bai, Liu & Su, 2023; Zhai, Wibowo & Li, 2024). This could lead to a more permanent passive consumption of information rather than active, critical thinking that can be considered higher cognitive engagement in class. Over-reliance on AI can lead to a superficial approach to learning, where learners prioritize speed over understanding. Learners might not develop the resilience needed to tackle challenging problems, as they become accustomed to checking everything with the help of AI tools such

as ChatGPT.

2.4. Impact on Social Engagement (Interactions and Collaboration)

With regards to how ChatGPT may be able to encourage classroom social interactions more, some research suggests that learners are more willing to communicate with each other when using the technology. It is believed to help learners work together, share ideas, and learn from each other because if its engaging properties (Zou, Reinders, Thomas & Barr, 2023). During speaking activities, learners can be more likely to engage in peer interactions and collaborative learning activities when assisted by AI (Zou, Guan, Shao & Chen, 2023). This increased social engagement in classes can be expected to help learners over time by helping them generate more ideas and think more deeply about their learning.

In addition to this increase in interactions between classmates, ChatGPT has also been reported to be helpful for facilitating discussions in class (Wang, Tao & Chen, 2024) leading to a more cohesive and collaborative learning environment. When instructors are unable to mediate multiple group discussions within classes with many learners, the support of ChatGPT to do this may be of great benefit to ensure that learners are becoming socially engaged. There may also even be positive long-term implications of such support. With the assistance of ChatGPT in class, learners can improve at presenting counterarguments and alternative viewpoints to develop more robust and well-rounded arguments within discussions and debates (Darmawansah et al., 2024). Again, with continual support from ChatGPT, learners may become more confident and effective within their social interactions which can help them benefit beyond the learning in the classroom.

On the other hand, the use of ChatGPT may have negative effects on social engagement in class. While ChatGPT may boost overall classroom engagement, it will alter and perhaps reduce the amount of direct interaction between learners and instructors (Baskara, 2023; Seo et al., 2021). If learners become too focused on screens to seek their answers, they may ignore those around them in the classroom. This is a real potential danger of the use of AI in class that needs careful consideration by instructors. This diminished human interaction can hinder the development of interpersonal communication skills crucial for holistic education.

There are also concerns about the quality of social interactions that ChatGPT may lead to compared to those normally observed between people in classrooms. While AI can help facilitate peer interaction, it might not be able to capture the nuances and emotional subtleties of face-to-face communication (Escalante et al., 2023). This limitation can affect the quality of peer relationships and the development of social skills.

2.5. Impact on Agentic Engagement (Proactive Enrichment of Learning)

The final dimension of engagement to consider for ChatGPT is agentic engagement. Learners need to consider not only the behavior, emotions, critical thinking and social interactions of learners, but also their efforts to become autonomous and proactive in their learning journey. One positive effect of ChatGPT found for agentic engagement was the increase in self-directed learning undertaken by learners (Qiao & Zhao, 2023). Recent studies have concluded that learners are more likely to take steps to explore topics and become more autonomous and proactive in seeking answers by themselves when they were supported by AI (Li et al., 2024).

As discussed previously in the emotional engagement section, ChatGPT can spark curiosity among learners and create a deeper interest in classwork. This curiosity also leads to extra efforts being made by learners (asking the instructor, classmates or ChatGPT more questions for example), without the need for a ‘push’ from the instructor to complete their tasks and reach their learning goals.

Despite these benefits for agentic engagement, as mentioned in the social engagement section above, overreliance on the technology can become an issue for proactiveness (Buçinca, Malaya & Gajos, 2021). There is a real danger of the overuse of ChatGPT leading to passivity in the learning process with learners waiting for answers rather than seeking them out for themselves. Whether this will happen, or the opposite discussed above, is something the instructor should keep a close eye. The instructor must assess if ChatGPT is serving its purpose or not as a catalyst for agentic engagement within the learning.

3. Recommended Instructor Assessment of ChatGPT

If we look at the discussion above, there is clearly an overwhelming amount for instructors to consider when choosing to implement, adjust or even remove ChatGPT from classroom learning. The research seems to even contradict itself at points. For instance, ChatGPT can help learners participate more, but may make them participate less for other reasons.

Because of these contradictions and uncertainty for instructors, a 25-question checklist was created to summarize the important questions that need asking about the impact of ChatGPT. The use of the following

checklist will help instructors make better judgements about the use of ChatGPT, or other such Artificial Intelligence tools, for engaging their learners in class. Parts A, D and E can be completed by simply observing the actions of learners during class. However, parts B and C require the instructor's judgement about the learners' emotions and thinking processes during class (which may be more challenging to assess and perhaps not completely accurate). By circling 'MORE', 'LESS' or 'NC/NS' (No Change/Not Sure) for each question, and generating the 'TOTAL SCORE' for each underneath, instructors can create a better perspective of the overall impact of ChatGPT on classroom engagement for their learners. For example, if the 'TOTAL SCORE' of 'MORE' circles in significantly larger than 'LESS' or 'NC/NS' circles, then ChatGPT can be considered beneficial for engaging learners in that specific context. On the other hand, if it is significantly less in number, then a closer analysis of each of the five sections in the checklist should be undertaken to reflect more on why this may be happening. The instructor should then either find ways to produce a higher number of 'MORE' circles in the checklist, or even consider abandoning the use of ChatGPT in the learning process. It is with this closer analysis of the impact of ChatGPT on learner classroom engagement that instructors can ensure it is a *welcomed guest* rather than an *unwanted pest* in the learning process.

ChatGPT Engagement Checklist for Instructors:

Circle your answers
(NC/NS = No Change/Not Sure)

A. Behavioral Engagement:

Because of ChatGPT, are your learners...

1. doing more/less work overall in class?	MORE	LESS	NC/NS
2. speaking more/less in class?	MORE	LESS	NC/NS
3. taking more/less chances to participate in work?	MORE	LESS	NC/NS
4. participating more/less equally in pair or group work?	MORE	LESS	NC/NS
TOTAL:			

B. Emotional Engagement:

Because of ChatGPT, do you think that your learners are...

5. more/less interested in classwork?	MORE	LESS	NC/NS
6. more/less comfortable undertaking classwork?	MORE	LESS	NC/NS
7. enjoying undertaking classwork more/less?	MORE	LESS	NC/NS
8. showing more/less curiosity about classwork?	MORE	LESS	NC/NS
9. looking more/less energetic towards the end of class?	MORE	LESS	NC/NS
TOTAL:			

C. Cognitive Engagement:

Because of ChatGPT, do you think that your learners are...

10. challenging themselves more/less with classwork?	MORE	LESS	NC/NS
11. thinking more/less deeply about the classwork?	MORE	LESS	NC/NS
12. considering more/less perspectives on topics?	MORE	LESS	NC/NS
13. taking more/less care to read and understand material?	MORE	LESS	NC/NS
14. prioritizing understanding more/less than speed in classwork?	MORE	LESS	NC/NS
15. receiving more/less detailed responses than normal?	MORE	LESS	NC/NS
16. receiving more/less understandable responses than normal?	MORE	LESS	NC/NS
17. receiving more/less useful responses than normal?	MORE	LESS	NC/NS
TOTAL:			

D. Social Engagement:

Because of ChatGPT, are your learners...

18. interacting with each other more/less during classwork?	MORE	LESS	NC/NS
19. sharing more/less ideas with each other?	MORE	LESS	NC/NS
20. working more/less as teams to finish group work?	MORE	LESS	NC/NS
21. having more/less free-flowing discussions?	MORE	LESS	NC/NS
22. expressing more/less viewpoints during discussions?	MORE	LESS	NC/NS
TOTAL:			

E. Agentic Engagement:

Because of ChatGPT, are your learners...

23. asking you more/less questions during class?	MORE	LESS	NC/NS
24. seeking more/less answers to their questions during class?	MORE	LESS	NC/NS
25. being more/less proactive in their learning during class?	MORE	LESS	NC/NS
TOTAL:			

	MORE	LESS	NC/NS
TOTAL SCORE:			

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