

# Group Awareness Information to Support Academic Help-Seeking

Christian SCHLUSCHE<sup>a\*</sup>, Lenka SCHNAUBERT<sup>a</sup> & Daniel BODEMER<sup>a</sup>

<sup>a</sup>*Media-based Knowledge Construction,  
University of Duisburg-Essen, Germany*

\*christian.schlusche@uni-due.de

**Abstract:** Students are expected to deal with complex learning material, that regularly challenges their learning processes especially in the first semester. When students ask peers for explanations, they apply a functional learning strategy, known as academic help-seeking. But finding peers to discuss questions on learning materials is difficult for those that are new to university. Finding adequate peers for help-seeking requires awareness about their knowledge and competencies in and beyond the learners' own study group; i.e. group awareness. This paper investigates how group awareness information supports academic help-seeking among first-semester students on a Moodle-based learning platform that has been adapted with a newly developed extension to collect, transform and visualize group awareness information about peers. In a field study accompanying an introductory statistics lecture ( $N = 107$ ), we examined (1) motivational, attitudinal and social characteristics of helpees that asked for help on the platform, (2) the effect of provided group awareness information on the selection of helpers, and (3) the cognitive characteristics of selected helpers and their difference from the helpees. The participating students were invited to seek help from their peers within Moodle and had access to a sortable list of all course members in order to find an appropriate helper. The control group ( $n = 55$ ) only saw the full names of the peers while the treatment group ( $n = 52$ ) was additionally provided with self-assessed group awareness information (competence and availability of a helper). Unfortunately, participants rarely used the platform and only 22 help-seeking episodes were recorded. Results indicate that helpees did not differ regarding motivational, intentional or social factors from the rest of the course. The overall occurrences of sorting the list was higher for the condition provided with group awareness information, but both groups did not differ with respect to the competence of selected helpers. The results provide useful, practical insights bringing online help-seeking into an educational context.

**Keywords:** academic help-seeking, learning strategies, group awareness, interactive learning environments, Moodle, undergraduate students

## 1. Introduction

During the first year at university, students are in a transition from more guided learning at school to more self-regulated learning at university. This transition confronts them with cognitive and social challenges (Credé & Niehorster, 2012). Students are expected to adapt to a plenty of new and complex learning material, which they were not yet confronted with prior to university. Moreover, undergraduate students find themselves within large social groups with mostly unknown peers. When they experience knowledge-related problems they may consult sources of help to acquire missing information, which is called academic help seeking (Nelson-Le Gall, 1981). When seeking help to construct valid understanding, students can choose from various (*im-*)*personal* sources, differing in the adaptivity of their provided help (Makara & Karabenick, 2013; Minna Puustinen & Rouet, 2009). *Impersonal* sources, such as books or the world wide web enable learners to re-read information, but still require them to transfer information from the representation to their problematic task at hand. When this transfer fails the student does not reach a sufficient understanding of the topic. In contrast, *personal* sources of help are individuals that can provide missing information and adaptive assistance for an academic problem; these are usually lecturers, tutors or peer students. When asked for help, personal sources are capable to take the knowledge of their dialogue partner into account and can thus provide explanations that are tailored to the student who asks for help (Webb, 1989). Research has shown that

peers are the preferred source of help among students (Knapp & Karabenick, 1988). This person-centered process of asking for help comes along with the problem of choosing adequate peers as helpers: Before asking a peer, a freshman needs to know which potential helper has mastered the learning material sufficiently to provide help and is additionally willing to do so. Students usually attend lectures in large groups, but regularly work in smaller study groups. As students lack interaction with peers beyond their study groups (Gibney, Moore, Murphy, & O'Sullivan, 2011), they might need more information about peers outside their study group to consider them as sources for help. Information, such as individual competence for a topic, may enable learners to seek help beyond their study group. The provision of information about internal states (e.g. cognitive or motivational) of group members are examined within Group Awareness (GA) research (Bodemer, Janssen, & Schnaubert, 2018; Janssen & Bodemer, 2013). It has been found that such information can guide learners' attention within interactive learning environments (Dehler, Bodemer, Buder, & Hesse, 2011). Such information about peers may be useful to identify adequate personal sources of help that would not have been considered otherwise. Since personal help-seeking is a promising strategy to deal with knowledge-related problems, but requires sufficient GA within the course, the provision of GA information might help identifying potential helpers beyond the learner's study group and may thus improve the resolution of knowledge-related conflicts.

## 2. Academic Help-Seeking

Learning domains at university are more challenging than in school and thus, students struggle more regularly to establish understanding. Moreover, students are expected to take responsibility for their own learning processes. Students regularly experience difficulties during working with learning materials (e.g., when preparing an assignment), which may cause the learners to realize that their understanding of a concept is insufficient, and help is needed. By seeking help, the learner gets into the role of a *helpee*, who seeks information from a *helper* (or *source of help*). The literature describes help-seeking as a functional learning strategy that is related to study success (Karabenick & Knapp, 1991; Richardson, Abraham, & Bond, 2012). The helpee can mainly pursue two different aims, either seeking *executive* or *instrumental* help (Nelson-Le Gall, 1981). If helpees expect helpers to solve tasks in their stead, the helpee seeks *executive* help; which is neither contributing to understanding nor fostering independence from others. Helpees seeking *instrumental* help are asking for necessary information that enables them to develop a solution on their own. Optimally, this approach improves the helpee's understanding and is a sign of independent behavior (Nelson-Le Gall, 1981).

### 2.1 Help-Seeking Process

Help-seeking can be understood as a process, consisting of 8 phases (Makara & Karabenick, 2013; Nelson-Le Gall, 1981). At the beginning the learner has to (1) determine that a problem exists, then (2) determine that help is needed and (3) decide to seek help. Next the helpee (4) clarifies the goals of the request, whether seeking executive or instrumental help. The helpee continues to (5) decide whom to ask by choosing an appropriate helper, that may provide the expected type of help. The helpee continues by (6) soliciting help through formulating a question and subsequent communication between the helpee and the chosen helper. In a positive case this may result in (7) obtaining the requested help which leads to a solution for the problem. Nelson Le-Gall appends the subsequent phase (8) evaluation of help-seeking attempts, that may affect future decisions for seeking help considering effort and use of the implemented strategy (Nelson-Le Gall, 1981).

When a student deals with a knowledge-related problem and decides to seek help from a personal source, the next decision he or she has to make is *whom to ask for help* (phase 5). This decision depends on which personal sources can be accessed and if those are likely to provide helpful support. Knapp and colleagues (1988) have differentiated *formal* and *informal* types of personal sources, depending on their obligation to provide help in an educational context (Knapp & Karabenick, 1988). Formal sources usually belong to an academic institution (e.g., lecturers or tutors) and are expected to support learners because of their occupation. Whereas, informal sources (e.g., peers or friends) are not

occupied at an institution and are thus independent in their decision to provide support. *Peer students* usually share a similar understanding, as they were provided with same materials and tasks.

Support from peers in academic help-seeking occurs in various situations during the semester and is difficult to evoke in laboratories. Assessing actual help-seeking behavior is more effortful than asking for attitudes towards help-seeking and inferring to behavior. According to Karabenick & Knapp (1991) help-seeking *intentions* seem to be a good predictor of actual behavior; these are also called attitudes towards help-seeking (Huet, Dupeyrat, & Escribe, 2013; Karabenick & Knapp, 1991). Those are usually assessed through self-report with items formulated to measure the general intention to seek help within a particular class context (Pajares, Cheong, & Oberman, 2004; Sánchez Rosas & Pérez, 2015). However, Huet and colleagues (2013) discuss a gap between assessed intentions and actual help-seeking behavior: According to Huet and colleagues the assessment of the intentions is too general, hence the predictive quality for actual behavior is rather low. Actual help-seeking behavior can be assessed by observation with recorded video material, though transcription of this materials is time-consuming (Nelson-Le Gall & Glor-Scheib, 1986). Another promising approach to assess help-seeking behavior is tracking learners' inputs within interactive learning environments that mediate between helpees and helpers, which provides data that can be processed with little effort.

## 2.2 Source Selection

When a helpee chooses a helper among peers, relevant qualities as criteria of a good source of help need to be identified. Which qualities of helpers among peers make them likely to provide helpful answers? Makara and colleagues (2013) developed the expectancy-value *model of source selection and utilization (MSSU)* to address this question. Expectancy-value models predict an outcome variable that is expected to be the multiplicative conjunction of an expectancy- and a value-component towards reaching a goal (Eccles & Wigfield, 2002). Makara and colleagues' model predicts the likelihood of soliciting help from a particular source by considering the expectancy that a helper will provide help (e.g., are they available) and the values the helpee ascribes towards the helper (e.g. are they competent to help) (see Fig. 1). High availability of a helper, for instance, leads the helpee to the expectation that a problem can be solved in the near future and waiting time can be reduced to a minimum. When a source is known to be competent and can thus be asked to provide high quality help, the helpee can trust her/his explanations. As both components are multiplied, one component can constrain the whole outcome: whenever one component is low, the predicted likelihood of soliciting help from this source is reduced as well (e.g. if a highly competent source is unavailable). In conclusion, the higher both components are, the higher is the likelihood of soliciting help from this particular source. From this perspective a good potential helper is characterized as highly available and providing high quality answers (i.a., being competent). This source selection model emphasizes the importance of reliable information about potential helpers to identify a good source of help. During their first year, students may lack this information from peers outside their study group. Thus, they either need to invest time to gain information about unknown others on their own, over several help-seeking episodes or they may avoid seeking help from others at all. Finding an appropriate helper is essential for successful help-seeking, thus the provision of supporting information about helpers can improve the help-seeking behavior of undergraduate students.

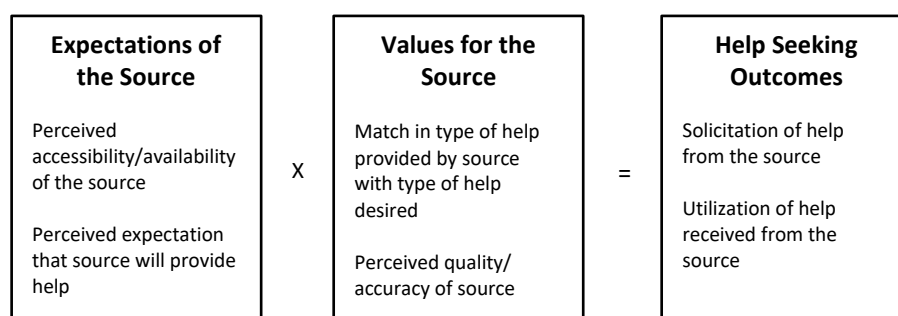


Figure 1. Expectancy-value model of source selection (based on Makara & Karabenick, 2013).

### 2.3 Group Awareness Tools Supporting Help-Seeking

Asking others for help is an inherently social activity which requires non-trivial communicative behavior: the helpee usually describes a problem and the helper will subsequently try to understand and provide explanations. The coordination of such learning activities, in which at least two learners interact, requires mutual understanding. During communication, each member within a group builds a more or less valid internal representation of socio-cognitive states (e.g., knowledge) or socio-motivational states (e.g., invested time) of other members, referred to as *group awareness* (GA) (e.g., Bodemer et al., 2018; Janssen & Bodemer, 2013). The degree to which GA is developed increases with interaction frequency among the group and varies for individual group members. Research in the field of Computer-Supported Collaborative Learning indicates that GA can be improved by the provision of information about group members within digital learning environments, via so called *GA tools* that collect, transform and visualize learner data (Bodemer et al., 2018). Learners can benefit from GA tools as these tools have been found to support, amongst others, communication and selection processes within collaborative learning settings (e.g., Dehler et al., 2011; Schnaubert & Bodemer, 2019). Ogata & Yano (2004) have used awareness information in form of concept maps to successfully recommend helpers with highest interested in similar topics (Ogata & Yano, 2004). Research suggests to support helpees trying to select an appropriate helper within the process of academic help-seeking, by providing GA information about the potential helpers. Based on help-seeking literature it seems promising to present information as GA information that are in accordance with the MSSU (see Sec. 2.2). We adapted *availability for questions* from the expectancy-component and *competence to give explanations* from the values-component as GA information. Consequently, the question arises of how students consider this information for their selection of a helper?

### 2.4 Research Questions

The current research addresses the potential of providing group awareness information to guide *whom to ask for help*, supporting students making better decisions on potential helpers on an interactive learning environment. The following research questions shall be examined:

Such an optionally accessible interactive environment demands the investment of free time, which may involve certain attitudes towards learning and motivation to discuss problems. Can students that make use of such an environment be differentiated from those who do not? This brings up the question of who makes use of such an environment and actively seeks help, thus we ask *RQ 1: What are characteristics of helpees asking for help at an ILE?*

Based on the MSSU (see 2.2) the provision of information regarding competence and availability should be useful to identify an adequate source of help, but are these criteria really used by students, when they look for a helper within a larger group of potential helpers? Thus, we want to know *RQ 2: What information do students use when they select a helper out of a larger group?*

Helper with higher levels of both components are predicted by the MSSU (see 2.2) to be selected most frequently. Considering social factors (e.g., zone of proximal development [Vygotsky, 1986]) helpees may also prefer helpers with similar values on competence. What about social factors such as friendship or expertise that may attract helpees towards popular helpers (Nurminen, Heino, & Ihantola, 2017)? Thus, we want to know *RQ 3: How do cognitive characteristics of helper and helpee relate to each other?*

## 3. Methods and Design

To answer our RQs, we enriched an online course by a group awareness tool which enabled students to seek help from other participants via one-on-one private messages. In this field study the between-subject factor *group awareness information* was systematically varied, information was either available (GA+) or not available (GA-). Within a participant list the control condition was only provided with full names of the participants, whereas the treatment condition was additionally provided with visualizations about self-assessed competence and availability. The online learning platform

accompanied an introductory statistics lecture for four weeks, in the first third of the semester. Unfortunately, students did rarely use the platform.

Participants were attended an introductory statistics lecture (winter term 2017) at the *University of Duisburg-Essen*. 107 participants initially signed up on the online platform and were alternately assigned to either the control condition (GA-;  $n = 55$ ) or treatment condition (GA+;  $n = 52$ ). After four weeks, 96 subjects finished the study (94 were freshman students, 70 females), aged 18 – 49 years ( $M = 20.98$  years,  $SD = 4.97$ ). 76 were enrolled in the *Applied Cognition and Media Science* study program, 18 were enrolled in Psychology; 2 participants did not disclose their study program. Participants received credit for participation and had the chance to win a voucher worth 50 €.

### 3.1 Learning Environment and Procedure

The online platform was realized with Moodle™ Learning Management System (LMS). The interaction of participants was centered around a sortable participant list with all course members. A new Moodle extension was developed to supplement the list with self-reported GA information (GA+ condition). The plugin collects self-reported data from the participants and visualizes the information next to their respective names. Information about helpers' *competence* and *availability* were handled within the plugin and fed back to the helpees (see Sec. 2.2). Designed with the goal to support the decision of *whom to ask for help*, students could sort the list by picking one of the provided information and subsequently choose a helper, by clicking the message icon and writing a private message (see Fig. 2). As the platform was a digital mediator between helpers and helpees, each sorting, each selection and each message was logged. The list emitted a sort-event with the criterion 'lastname' by default, each time it was initially accessed (default setting).

Participants went through the following procedure: After enrolling to the course (assignment to experimental condition), participants were asked to read the instructions on how to use the platform; followed by an introductory survey assessing motivational constructs (see Sec. 3.3). Subsequently, participants were asked to provide group awareness information by filling two self-reports about their competence for the past weeks' lectures and current week's lecture (see Sec. 3.2). These self-reports were assessed each week on the day of the lecture. Moreover, participants shared their availability for requests.

Firstname / Lastname	Competence (agg. past)	Competence	Availability
Zaphod Beeblebrox 			
Fanny Dent 			
Joe Dent 			
Ford Prefect 			

Figure 2. Sortable list of potential helpers with additional information (competence and availability)

### 3.2 Assessing and Visualizing Group Awareness Information

We provided participants within the GA+ condition with two types of awareness information: competence and availability. GA information regarding competence was assessed once a week after the lecture took place via a short, mandatory self-report questionnaire. Participants were asked whether their knowledge of the contents of the past lectures was sufficient to explain them to a fellow student on a 6-point equidistant response scale (*completely true – not true at all*). Two ratings were collected each week: one assessing all past weeks' topics and one asking about the current week's topic. Both competence-ratings were transformed onto a 3-point scale and were visualized as stars (1 to 3) in the participant list for GA+ (see Fig. 2), if no data was provided no stars were visualized (*left "blank"*).

Additionally, the GA tool provided participants in GA+ with information about the availability of a helper. Data representing availability was collected on a binary scale (*available – not available*). Participants were free to change their availability status at any time during the study, but – apart from the initial instruction – were not explicitly prompted to do so. Information on availability were

visualized within the participant list as a traffic-light-like filled circle, showing green for “available” and red for “not available”.

### 3.3 Measures

The following measures were used to characterize helpees (see RQ 1): motivational (mastery-goal orientation), intentional (help-seeking intentions) and social (social connectedness). Motivational factors esp. mastery-goal orientation were assessed with the subscales mastery-approach and performance-avoidance of the SELLMO on a 5-point Likert scale (*strongly agree – strongly disagree*). *Help-seeking intentions* were measured in four different types, namely instrumental, executive, avoidance of help-seeking and perceived benefits of help seeking, with three items each on a 7-point Likert scale (*completely disagree to completely agree*) (Pajares et al., 2004). Friendship among course participants was measured by a rating of how good participants know their fellows, on a 4-point scale (ranging from *unknown* to *friends*). *Social connectedness* was operationalized as the number of participants that were given one of the ratings at the upper half of the scale (*known associate* or *friend*) at the beginning of the data acquisition.

Sorting-events and self-reported data were examined to investigate the considered information for selecting a helper (see RQ 2). The tracked *sorting-events* in Moodle indicate which information was considered when choosing a helper. These events usually precede the selection of a helper at the start of a new help-seeking episode. In order to gain an overview of the list presenting all course participants, each represented information could be used as a criterion to sort the entries accordingly. Each sorting-event of the participants’ list was logged including, when it was triggered, which user has sorted and which criterion and order (ascending / descending) was used. It is obviously possible to select a helper independently from the sorting criterion, but the sorting-criterion may be a relevant indicator of how students prioritize available information about helpers.

The characteristics of chosen helpers (targets) (RQ 3) are stored immediately after selection. Various information about the target’s provided group awareness information are stored. The *competence-value* (0-5) represents the mean of the self-assessed competence items. These means get transformed into three *competence-level*, which are visualized by 3 stars to 1 star (higher is better). Furthermore, target’s position in the list and information about the distribution of competence-classes among the course members, at the time the event is triggered, gets stored. Another interesting aspect is the difference between the helpee’s competence level relative to the helper’s, revealing helpees’ preferences for characteristics of helpers.

## 4. Results

### 4.1 Characterization of Helpees

In the following, those participants that made use of the platform are characterized (see RQ 1). The subgroup of those participants, in the role of helpees ( $n = 14$ ), shall be described with regard to motivational, attitudinal and social factors, independent of their experimental condition (see Table 1). Results of this subgroup are presented side-by-side with those that did not seek help, which formed the majority. Both groups have relatively high values for mastery-goal-orientation, instrumental help-seeking and perceived benefits of help-seeking. Regarding the constructs, performance-goal-orientation, executive help-seeking intentions, and help-seeking avoidance, both groups have in common that their values are at the lower end of the scale. Regarding social connectedness both groups do not differ. No differences can be found, that particularly characterize helpees who used the platform.

### 4.2 Used Sorting Criteria

The usage frequencies of each sorting-criterion is depicted in Table 2 (see RQ 2). The table contains data for each week along the columns; each row contains frequencies for a criterion, per condition. In each of the four course weeks (*columns*), the overall usage of the sorting feature is lower in GA- than in

GA+ (*bottom of columns*). When comparing usage over time, between both groups, it gets obvious that they differ at week 2 and 3. Accumulated data over the whole period reveals that GA+ sorted nearly twice as frequent as the control condition (*last column*). The frequencies for the lastname-criterion are highest each week, as it was triggered by default whenever a course participant navigated to the participants' list. For this reason, merely the cautious conclusion can be made that GA+ accessed this page more often; but not necessarily preferred sorting by lastname-attributes. Amongst the additional information only GA+ could leverage, it gets obvious that competence-information was used more often than (albeit still rarely) availability-status, which was not used (at all). Both types of competence-information combined (past weeks and current week) were used in about 22% of the weekly summed sortings of the treatment condition (week 1/2/3/4: 12%, 22%, 22%, 26%).

Table 1

*Characteristics of Helpees' Side to Side with Participants who Did Not Use the Platform*

	Goal-Orientation † <i>M (SD)</i>		Help-Seeking Intentions †† <i>M (SD)</i>				Connect- edness <i>M (SD)</i>
	Mastery	Performance	Instrumental	Executive	Avoidance	Benefit	# Friends
Helpees*	4.13 (0.51)	2.06 (0.73)	5.77 (1.02)	1.57 (0.59)	2.67 (0.89)	4.57 (1.01)	10.5 (6.92)
Other**	4.15 (0.40)	2.37 (0.70)	5.24 (1.05)	1.83 (0.80)	2.88 (1.17)	4.27 (1.12)	8.19 (5.08)

\* Helpees: asking for help: GA-: 6 / GA+: 8

\*\* Other: not asking for help: GA-: 41 / GA+: 41

† [1-5] †† [1-7]

Table 2

*Frequencies of the Usage of Sorting-Criterions per Experimental Condition*

Criterion	Week 1 GA -/+	Week 2 GA -/+	Week 3 GA -/+	Week 4 GA -/+	Accumulated GA -/+
Firstname	3 / 2	12 / 5	5 / 2	0 / 3	20 / 12
Lastname	32 / 34	30 / 56	24 / 48	2 / 11	88 / 149
Availability	-- / 0	-- / 0	-- / 1	-- / 0	-- / 1
Past weeks' competence	-- / 3	-- / 8	-- / 6	-- / 2	-- / 19
Current week's competence	-- / 2	-- / 9	-- / 14	-- / 3	-- / 28
Summed frequencies	35 / 41	42 / 78	29 / 90	2 / 19	108 / 209

### 4.3 Sortings that Lead to a Selection

The aim of sorting the participants' list was to support identifying an appropriate helper. Over the four weeks of the study there were 22 selections made by 14 different helpees who selected 18 different helpers. These selections were preceded in 68% of the incidents by a lastname-sorting (GA-: 6 / GA+: 9), in 23 % of incidents by a firstname-sorting (GA-: 4 / GA+: 1) and in 9% of the incidents by a competence-sorting (GA-: - / GA+: 2) (of the current week). The lastname-sorting is recorded most often but must be interpreted with caution (see Sec. 3.3). Immediate before a selection the competence-criterion was sparsely used and availability-criterion was not used at all.

#### 4.4 Who Has Been Asked for Help on the Platform?

There were only 22 selections over the four weeks of the course. The frequencies of the selected helpers competence were as follows (split by condition): 3-stars helper (GA-: 4 / GA+: 1), 2-stars helper (GA-: 2 / GA+: 3), 1-star (GA-: 2 / GA+: 0) and no-stars “blank” (GA-: 4 / GA+: 6). GA+ was expected to select more competent helpers, as they were provided with competence information. The frequencies of selected helper’s competence do not reveal a difference between both conditions: Most often helpees choose students that did not had a visualization for current’s weeks competence (“blank”). 1-star- and 2-star-helpers were selected equally often. The incidence of 3-stars selections is too rare to be interpreted. In conclusion both groups seem not to differ regarding the competence of selected helpers, hence no pattern for preferred helper’s competence could be found.

#### 4.5 Helpee and Helper: Differences Regarding Competence

Helpees are in need for information or explanations, hence it can be expected that they seek helpers who are knowledgeable. But *how* knowledgeable or competent, were the selected helpers relative to the helpees? For the few occurred help-seeking episodes the proportion of the competency-levels of both agents are depicted in Table 3. The recorded data reveals that helpees selected more competent helpers in about 27% of the cases (*in green*), equally competent helpers in 14% of the selections (*in blue*) and similarly selections of less competent helpers made in 14% of the cases (*in orange*), regarding current week’s competence. There were 11 selections of helpers (about 48%) that did not have a visualization for current’s weeks competence (“blank”). Possibly the visualization for “past weeks” might have also been considered before selecting. Overall there are no differences between both conditions regarding the pattern of competence-levels between helpees and helpers.

Table 3

*Occurrence of Competence Patterns for Each Help-Seeking Episode, per Condition*

		Helper’s competence-level GA-/GA+			
		3	2	1	blank
Helpee’s competence level	1	0 / 0	2 / 1	0 / 0	2 / 1
	2	1 / 2	1 / 0	0 / 1	4 / 2
	3	0 / 2	0 / 1	0 / 1	0 / 1
	blank	0 / 0	0 / 0	0 / 0	0 / 1

*\* competence visualizations ranged from 3 to 1; blank: no data provided*

## 5. Discussion

The presented study investigates the effects of group awareness (GA) information on the selection of helpers within an interactive learning environment. Learners in GA+ condition were provided with information on competence and availability of their peers, learners in GA- condition were merely provided with their peers’ names. Unfortunately, the adapted Moodle platform was rarely used for academic help-seeking (HS) which is a major limitation of the study. This was probably caused by the lack of accessibility on mobile devices, which made the communication with helpers more time-consuming. However, the data acquired provides insights into practical challenges when implementing such support into educational settings. Qualitative feedback provides anecdotal evidence that whole groups in messenger services were considered instead of Moodle one-on-one communication for asking questions. One-on-one communication was implemented within this study, with the goal to reduce avoidance tendencies. Addressing whole groups (i.e. one-to-many) could be related to the expectation that one of a group might respond quicker than an individual (i.e., increase of availability, but not necessary competence). Further research should investigate factors (e.g., avoidance tendencies, or group size) under which communication with a group is preferred to a single helper. In group contexts, privacy concerns should be considered (esp. high perceived HS threat) (Kitsantas & Chow, 2007). It seems plausible that students used other channels, because the predictors of HS we found in our study were high in value. We also found unexpectedly high social connectedness among



freshmen (see 4.1). Data was collected early in first semester at university and students might not always be aware of metacognitive inaccuracies, hence future research might consider supporting learners identifying knowledge-related misconceptions (Kruger & Dunning, 1999).

The first research question addresses motivational, intentional and social differences in the characteristics of first-semester students who sought help on the ILE. Those students, asking for help at least once, did not differ from the rest of the course in terms of the goal-orientation, HS intentions and social connectedness (see 4.1). Overall, the sample reported rather high values on constructs that are positively related with HS behavior (e.g., mastery-orientation, instrumental HS intentions). Assessed variables do not indicate a general lack of motivation or high values of perceived threat, surprisingly, HS was still low. As social connectedness was higher than expected for the first weeks at university, participants might have already formed study groups that could provide sufficient help when needed.

The second research question investigates which sorting criterion (information) was considered most useful and was used most often for sorting helpers. The sorting mechanism should enable students in GA+ to identify adequate helpers by using the GA information competence and availability. GA+ compared to GA- produced about twice the number of overall sorting-events (especially in weeks 2 & 3) and sorted by competence in about 22 % of the cases; whereas availability was not used (see 4.2). As these events, were not dependent on selections of helpers, they may be a byproduct of exploring the information of other peers (“lurking”). Besides, GA+ viewed the sortable list more frequently. However, we cannot infer the explicit use of particular information. The immediate use of a sorting-criterion before a selection of a helper could be an indicator for its utility. The last name-criterion preceded a selection most often (68%), followed by first name (23%), with no differences between conditions. GA+ used competence-sortings only two times immediate before selection (see 4.3), that raises the question, if sorting was necessary for helpees to choose a helper. Whether the last name-criterion was used intentionally for sorting or if the recorded data stems from default visits is unclear: For the control condition it is conceivable that this criterion has been helpful and thus has been used intentionally, whereas for the treatment condition it is likely that the frequency resembles “lurking” behavior. There is no evidence that students use the additionally provided information in their HS process, thus the utility value of additional information remains unclear. Future research should consider that a single-criterion sorting functionality is of limited use to measure the utility of multiple information categories, as it does not account for mental references the learner establishes during the use of such information. Availability, for example, has never been used for sorting, but still could have been evaluated, right after sorting. Future studies could use stepwise filtering mechanisms, which let users identify helpers based on multiple decisions each based on a single criterion.

Investigating the third research question provides insight in who has been asked for help and thereby provides indicators which characteristics of a helper are preferred by learners. It was expected that GA+ would consider additional competence information and select highly competent helpers. However, data does not confirm this hypothesis (see 4.4): participants most frequently asked helpers with unknown “blank” competence-levels, independent from condition. 2-stars and 1-star helpers were selected equally often by both conditions. 3-star-selections were so rare that those cannot be interpreted. Both conditions do not differ regarding the patterns of helpees’ and selected helpers’ competence, hence further criteria might be involved in a selection, e.g. friendship or prior acquired knowledge about peers (Nurminen et al., 2017). Future research shall assess reasons why a helper has been chosen, to identify additional factors influencing the decision. Moreover, we also shed a light on the difference regarding cognitive information between both agents that interacted within an episode. Helpers with the same competence as the helpee were selected least often (see 4.5). A high amount of selections were related to helpers who did not provide information for the current week (“blank”) at time of selection. Other sources of information might have been considered, e.g. about past weeks’ competence or previous interactions. The data does not provide any tendency on whether helpees prefer a rather high or low difference between their own and the helper’s competence (Vygotsky, 1978). When examining these decisions, competence levels and motivational factors predicting help-seeking avoidance should be considered (see Ryan & Pintrich, 1997). Future studies are advised to use a more differentiated scale of competence-visualizations (> 3-levels) for the detection of possible differences.

The presented study was a first step into the support of online academic HS and describes a newly developed extension for Moodle. Results have uncovered new, mostly practical issues regarding the implementation of GA information for HS in such environments. In future possible effects of GA on academic HS should be examined assessing data over the whole first semester (esp. closer to exams).

Moreover, research needs to be done on how students actually use social media and messenger apps on mobile devices to seek help in academia and to identify additional ways to support online HS.

## References

- Bodemer, D., Janssen, J., & Schnaubert, L. (2018). Group awareness tools for computer-supported collaborative learning. In F. Fischer, C. E. Hmelo-Silver, S. R. Goldman, & P. Reimann (Eds.), *International Handbook of the Learning Sciences* (pp. 351–358). New York, NY: Routledge/Taylor & Francis.
- Credé, M., & Niehorster, S. (2012). Adjustment to College as Measured by the Student Adaptation to College Questionnaire: A Quantitative Review of its Structure and Relationships with Correlates and Consequences. *Educational Psychology Review*, 24(1), 133–165.
- Dehler, J., Bodemer, D., Buder, J., & Hesse, F. W. (2011). Guiding knowledge communication in CSCL via group knowledge awareness. *Computers in Human Behavior*, 27(3), 1068–1078.
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53(1), 109–132.
- Gibney, A., Moore, N., Murphy, F., & O’Sullivan, S. (2011). The first semester of university life; ‘will I be able to manage it at all?’ *Higher Education*, 62(3), 351–366. <https://doi.org/10.1007/s10734-010-9392-9>
- Huet, N., Dupeyrat, C., & Escribe, C. (2013). Help seeking intentions and actual help-seeking behavior in interactive learning environments. In M. Puustinen, S. A. Karabenick, & M. Puustinen (Eds.), *Advances in Help-Seeking Research and Applications: The Role of Emerging Technologies* (pp. 37–72). Charlotte, NC: Information Age Publishing.
- Janssen, J., & Bodemer, D. (2013). Coordinated computer-supported collaborative learning: Awareness and awareness tools. *Educational Psychologist*, 48(1), 40–55.
- Karabenick, S. A., & Knapp, J. R. (1991). Relationship of Academic Help Seeking to the Use of Learning Strategies and Other Instrumental Achievement Behavior in College Students. *Journal of Educational Psychology*, 83(2), 221–230.
- Kitsantas, A., & Chow, A. (2007). College students’ perceived threat and preference for seeking help in traditional, distributed, and distance learning environments. *Computers & Education*, 48(3), 383–395.
- Knapp, J. R., & Karabenick, S. A. (1988). Incidence of formal and informal academic help-seeking in higher education. *Journal of College Student Development*, 29(3), 223–227.
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one’s own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology*, 77(6), 1121–1134.
- Makara, K. A., & Karabenick, S. A. (2013). Characterizing sources of academic help in the age of expanding educational technology: A new conceptual framework. *Advances in Help Seeking Research and Applications: The Role of Information and Communication Technologies*, 37–72.
- Nelson-Le Gall, S. (1981). Help-seeking: An understudied problem-solving skill in children. *Developmental Review*, 1(3), 224–246.
- Nelson-Le Gall, S., & Glor-Scheib, S. (1986). Academic help-seeking and peer relations in school. *Contemporary Educational Psychology*, 11(2), 187–193.
- Nurminen, M., Heino, P., & Ihantola, P. (2017). Friends and gurus: Do students ask for help from those they know or those who would know. *Proceedings of the 17th Koli Calling International Conference on Computing Education Research*, 80–87.
- Ogata, H., & Yano, Y. (2004). Knowledge awareness map for computer-supported ubiquitous language-learning. *The 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education*, 19–26.
- Pajares, F., Cheong, Y. F., & Oberman, P. (2004). Psychometric analysis of computer science help-seeking scales. *Educational and Psychological Measurement*, 64(3), 496–513.
- Puustinen, Minna, & Rouet, J.-F. (2009). Learning with new technologies: Help seeking and information searching revisited. *Computers & Education*, 53(4), 1014–1019.
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students’ academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353–387.
- Ryan, A. M., & Pintrich, P. R. (1997). Should I ask for help? The role of motivation and attitudes in adolescents’ help seeking in math class. *Journal of Educational Psychology*, 89(2), 329–341.
- Sánchez Rosas, J., & Pérez, E. (2015). Measuring Threats, Benefits, Emotional Costs and Avoidance of Academic Help-Seeking in Argentinian University Students. *Pensamiento Psicológico*, 13(2), 49–64.
- Schnaubert, L., & Bodemer, D. (2019). Providing different types of group awareness information to guide collaborative learning. *International Journal of Computer-Supported Collaborative Learning*.
- Vygotsky, L. (1986). *Thought and Language—Revised Edition*. The MIT Press.
- Webb, N. M. (1989). Peer interaction and learning in small groups. *International Journal of Educational Research*, 13(1), 21–39.